July 26, 1955 J. W. BEATTY 2,714,195

QUICK CONNECT-DISCONNECT ELECTRICAL CONNECTORS

Filed Sept. 19, 1951 2 Sheets-Sheet 1

FIG. 1

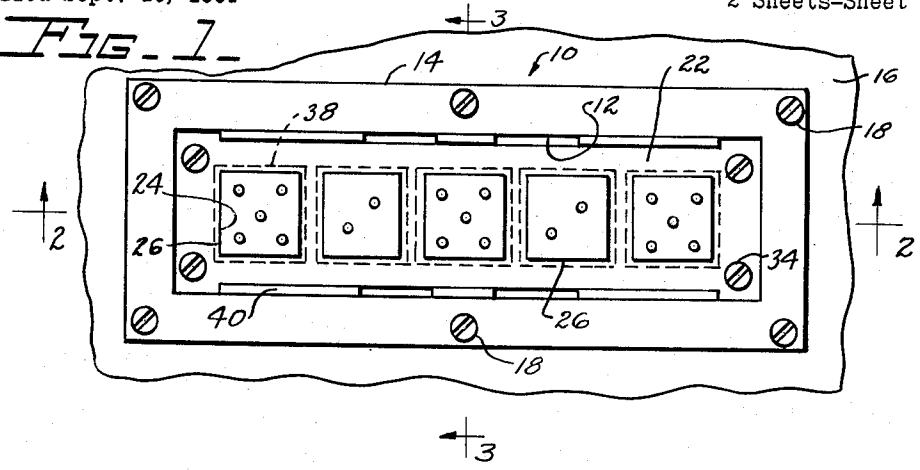


FIG. 2

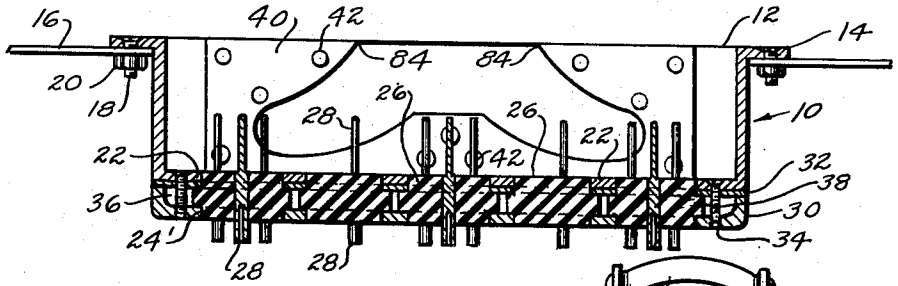


FIG. 3

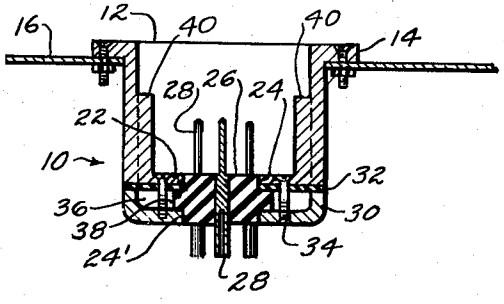
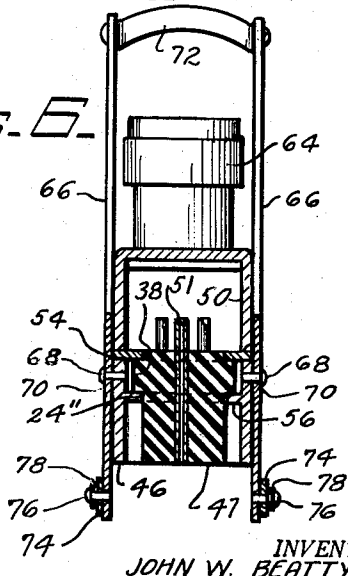


FIG. 6



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July 26, 1955 J. W. BEATTY 2,714,195

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Filed Sept. 19, 1951 2 Sheets-Sheet 2

FIG. 4

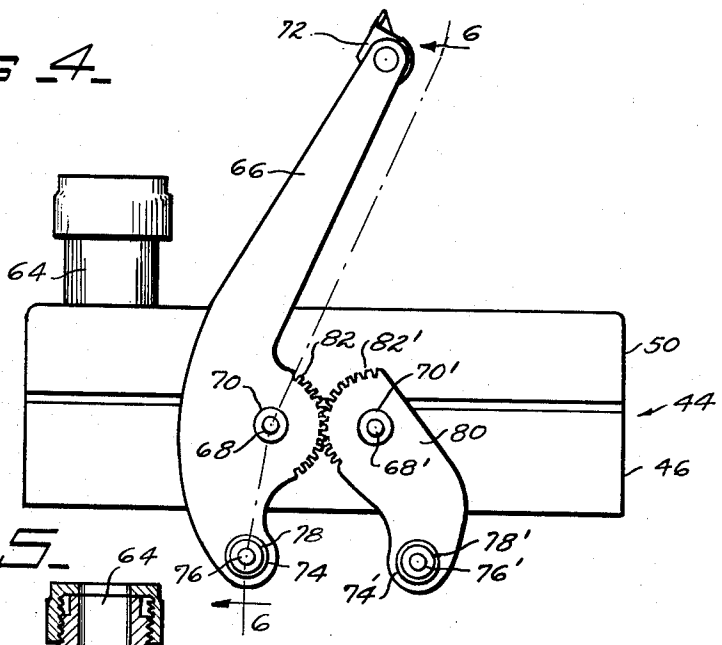


FIG. 5

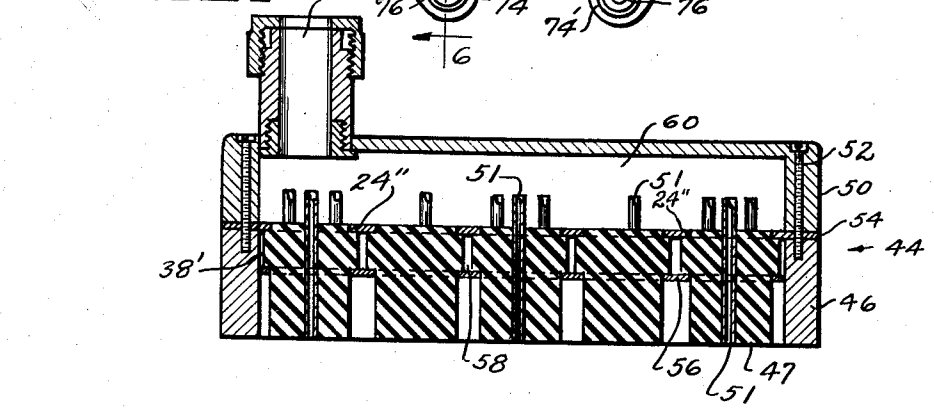
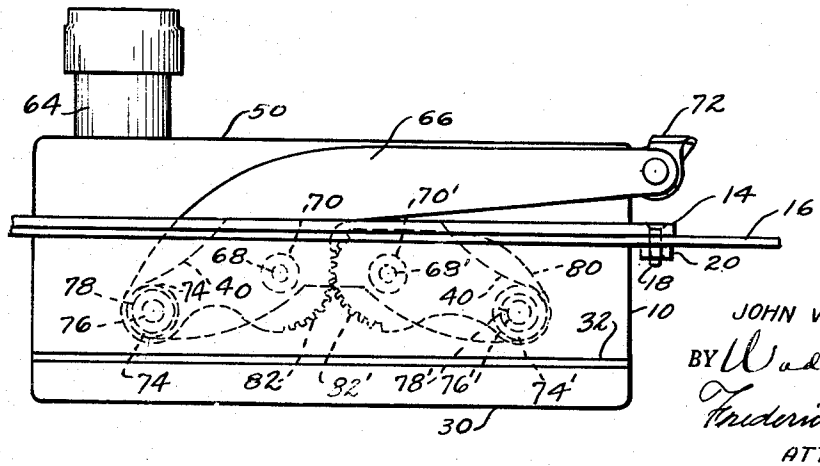


FIG. 7



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United States Patent Office 2,714,195
Patented July 26, 1955

2,714,195

QUICK CONNECT-DISCONNECT ELECTRICAL CONNECTORS

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Application September 19, 1951, Serial No. 247,351

3 Claims. (Cl. 339—45)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the United States Government for governmental purposes without payment to me of any royalty thereon.

This invention relates to quick connect-disconnect electrical connectors and has special reference to an improved version of this type of connector wherein a plurality of electrical contact pins are simultaneously entered into mating tubular sockets by coaxial movement of the sockets over the pins.

A feature of the present invention resides in the novel linkage whereby the several parts of the connector are moved into and out of their operative position. By use of this linkage a single manual movement connects or disconnects all of the pins of the device from all of the tubular sockets. Moreover, the linkage is such that the sockets or pins are moved in a straight line in moving on and off their mating members.

The configuration of the improved device is also such that it takes the least possible area on the panel or switchboard upon which it is mounted together with a plurality of devices of like structure.

Other valuable features will be manifest upon a consideration of the accompanying description and drawings wherein:

Fig. 1 is a plan view of the rectangular pin housing in the bottom of which a row of insulators are positioned and held, each insulator having a plurality of contact pins imbedded therein.

Fig. 2 is a longitudinal vertical cross section taken at 2—2 of Fig. 1 showing the pin mounting and an elevation of one of the cams.

Fig. 3 is a transverse section taken at 3—3 of Fig. 1 showing an edge view of the cams.

Fig. 4 is a side elevation of the socket housing showing part of the linkage provided for maintaining parallel entry of the pins into the sockets.

Fig. 5 is a longitudinal-vertical-central cross section through the upper or socket housing showing the socket mounting and the cable take-off tube.

Fig. 6 is a transverse section taken at 6—6 of Fig. 4 through the socket housing showing the operating handle and its mounting studs and its rollers.

Fig. 7 is a side elevation of the complete assembly in the fully closed position.

Referring to the drawings, a trough-like pin housing **10** is open on the face side **12** and has a flange **14** extending all around the open side for flush mounting the pin housing **10** on a panel or switchboard **16**. Screws **18** and nuts **20** secure the flange **14** to panel **16**. Openings for a plurality of pin housings **10** may be cut in the panel with a minimum of space between adjacent openings whereby a maximum number of pin housings may be mounted on a given size panel.

The bottom **22** of the pin housing **10** may preferably be an integral part of the housing and has a row of square openings **24** therethrough for positioning and holding a series of insulators **26**. These insulators are made with

any number of contact pins **28** imbedded therein up to nine.

Below the bottom **22** is a cover **30** which also has a series of square openings **24'** corresponding in size and spacing to the openings **24**. A gasket **32** separates the bottom **22** from the cover **30**. Screws **34** hold the bottom **22** in place.

The upper side of the cover **30** is hollowed out as at **36** and within this hollowed out portion the insulators are enlarged as at **38**, whereby they are held against vertical movement in the space **36** within the cover **30**.

The cams **40** are part of the mechanism employed for pressing the sockets of the device on and off the pins **28** and at the same time maintaining coaxial relation between, and uniform movement of pins and sockets. The cams **40** are secured to the inner wall of the pin housing by rivets **42**, but may be made an integral part of the housing if so desired.

The socket housing **44** is in two main parts, a box like socket container **46** for supporting the socket insulating members **47** and a lid **50** held to the socket container by screws **52**, a plate **54** being clamped between the socket container **46** and lid **50** by the screws, the socket insulating members **47** each supporting sockets **51** which are corresponding in number and spacing to the pins **28** in the pin housing **10**.

Intermediate the upper and lower surface of the socket container **46** is a false bottom **56** which may be an integral part of the socket container **46** or may be separately made and secured in position by any appropriate fastening means.

Like rows of square openings **24''** extend through the plate **54** and false bottom **56**, the openings **24''** corresponding in size and spacing to the openings **24**. Between the plate **54** and false bottom **56** the socket insulators are enlarged as at **38'** whereby they are held against vertical movement in the space **58** between the plate **54** and false bottom **56**. Space **60** is provided in the lid **50** for the individual wires which are joined to the sockets **51** then brought together to compose a cable which will be brought out through the cable outlet **64**.

The mechanism which compels coaxial entry of the pins **28** into the sockets **51** includes two levers **66** of the first order, fulcrumed on studs **68**, one stud on each side of the container **46**, washers **70** being placed on the studs over the levers and the studs riveted over. The two levers **66** are joined at the power end by a bridge **72** which is riveted or similarly fastened by appropriate means, whereby the two levers **66** always rock about the studs **68** in unison. At the load end of the levers **66**, rollers **74** rotate on studs **76**. Washers **78** hold the rollers on the studs, the studs being riveted over on the outer ends to hold the rollers in place.

A second pair of levers **80** are rockable on studs **68'**, the levers being held on the studs by washers **70'** and the ends of the studs being riveted over. Rollers **74'** revolve on studs **76'** and are held on by washers **78'**.

Intermeshing gear segments **82** and **82'** are formed in the edges of the levers **66** and **80** whereby, when the levers **66** are turned clockwise about the studs **68**, the levers **80** will turn anticlockwise about the studs **68'**.

The operation of the hereinbefore described device may preferably be substantially as follows:

The pin housing assembly **10**, Figs. 1, 2 and 3, may be secured in the panel **16** by screws **18** and conductors attached one end of each conductor to a pin **28** and the other end of each conductor to one of the various electrically controlled or operated instrumentalities.

The socket housing assembly **44** may next be wired by bringing in a cable through the cable outlet **64**, separating it into its individual wires and joining the ends to the several sockets **51**.

The handle end of the levers 66 may now be raised as seen in Fig. 4 until the rollers 74—74' are close enough together that they will pass downward between the points 84 of the cam 40, after which the handle end of the levers 66 may be pressed down to the position shown in Fig. 7, in which position the sockets 51 will be pressed down over the pins 28.

It is noted that, in any position of the handle ends of the levers 66, the rollers 74—74' retain their parallel relation with the housings whereby the pins and sockets remain coaxial when they engage, one with the other.

I claim:

1. A quick electrical connector device comprising a trough-like pin housing having contact pins insulatingly fixed in the bottom thereof, a mating socket housing having cooperating socket members fixed therein aligned with the respective contact pins and adapted to be connected in nesting relation with the pin housing, first cam means including recessed portions arranged on the inner surface of opposite sides of the pin housing, two pair of interengaged lever means pivotally connected to the opposite sides of the socket housing, each pair of lever means comprising two geared lever members, said two geared lever members of each pair having their pivots arranged in a single plane in spaced relation, second cam means arranged on each of said lever members and cooperatively engaging said first cam means, said second cam means being arranged so as always to be in a plane parallel to the plane of the pivots of its lever members, whereby on actuation of said lever means said second cam means engages in the recessed portions of said first cam means to draw said pins and said socket members uniformly and positively into locking engagement.

2. The structure set forth in claim 1 wherein said first cam means comprises a pair of cam plates having symmetrical surfaces fixed to opposed sides of the pin housing and having recessed portions adapted to receive said second cam means in interlocking engagement therewith, said second cam means comprising projections from said lever members.

3. An electrical connector device comprising a pin housing having contact pins insulatingly mounted therein, a socket housing associated with said pin housing and having a plurality of socket members insulatingly mounted therein, each of said socket members being cooperatively aligned with a respective contact pin, cam means including recessed portions disposed on two oppositely disposed parallel flat walls of one of said housings, lever members pivotally connected on corresponding oppositely disposed walls of the other of said housings, said lever members having intermeshing gear segments, said lever members having means operatively engaging said cam means whereby on actuation of said lever members in one direction said housings are moved in continuous parallel relation into interlocking engagement causing said pins and said socket members to be uniformly guided in aligned relation into engagement with each other.

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