

[54] **BRIDGE CONNECTOR FOR PHASE CONDUCTOR OF CURRENT COLLECTING SYSTEM**

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[58] Field of Search 104/96-105, 104/130, 131; 191/38, 22, 29, 37

[56] **References Cited**

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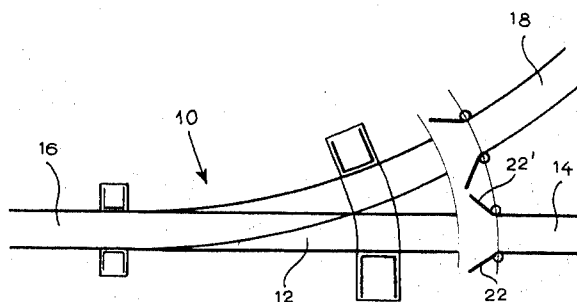
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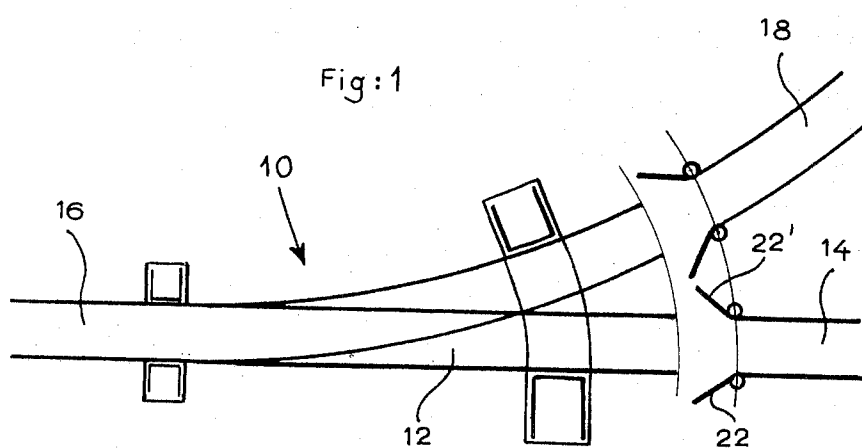
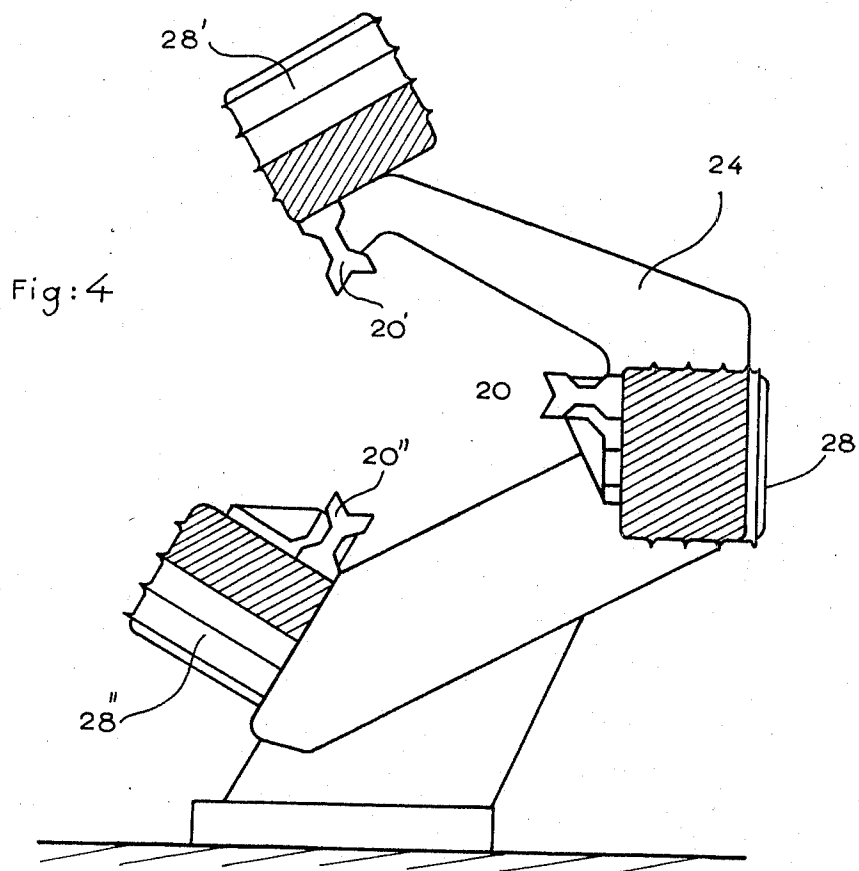
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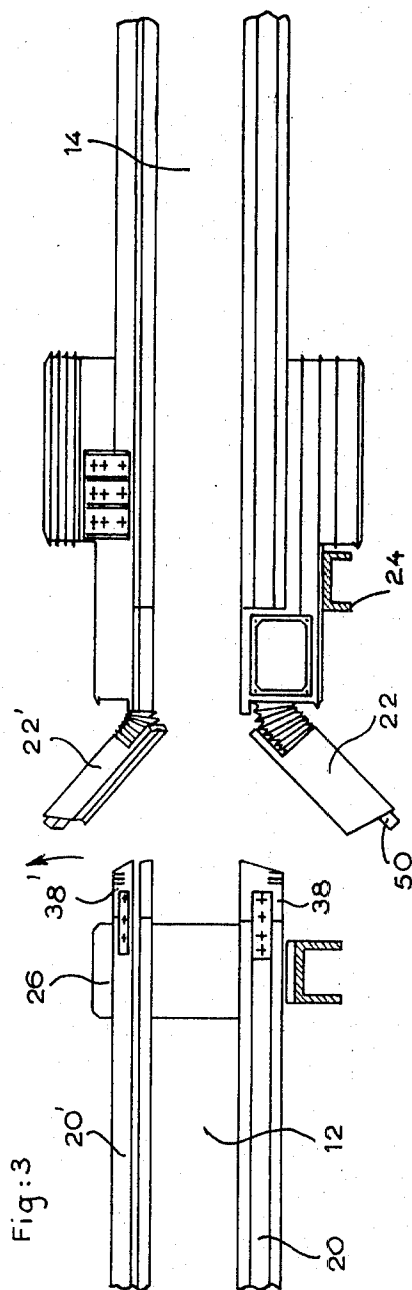
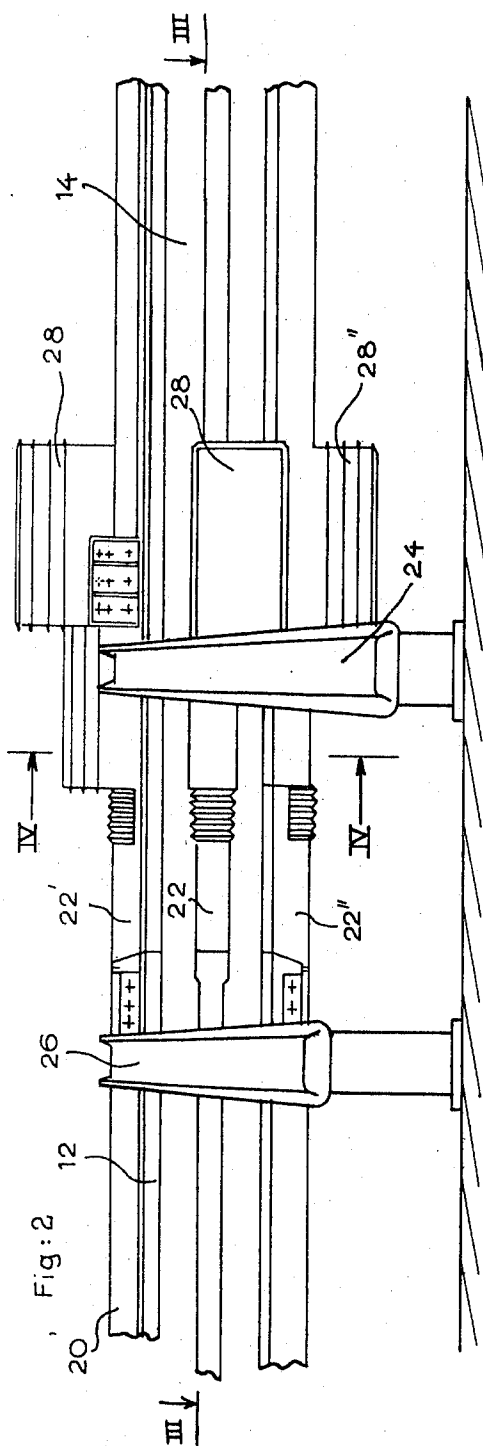
[57] **ABSTRACT**

A movable bridge connector providing in active position a continuous contact surface between spaced apart sections of a phase conductor at a switching station of a current collecting system. The connector comprises a rod pivotally mounted at one end thereof to the end of one of the sections, preferably a fixed section, and locking means cooperating with the end of the other section, preferably the movable section, to ensure the precise positioning and latching of the rod in active position so that a current collector may engage a through contact surface without jerking, even if moving at very high speed past the switching station.

6 Claims, 6 Drawing Figures







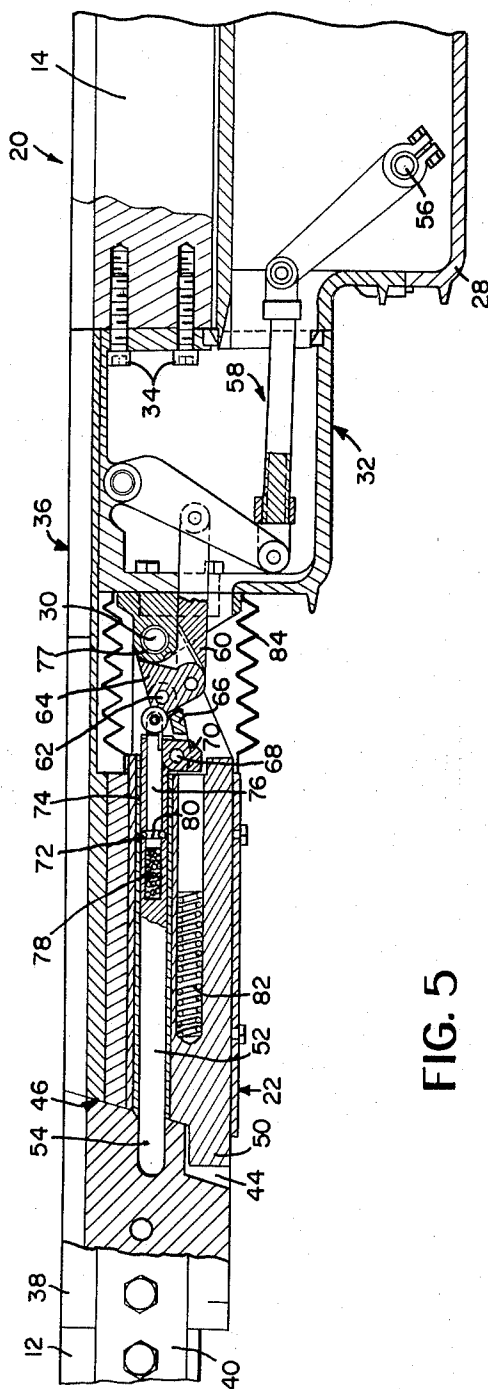
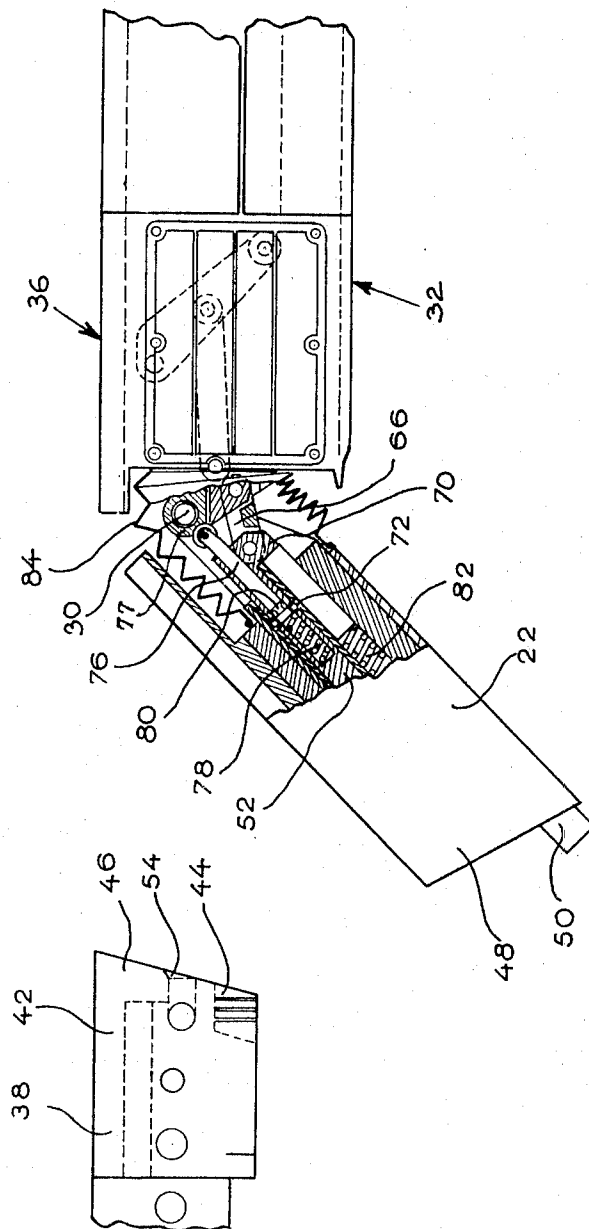


FIG. 5

Fig: 6



BRIDGE CONNECTOR FOR PHASE CONDUCTOR OF CURRENT COLLECTING SYSTEM

This invention relates to switching sections of electrical distribution and current collecting systems and more particularly to movable bridge connector means providing in the operative position thereof a continuous through contact surface between longitudinally spaced apart and aligned phase conductor rails for a current collector moving past a switching section. In switching sections of a conveyor track, the track bifurcates into two branch tracks so that a mobile may be directed selectively into one or the other of the branch tracks, according to the position of a switch tongue assembly. In electrically powered traction systems, one or more conductor rails are provided which extend parallel to the track and supply current to the vehicles moving along the track through contact shoes engaging the conductor rails. The latter are generally comprised by extruded or rolled-section rails of conducting material, such as aluminum, and the contact shoe engaging surface thereof is shaped, for example dihedrally, to permit a proper centering and smooth sliding of the conformably shaped contact shoes. The contact surface of the rails may be plated, for example with stainless steel, in order to reduce wear and enhance proper sliding of the contact shoes.

In certain known electric traction systems, such as overhead contact system tramways or trolleybuses, the switching sections of the contact systems comprise a pivotally mounted tongue which is positioned according to the position of the switch of the track and which directs the current collector into the proper branch conductor. The course positioning of the tongue of the prior art devices and the gap subsisting between the tongue and the movable conductor make these systems improper for use with high speed or high current conveyor devices, more particularly in case of polyphase supply systems liable to flashover between adjacent phase conductors.

It is an object of the invention to provide a bridge connector system of high reliability ensuring a perfect alignment of the bridge connector in operative position with the associated conductor rail sections and a uniform and smooth through contact surface for the current collector which may move even at very high speeds past the bridge connector section without undergoing any jerk.

It is another object of the invention to provide a bridge connector system especially adapted for polyphase feeding systems.

It is a further object of the invention to provide a bridge connector system having improved control means.

It is a more specific object of the invention to provide an actuating system controlling in due order the positioning of the bridge connector and the latching of the connector in the operative position thereof.

These and other objects and advantages will become apparent upon reading of the following description of an embodiment of the invention shown in the annexed drawings, in which:

FIG. 1 is a schematic plan view of a switching station having bridge connectors pivotally connected to the stationary sections of the phase conductor rails;

FIG. 2 is an elevational side view on an enlarged scale of a detail of the assembly of FIG. 1;

FIG. 3 is a sectional view taken along the line III—III of FIG. 2, the connectors being shown in the open or inoperative position thereof;

FIG. 4 is a sectional view on an enlarged scale taken along line IV—IV of FIG. 3;

FIG. 5 is a plan view, partially in axial cross section, on an enlarged scale, of a bridge connector according to the invention shown in the closed or operative position thereof;

FIG. 6 is a view corresponding to FIG. 5 but showing on a smaller scale the connector in the inoperative position.

Referring now to FIG. 1, there is shown a switching station 10 where a main track 10 bifurcates into a pair of branch tracks 14, 18. The flexible phase conductors 12 of the main track may be selectively aligned by suitable actuator means (not shown) with one or the other of the branch tracks, phase bridge connectors 22, 22' being pivotally connected to the stationary phase conductors of the branch tracks 14, 18 so that the closing thereof after due alignment of the movable section 12 may establish a through path for a current collector (not shown) guided along the conductors past the switching station. The tracks 14, 16, 18 may constitute a three-phase current distribution system as shown in FIG. 4 wherein the three phase-conductor rails 20, 20' and 20'' are regularly spaced apart and supported by insulating brackets 24 spaced along the track to form a passageway for a collector head (not shown) having contact shoes urged into sliding contact with the dihedrally shaped contact surfaces of the rails to supply current to a mobile guided parallel to the conductors. Such current collecting systems are known and reference may be had for example to copending U.S. Pat. application, Sr. No. 201,510, now U.S. Pat. No. 3,790,725, for further details.

The movable section 12 of the three-phase system shown in FIG. 2 to 4 comprises three flexible rail conductors corresponding to the three phases of the power supply system and the free end portions of the movable rails may be brought into alignment with the free end portions of the stationary rails of the branch track 14 so that three bridge connectors 22, 22' and 22'' pivotally connected to the respective rails of the branch track 14 may be closed to form a continuous through contact surface for the contact shoes of the current collector (not shown) moved past the switching station. Preferably, the bridge connectors 22, 22', 22'' open outwardly relative to the passageway constituted by the phase conductors to avoid flashover between adjacent rails.

A stationary insulating bracket 24 secures the stationary rails of the branch track 14 in position and another C-shaped insulating bracket 26, which is movable and which may be slidably guided, fixes the relative position of the three movable conductors 12, or switch tongues, with respect to each other.

The connectors 22, 22', and 22'' being of identical construction, only one of them, the bridge connector 22, will now be described in details with reference to FIG. 5 and 6. In the operative or closed position, the bridge connector 22 ensures the continuity of rail 20 between the movable section 12 and the stationary section 14. The connector 22 is pivotally mounted on a stationary axis 30 which is supported by a stationary housing 32 secured to the end of rail 20 by bolts 34. The upper part of housing 32, as viewed in FIG. 5, com-

prises a contact surface 36 for the contact shoes which prolongs the contact surface of rail 20. In a similar manner the end portion of movable rail 12 supports a guiding and latching block 38 which is secured to rail 12 by straps 40 and which carries a prolonged contact surface 42; a tapered positioning notch 44 and a latching recess 54. The front surface 46 of the block 38 and the matching frontal surface 48 of the connector are chamfered to ensure a good contact therebetween and in case of deformation or thermal expansion a reliable forced closing. The frontal surface of the connector 22 carries a tapered projection 50 which is shaped complementary to the shape of the notch 44 in order to cause a proper centering and final positioning of the closed connector 22. The latter carries a sliding latch 52 which penetrates after final positioning of the connector 22 into the complementary shaped recess 54 of the block 38. The control of the pivoting movement and the latching of the connector 22 may be operated by appropriate mechanical, pneumatic, hydraulic or electrical means. In the embodiment shown, an electric motor driving a reduction gear (not shown) may be lodged in a casing 28 of the housing 32 and actuate a crank member 56 which operates a linkage generally designated by the numeral 58. The linkage 58 actuates a reciprocating rod 60 which has its left-hand end (as viewed in FIG. 5) pivotally connected to a toggle mechanism 62 comprised by levers 64 and 66. The lever 64 is pivotally connected to the stationary pin 30 and the lever 66 is pivotally connected at 68 to a slide 70 integral with the latch 52. A ball assembly 72 may lock the slide 70 by penetrating into appropriately shaped recesses 74 carried by a stationary guide member of the slide 70. A sliding push rod 76 having an end portion which engages as a cam follower, under the action of a spring 78, a cam surface 77 shaped on the lever 64 controls the locking and unlocking of the slide 70 by the balls 72 according to the longitudinal position of the rod 76 in response to the pivoting of the connector 22. The push rod 76 has notches 80 which are adapted to lodge the balls 72 as soon as the push rod has occupied its final position following the completion of the closing movement of the connector 22. The toggle joint 62 moves slightly beyond the dead center position thereof at the end of the closing movement of the connector 22 and a spring 82 urges the slide 70 towards a position corresponding to the collapsing of the toggle joint 62.

Starting from the inoperative or open position of the connector shown in FIG. 6, the closing thereof is initiated by a rotation of shaft 56 in the counter-clockwise direction, as viewed in FIG. 5, causing the rod 60 to move to the left. As a result, the lever 64 rotates in clockwise direction so that the toggle joint 62 bearing on the pivot axis 30 and on the slide 70, which remains locked on the connector 22 by the balls 72, can rotate towards its closed operative position. In the meantime the push rod 76 is moved by the cam 77 towards its left-hand position causing the notches 80 to register with the balls 72 which penetrate then into the notches. The now freed slide 70 moves to the left in response to a continuation of the movement of the toggle joint 62 thereby pushing the end of the latching rod 52 into the recess 54. At the end of the stroke of the toggle joint 62 the connector 22 is rigidly interlocked with the movable section 12 of the rail as a result of the moving of

the toggle joint beyond the dead center position thereof.

The opening of the connector is caused by the inverse movement of the different elements beginning with the collapsing of the toggle joint 62 which acts on the slide 70 to withdraw the latching rod 52 from the recess 54 and sequentially locks the slide 70 by the balls 72 and rotates the connector towards the inactive position thereof.

The toggle joint 62 furnishes a high positioning and locking force at the end of the closing movement of the connector 22 so that accidental resistances due to ice-formation or thermal deformations may be overcome without difficulties. Preferably, bellow means 84 protect the moving parts and shunting braids may be provided to improve the current flow across the connector.

It is to be noted that the connectors 22, 22' and 22'' might also be pivotally connected to the moving rails of the switching station but this arrangement would call for a more complicated control mechanism of the movement of the connector.

What is claimed is:

1. Bridge connector means to provide a continuous contact surface for a sliding current collector between the confronting spaced apart end portions of a pair of aligned power supply rails of conducting material having conformably shaped collector-engaging contact surfaces, comprising a bridge rod of conducting material having a collector-engaging contact surface shaped in conformity with the contact surfaces of said rails and adapted to form a through contact surface for said collector in the operative position of said bridge rod, pivot means to pivotally connect one end of said bridge rod to one of said end portions, locking means cooperating with the other of said end portions to position and latch said bridge rod in the operative position thereof, and control means to control the pivoting movement of said bridge rod between the operative and the non-operative positions thereof, said control means comprising linkage means connected to said locking means in such a manner as to cause the latching of said bridge rod after the positioning in the operative position thereof and the unlatching of said bridge rod before the movement thereof towards the inoperative position.

2. A device according to claim 1, said locking means comprising a movable latch carried by said bridge rod and adapted to penetrate into a recess defined by said other end portion.

3. A device according to claim 1, said control means comprising toggle lever means the stretching of which causing said bridge rod to be pushed into the operative position thereof.

4. A device according to claim 3, said toggle lever means comprising a cam surface cooperating with a slidable latch to cause the latching of said bridge rod in the operative position thereof.

5. A device according to claim 4, said locking means comprising a lock adapted to hold said latch in the inoperative position thereof as long as said bridge rod has not attained the operative position.

6. Bridge connector means to provide a continuous contact surface for a sliding current collector between the confronting spaced apart end portions of a pair of aligned power supply rails of conducting material having conformably shaped collector-engaging contact surfaces, comprising a rigid bridge rod of conducting

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material having a collector-engaging contact surface shaped in conformity with the contact surfaces of said rails and adapted to form a through contact surface for said collector in the operative position of said bridge rod, pivot means to pivotally connect one end of said 5

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bridge rod to one of said end portions, and locking means cooperating with the other of said end portions to position and latch said bridge rod in the operative position thereof.

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