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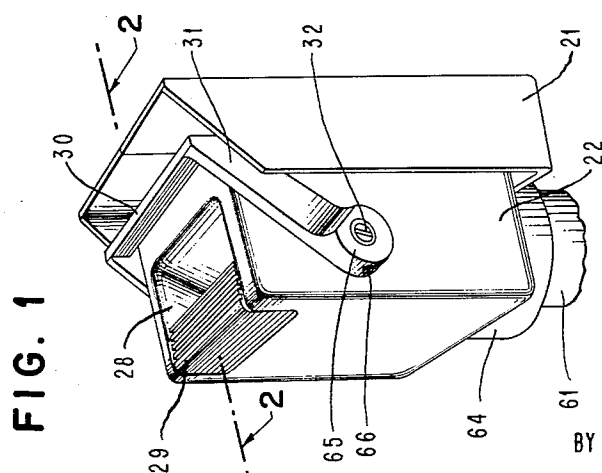
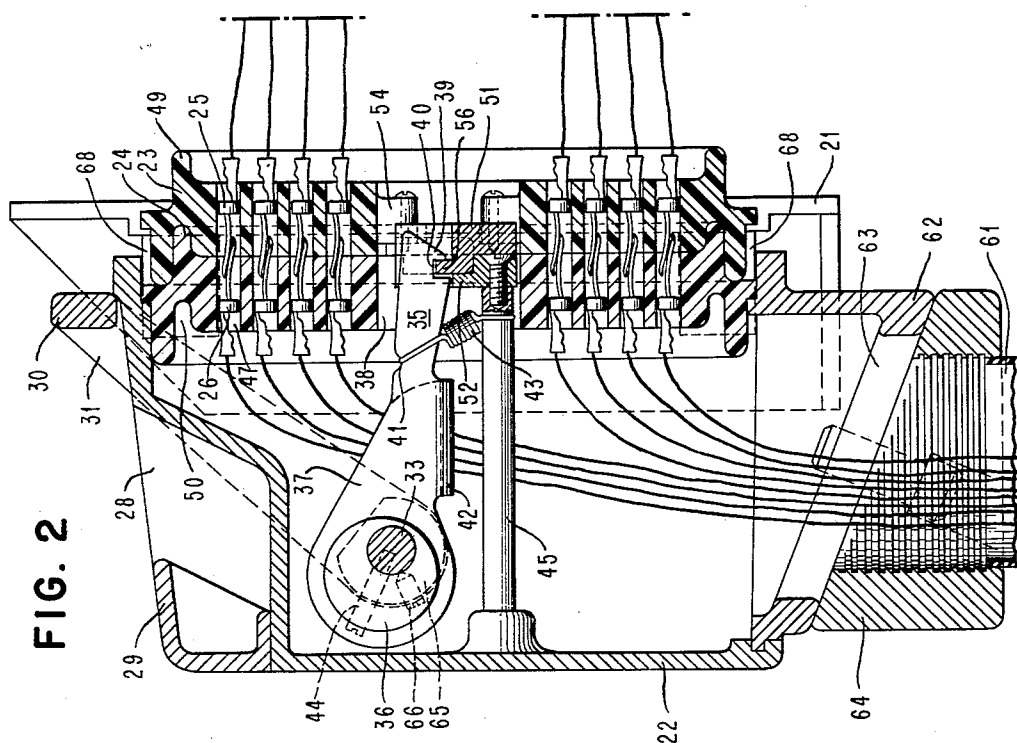
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CONTACT CONNECTOR OPERATING DEVICES

Filed March 16, 1961

2 Sheets-Sheet 1



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FIG. 3

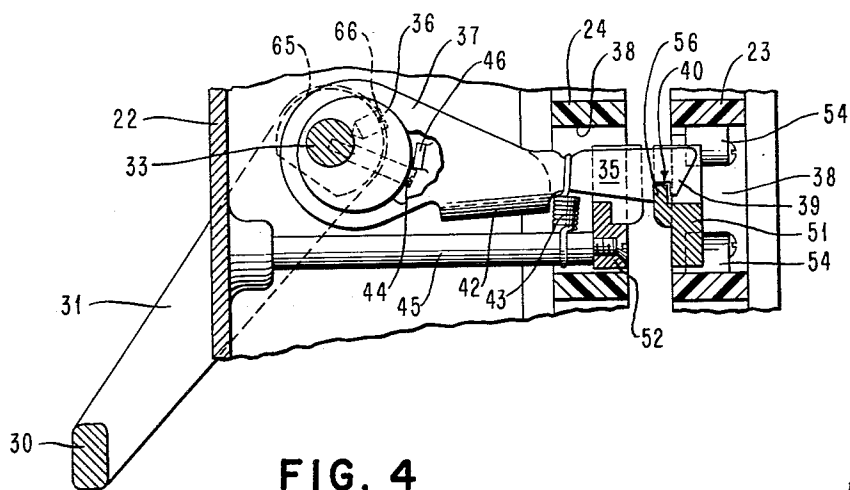


FIG. 4

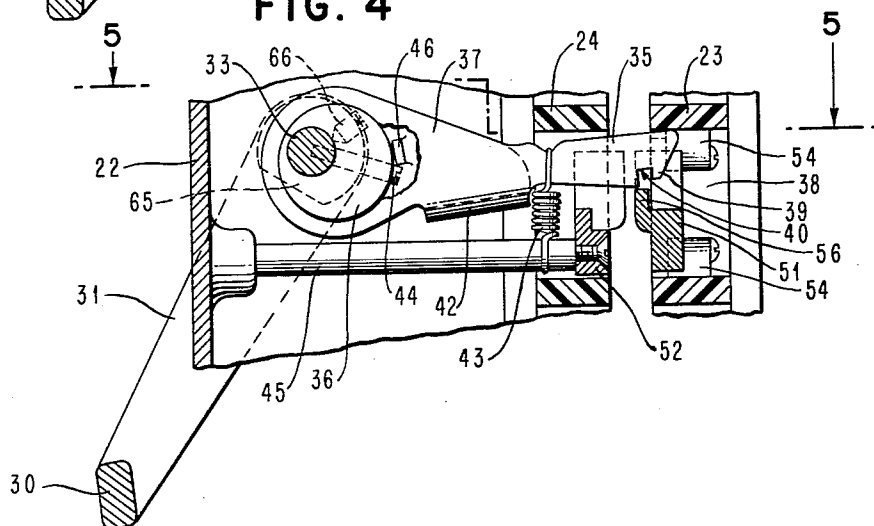
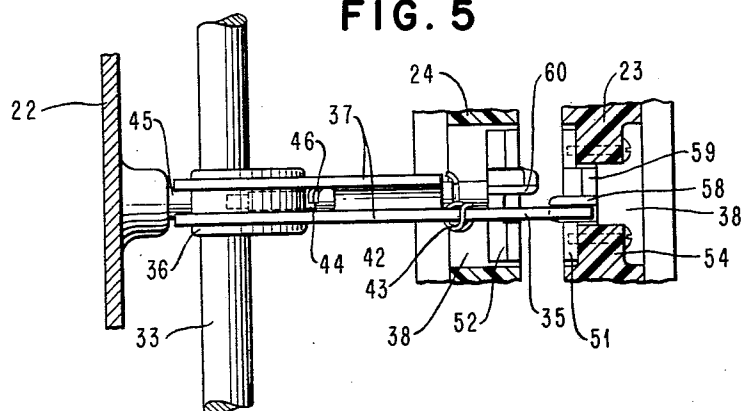


FIG. 5



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CONTACT CONNECTOR OPERATING DEVICES

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This invention relates to an improved form of multiple contact connector and is especially adapted for rapidly connecting or disconnecting a plurality of flexible wiping contacts arranged in a pair of mating connector blocks.

When a substantial number of contacts are to be forcibly joined or separated, there is quite an amount of force required, and yet extending levers or bolts are to be avoided for sake of appearance as well as to save time of operation. The present devices provide a quick, easy and sure way of operating a connector. Some of the common faults in devices for connecting multiple contact blocks are looseness and rocking of the blocks, imperfection or inoperativeness of latching because tolerances mount in one direction to either prevent latching or make it so loose as to be ineffective, and use of expensive parts which are difficult to machine and assemble. All of these faults are avoided by the latching means of invention which in its simplicity avoids inoperative tolerance buildup, while providing inexpensive parts easy to assemble and replace.

Another object of the invention is the provision of an improved hook latch connecting means for mating contact blocks. A pair of plastic blocks are formed with sets of related openings, each opening containing a thin flexible contact formed to provide mutual wiping and contact faces. Separate wires enter into the blocks and are clamped or pin fitted into the fixed portions of the pairs of flexible contacts. The blocks are fitted into strong outer shells which not only protect the plastic blocks but also furnish anchorage for strain relief clamps for the thick cables bringing the sets of wires into and out of the connection.

Both blocks are formed with central openings and attached to the center of one block is a slotted latch plate. The other block opening provides clearance for a projecting hook shaped latch lever which is designed to project thru the slot of the latch plate, engage the edge of the slot, and pull the blocks together and force all mating contacts together. The latch lever is mounted on an eccentric cam on a rod journaled in the shell casing holding the hook block. To the rod is connected an outer operating bail which swings close to the shell to rock the eccentric and provide the hook latch with the reciprocating motion to clamp and unclamp the blocks.

Another object of the invention is to provide a hook latch of folded sheet metal formation which is both inexpensive and strong. A sheet metal eccentric is fitted into a latch hub opening to furnish a compact and dependable drive connection. The eccentric is mounted on a plain rod as a shaft supported between the shell walls and said rod ends being detachably secured to the bail arms for easy assembly and repair.

Another object of the invention is the provision of a novel means for holding a reciprocating part in position axially on an eccentric cam which operates it. In the present instance a reciprocating latch clamp is formed with two hub arms embracing an eccentric cam. A pin is attached to the cam in the space between the two arms and thus holds the latch in position axially. The same pin serves another purpose in disengaging the latch when the eccentric is turned to an extreme rocked posi-

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tion. A third function is performed by the pin in keying the cam to the drive shaft.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention, as illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a perspective view of the assembled connector blocks.

FIG. 2 is a sectional elevation view of the assembled blocks taken along line 2-2 in FIG. 1.

FIG. 3 is a detailed sectional view showing the blocks separated by the hook latch due to the downward movement of the handle.

FIG. 4 is a detailed sectional view showing the hook latch swung to a disengaged position by a further downward movement of the handle. When the latch is in this position, the block at the left may be removed from the fixed block.

FIG. 5 is a plan view of the latch and blocks partly in section as seen along line 5-5 in FIG. 4.

In FIG. 1 it is seen that a fixed rectangular box or bracket 21 is closed at the right whereat it is attached to machine frame or wall. Bracket 21 holds one of a pair of contact containing blocks fastened therein. The left side of bracket 21 is open to receive the removable shroud or cover 22 containing the second half of two contact containing blocks 23 and 24 not shown in FIG. 1 but clearly represented in FIG. 2 as designed to nest together to bring respective contacts 25 and 26 of a related pair into wiping engagement.

Cover 22 (FIG. 2) is formed with a finger opening 28 and provided with an attached recessed ledge 29 under which finger tips may be inserted when carrying the cover 22 or removing or attaching it. As shown in FIG. 1, the bracket 21 and cover 22 are joined and the contact blocks 23, 24, therein are clamped together with all 200 pairs of contacts flexed together. In such a condition, an operating handle or bail 30 is in a raised or swung up position as shown in FIG. 1. Bail 30 swings down to release box 22 and up to latch it in place. Two side arms 31 of bail 30 are attached by screws 32 to a shaft or rod 33 (FIG. 2) which is journaled in the side walls of box 22, said shaft serving to operate a clamp latch 35 eccentrically as about to be explained with reference to progressive positional views, FIGS. 2, 3 and 4.

In FIG. 2 it is seen that fastened to the plain rod shaft 33 is an eccentric collar or cam 36 which is embraced by the two side arms 37 of the sheet metal clamp lamp 35. One end of latch 35 projects through an opening 38 in block 24 and is formed with a slanted cam end 39, a hook indentation 40 and a spring hook notch 41. The other side of latch 35 is short and extends only to the formed cross bar 42 joining the two arms 37 which forms the hook clamp as a simple economical clamp element formed from a single thickness of sheet metal. A small coil spring 43 is stretched between latch 35 and a stay rod 45.

A pin 44 has a threaded end which is screwed fast into rod 33 in between the two arms 37, FIG. 5, so that the pin acts as a retainer to hold the latch 35 in position axially on cam 36. In passing through cam 36 to attach it to shaft 33, pin 44 also acts as a keying means to locate the parts with reference to the eccentric operating position. Pin 44 has another function of camming latch 35 to a disengaged position as noted hereinafter. Before dealing with the latching and unlatching actions of the clamp as revealed in sequence in FIGS. 2, 3, and 5, it is believed best to explain the structure of the contact carrying blocks and the clamping arrangements thereon.

It is noted in FIG. 2 that the two plastic connector

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blocks 23 and 24 are similar in contour and also matched as to contact hole positions. Each block is formed with 200 contact receiving holes 47 arranged symmetrically around the central opening. Each hole has a shoulder therein whereby an inserted contact 25, 26 is snapped into place when inserted. These contacts 25, 26 are of the form whereby one end is clamped over the wire and insulation cover of a cable strand, and the other end is a flexible blade designed to wipe against a similar blade to establish electrical connections between machine units.

The main function of the latching and clamping mechanism disclosed is to operate the holders of two such sets of contacts so that they are brought together and forced apart with sufficient leverage to facilitate connection and disconnection of the rather stiff and heavy holder 22.

As an aid to aligned assembly of the two plastic blocks 23 and 24, each block is formed on one face with a peripheral ridge or extension 49 which conforms in shape with a peripheral indentation 50 in the other face of the block. In FIG. 2 it is obvious that the ridge 49 of one block nests into the indentation 50 of the other block and aids in aligning the two blocks during assembly of the units.

It is already noted that blocks 23, 24 are formed with central openings 38 wherein plates 51 and 52 are fastened to be used for aligning and clamping the two blocks together. Plate 51 is shown as attached to a series of extending lugs 54 which project inward on block 23. Plate 52 is fastened in a similar fashion in block 24 onto lugs (not shown).

Plate 52 is also fastened to the top of stay rod 45 which not only serves as a spring terminal but also as a central strut or stiffening support for the center of block 24 to keep it from flexing when all the contacts are pressed together or pulled apart.

A dished out or recessed shoulder in plate 52 is shaped to receive the depressed and extending latch tongue 56 formed on the other plate 51. This tongue 56 is adapted to be engaged by the hook end indentation 40 of the latch 35 and, through the hooked latch, as the eccentric shaft 33 is rotated by handle 30, casing 22 is moved to the right (FIG. 2) and the enclosed block 24 is forced firmly to the right, to the final contact engaging position shown, wherein block 24 is nested against block 23 and plate 52 is brought against plate 51. Thus the latched or clamped position shown in FIG. 2 involves the preliminary association of the casing 22 (FIG. 1) against the bracket 21 with the handle 30 down as in FIG. 3. There it is noted that the eccentric cam 36 is so situated as to extend latch 35 and permit its sloping end 39 to snap over tongue 56 and latch indentation 40 thereon. As handle 30 is lifted, cam 36 is rotated clockwise about shaft 33 and since the end of latch 35 is hooked onto plate 51 that end remains fixed as the casing 22 (through the shaft journals) is pulled to the right and block 24 is pushed along therewith until after about 180 degrees of movement of handle 30 to the position of FIG. 2 wherein the contact blocks are firmly clamped together.

The reversal of the foregoing process takes place when it is desired to disengage the contacts 25, 26 and remove casing 22 for subsequent attachment of another electrical or electronic unit. As handle 30 (FIG. 2) is grasped and moved downward, the cam 36 is rocked counterclockwise about shaft rod 33 and the hook end of latch 35 is pressed against the left side of tongue 56 and, since that end is fixed, the shaft 33 starts to push casing 22 to the left, and block 24 is carried along therewith to disengage contacts 26 from contacts 25. The downward movement of lever 30 is continued until a point is reached (FIG. 3) wherein the blocks 23 and 24 are completely separated but the hook end of latch 35 remains in engagement with tongue 56.

In order to disengage the latch 35 so that casing 22

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may be removed, handle 30 (FIG. 4) is depressed still further beyond the position of the handle in FIG. 3. In FIG. 3 it is noted that pin 44 has swung counterclockwise to such an extent that its outer end is just touching the underside of a lug 46 which is struck out of or formed on the small arm 37 of the latch 35. When the handle 30 is moved further counterclockwise (i.e. to position FIG. 4) pin 44 lifts lug 46 and rocks latch 35 upward to the extent shown with indentation 40 removed from tongue 56. Then the entire unit 22 is free of the fixed unit and may be pulled outward to the left for complete removal.

In FIG. 5 it is seen that plate 51 has a flange formation 58 to guide the end of latch 35, and an opening 59 to receive a projection 60 on plate 52. These features 58-60 aid in alignment of the parts and reliable latching and unlatching operation by confining and guiding the latching parts at the point of operation.

In FIG. 2 it is illustrated how the fixed wires extend to the right from the contacts 25 and the wires of the removable cable 61 extend down and to the left from contacts 26. At the bottom of casing 22 is fastened a slanted casting 62 with a bottom opening or cable exit 63. Attached to casting 62 is a cable guide or strain relief clamp 64 which has an angular face which is complementary to the angle of the casting 62. By rotating the clamp 64 and attaching it angularly to the bottom of casting 62, the cable 61 may be diverted at an angle to the vertical position of the cable as illustrated in FIG. 2. Clamp 64 may be split in two sections to press onto the cable and absorb all tension to leave the wires and contacts 26 free of disturbance.

In order that bail lever 30 may be easily adjusted on shaft 33 and removable therefrom for repair and replacement, the hubs 65 (FIG. 1) of arms 31 are provided with one or more set screws 66 (FIG. 3) which have Allen key shape centers for quick and sure fastening and dismantling. By merely removing screws 32, 66 and 44 it is possible to slide shaft 33 out of casing 22 and repair or replace all the parts on the shaft.

It is well to note that plates 51 and 52 (FIG. 5) are similar in all respects and interchangeable one with the other.

An aid in assembly is provided by the location and size of stay rod 45. In one position of eccentric 36 the edges of the two arms 37 span across the side of rod 45, somewhat like the showing in FIG. 5. With the tapped hole for screw pin 44 situated to agree with this position, it facilitates assembly to have latch 37 properly located by rod 45 between side arms 37 while the holes in eccentric 36 and shaft 33 are thereby put in alignment to receive pin 44.

In addition to the several guiding and aligning surfaces and shapes of the two blocks 23 and 24 and holders 21 and 22 as already noted, bracket 21 is formed with four corner arcuate extensions 68 (FIG. 2) which not only confine the corners of block 23 but also guide and confine block 24 as it is being assembled and removed.

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.

What is claimed is:

1. In a multiple contact connector, a pair of mating blocks containing contacts to be brought into contact, a plurality of flexible wiping contacts in each of said blocks, a pair of shells holding said blocks, a latch plate in one of said blocks, a hook extending through the other block to latch onto said plate and operate the blocks in and out of contact, said hook being formed on a two armed U shaped sheet metal member, a plain rod as a shaft in the shell with said hook, a cam secured to said rod with

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said U member having two aligned arm holes encircling said cam, a handle on said rod, a stay rod in the shell containing the hook member, said stay rod being braced between the block and the shell end and alongside said hook member, and a coil spring drawn between said stay rod and said hook member tending to keep said member latched to said latch plate, said stay rod being located and proportioned to fit between the two formed arms of the U shape of the hook member, whereby said stay rod acts as an assembly locator for said cam and hook member in addition to acting as a spring terminal and prop.

2. In a latching mechanism, a shaft, an eccentric collar on said shaft, a latch formed of one piece of sheet metal with two spaced fulcrum arms, said arms fitting onto said eccentric collar, a removable joining means for fastening said collar to said shaft, said joining means being of a width equal to the space between said fulcrum arms and fastened between them, whereby said joining means also serves to retain said latch in position on said collar, a spring for said latch, and a spring terminal located adjacent said spaced fulcrum arms, said terminal being located in the mechanism to come between said arms and guide their location for assembly with said collar and shaft by said joining means.

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3. In a latching mechanism, a shaft, an eccentric collar on said shaft, a latch formed of one piece of sheet metal with two spaced fulcrum arms, said arms fitting onto said eccentric collar, a removable joining means for fastening said collar to said shaft, said joining means being of a width equal to the space between said fulcrum arms and fastened between them, whereby said joining means also serves to retain said latch in position on said collar, a spring for said latch, a spring terminal located adjacent said spaced fulcrum arms, said terminal being located in the mechanism to come between said arms and guide their location for assembly with said collar and shaft by said joining means, a pair of contact carrying blocks to be latched together, one of said blocks being within a fixed shell and the other of said blocks being within a removable shell, said removable shell also containing said latch, said terminal extending centrally in said removable shell between a shell wall and the enclosed block to form a prop therefor.

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