

Oct. 8, 1940.

L. G. RILEY

2,217,496

CONNECTOR

Filed Nov. 16, 1938

4 Sheets-Sheet 1

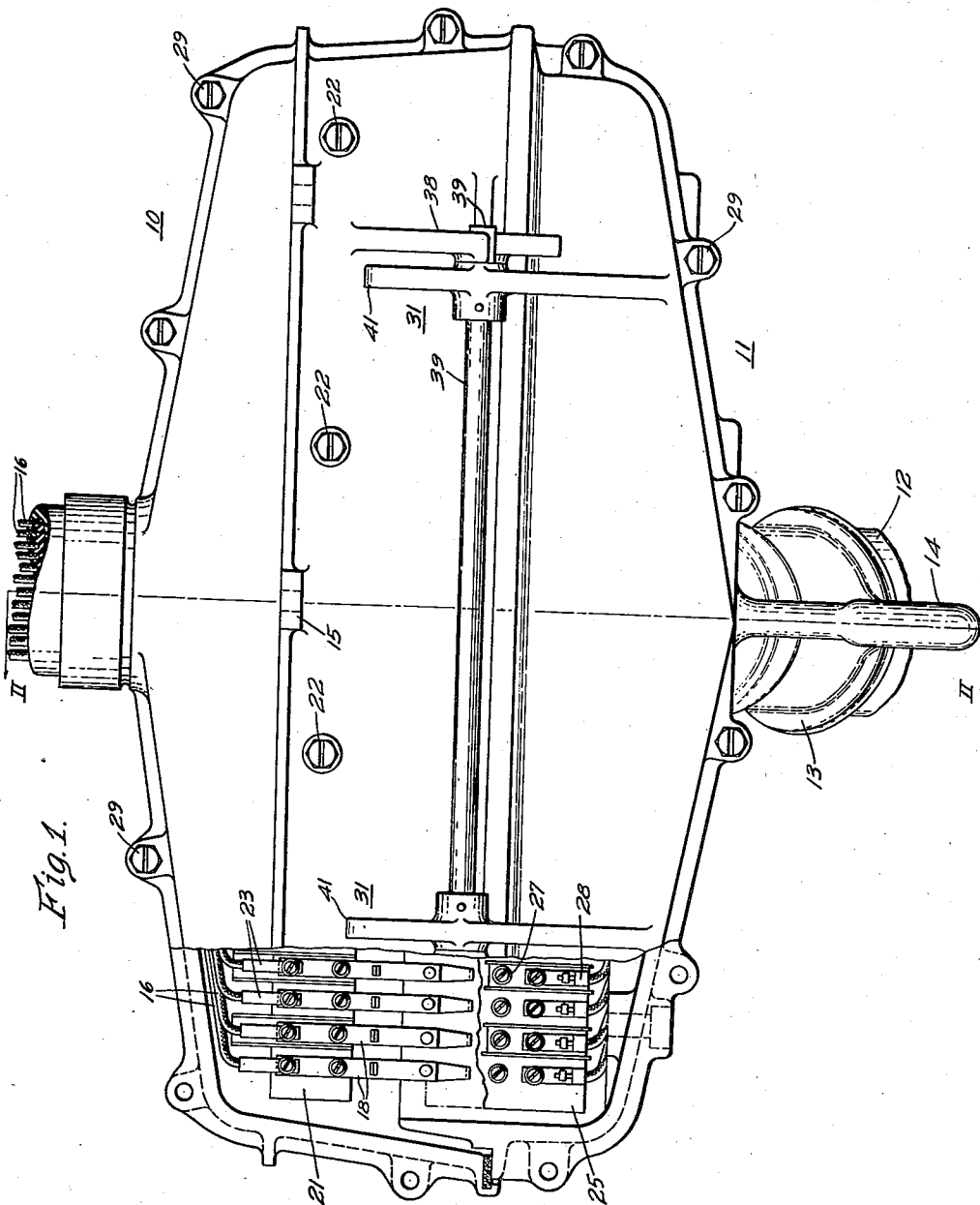


Fig. 1.

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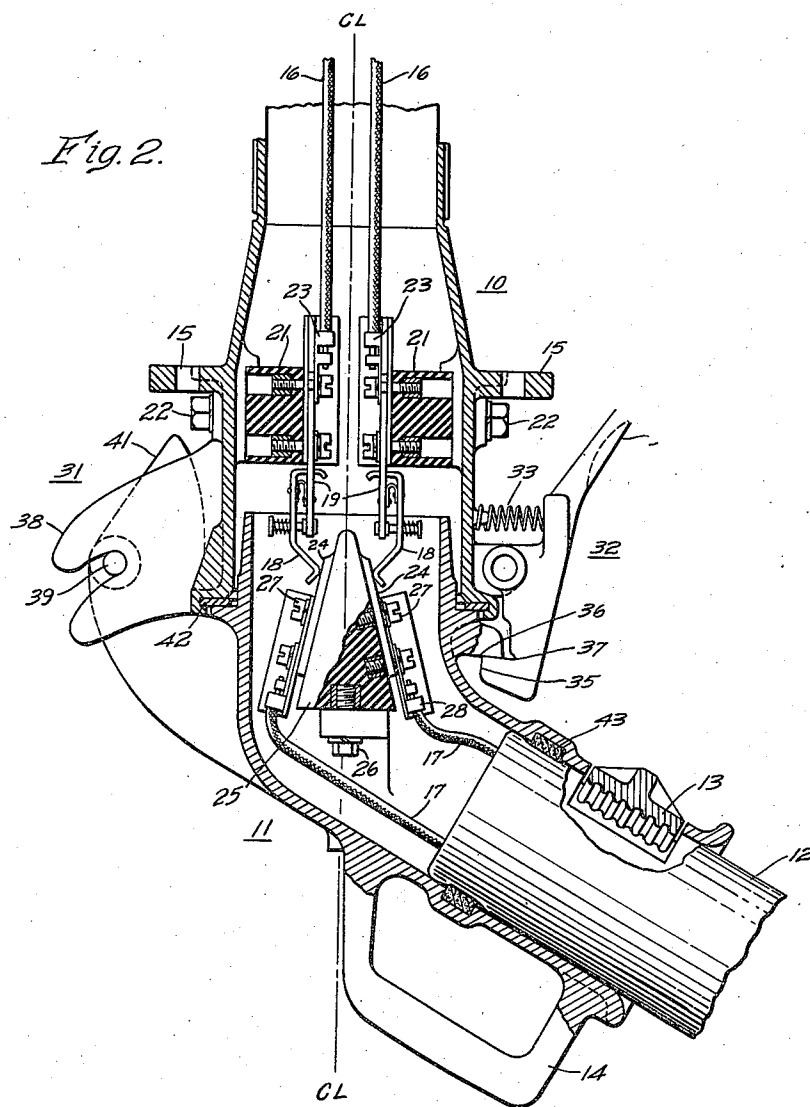
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4 Sheets-Sheet 2



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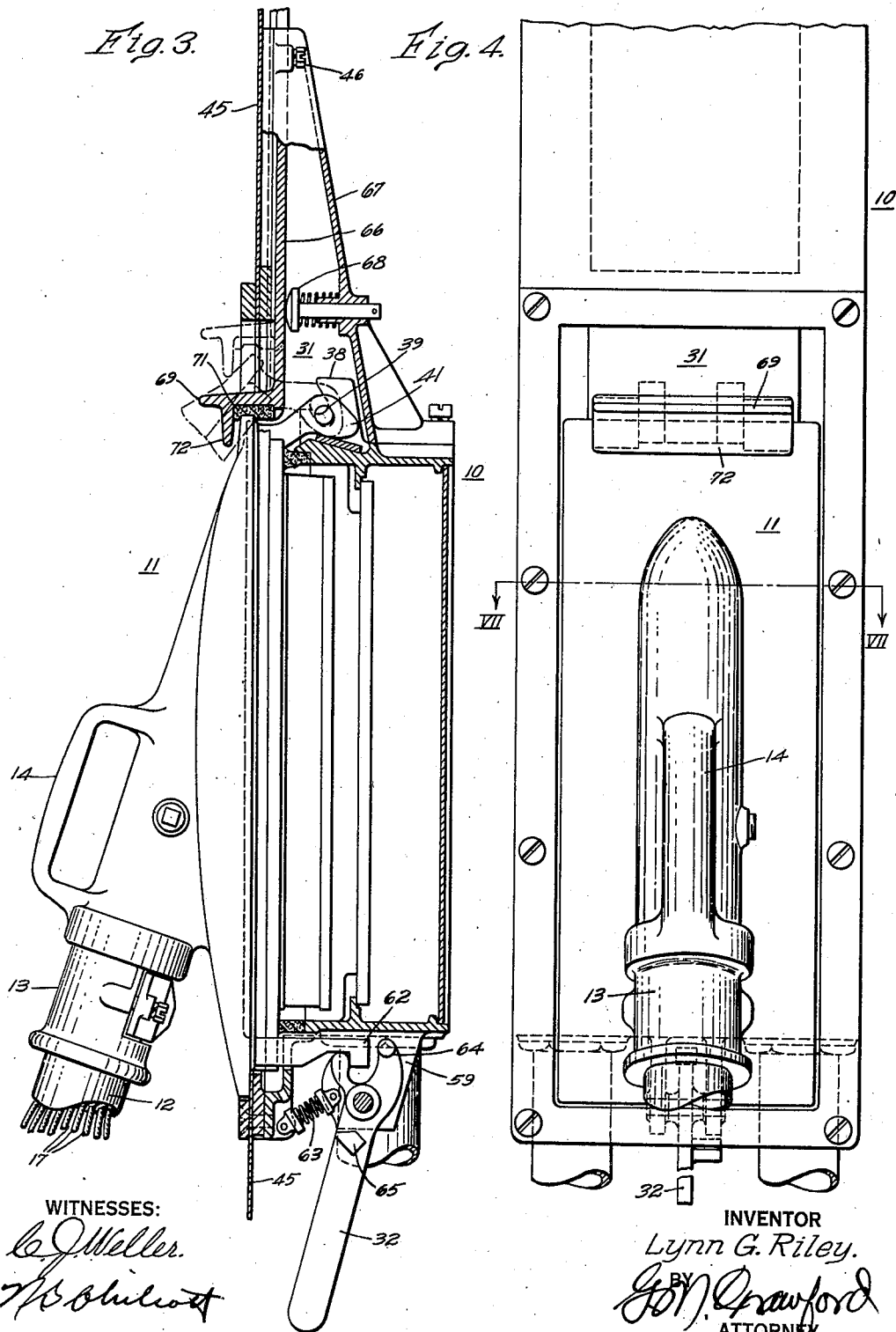
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Oct. 8, 1940.

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CONNECTOR

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4 Sheets-Sheet 4

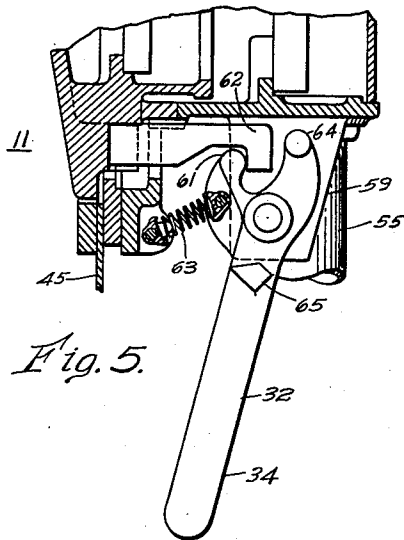


Fig. 5.

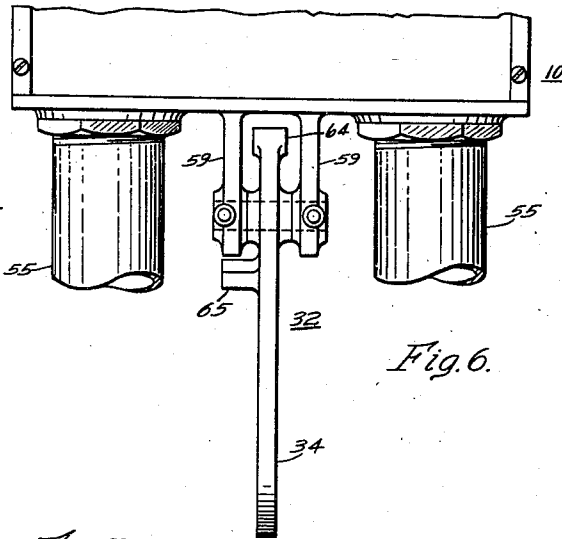
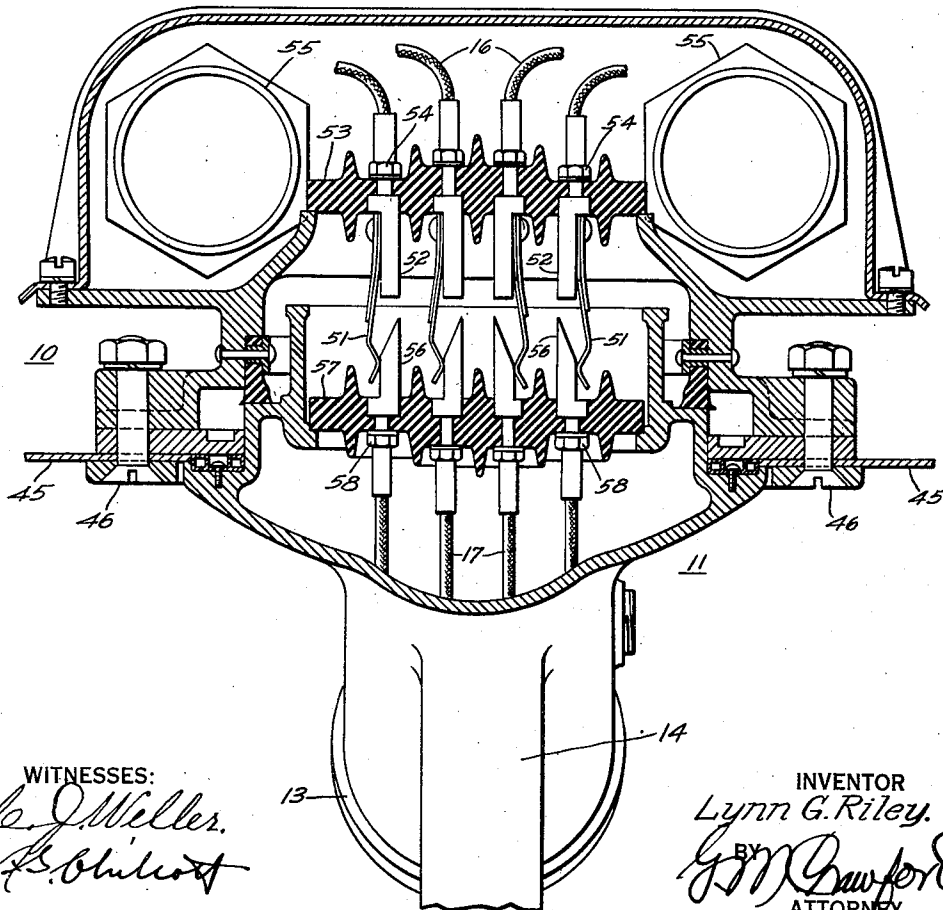


Fig. 6.

Fig. 7.



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2,217,496

CONNECTOR

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Application November 16, 1938, Serial No. 240,688

7 Claims. (Cl. 173—332)

My invention relates, generally, to connectors and, more particularly, to connectors for connecting electric current conductors which carry control and lighting or heating currents between the cars of a train.

Previously known types of multi-point plug connectors for completing control circuits between motor cars in a train or between electric locomotives when double-heading comprised a group of straight spring pins and spring sockets for the pins. The number of circuits that can be connected in this manner is limited because of the manual effort required to engage and disengage the pins with a straight line movement and the difficulty in manufacturing interchangeable jumper plugs with a large number of pins in correct alignment. When a large number of circuits are required it has, therefore, been necessary to utilize two or more connectors of the maximum practicable size.

An object of my invention generally stated, is to provide a connector which shall be simple and efficient in operation and which may be readily and economically manufactured and installed.

A more specific object of my invention is to provide a connector in which perfect alignment of the contacting parts is unnecessary.

Another object of my invention is to reduce the force required to engage the contacting parts of a train line connector.

A further object of my invention is to provide a connector in which all contact surfaces are visible and accessible for inspection and cleaning.

Another object of my invention is to provide for automatically closing the receptacle of a train line connector when the jumper head is removed from the receptacle.

Still another object of my invention is to provide a connector in which the electrical conductors may be readily connected to the contact members.

A still further object of my invention is to provide a train line connector which will not be seriously damaged in case the cars are inadvertently uncoupled without first disconnecting the connector.

Other objects of my invention will be explained fully hereinafter or will be apparent to those skilled in the art.

In accordance with one embodiment of my invention, a plurality of rows of compensated contact fingers are disposed in a cast train line receptacle or housing to engage resiliently contact members disposed in a jumper head that is

removably hinged to the receptacle. The jumper head is retained in the receptacle by a spring latch which will release under a predetermined pull, thereby permitting complete separation of the head from the receptacle without damaging the contact members and the housings of the connector in case the cars are uncoupled without first removing the jumper by releasing the latch in the usual manner.

For a fuller understanding of the nature and objects of my invention, reference may be had to the following detailed description taken in conjunction with the accompanying drawings, in which:

Figure 1 is a view, in plan, of one form of a train line connector constructed in accordance with my invention, a portion of the housing being broken away to show a part of the contact members;

Fig. 2 is a sectional view taken along the line II—II of Fig. 1;

Fig. 3 is a view, in side elevation, of another form of a connector embodying my invention, portions of the housing being broken away for clearness;

Fig. 4 is a view, in front elevation, of the connector shown in Fig. 3;

Figs. 5 and 6 are enlarged views, in side and rear elevation, respectively, of a portion of the structure shown in Fig. 3; and

Fig. 7 is an enlarged view, in section, taken along the line VII—VII of Fig. 4.

Referring to the drawings, and particularly to Figs. 1 and 2, the train line connector shown therein comprises a housing or receptacle 10 and a removable jumper head 11 which may be inserted in the receptacle in the manner shown in Fig. 2. The jumper head 11 is secured to a flexible jumper cable 12 by means of a corrugated clamp 13, thereby relieving the individual conductors in the cable from mechanical strain and movement. A handle 14 is provided on the jumper head for lifting, latching and unlatching the jumper head in the manner described more fully hereinafter.

The receptacle 10 is provided with projecting lugs 15 for securing the receptacle to the body or frame of a vehicle (not shown). A plurality of conductors 16 are provided in the receptacle 10 for conducting the control currents from one vehicle to another in a train and similar conductors 17 are provided in the jumper cable 12. The electrical connections between the two vehicles are established when the vehicles are cou-

pled together by inserting the jumper head 11 in the receptacle 10.

As explained hereinbefore, the number of conductors which could be provided in one connector of the types previously known, in which pin and socket connectors were utilized, has been limited by manufacturing difficulties encountered in maintaining the proper alignment of the connecting members and also by the force required to overcome the friction encountered in manually inserting the jumper in the receptacle. In the present connector a plurality of contact fingers 18, of the self-aligning compensating type shown, are resiliently mounted in the receptacle 10.

The contact fingers 18 are oppositely disposed in two or more rows, each finger being electrically connected to an individual conductor 16. The fingers 18 may be of a type well known in the art and previously utilized in drum controllers for controlling electric vehicles. As shown, the fingers 18 are resiliently mounted on conducting bars 19 which are secured to insulating blocks 21 mounted inside the receptacle 10 and secured thereto by bolts 22. The conductors 16 are connected to the bars 19 by suitable terminal connectors 23.

Cooperating contact members 24 are disposed in the jumper head 11 to engage the contact fingers 18 when the jumper head is inserted in the receptacle 10. As shown, the contact members 24 are angularly mounted on an insulating block 25 which is of a wedge shape and is secured to the jumper head by bolts 26. The contact members 24 are secured to the block 25 by bolts 27 and each contact member is connected to one of the conductors 17 by a terminal connector 28.

Since the contact members 24 are angularly mounted on the wedge-shaped block 25, the contact pressure between the fingers 18 and the contact members 24 is gradually increased as the jumper head 11 is inserted into the receptacle 10, thereby providing sufficient contact and pressure with a minimum closing force.

Perfect alignment between the contact fingers 18 and the cooperating contact members 24 is not required, since the fingers 18 are of the self-aligning compensating type. The housing 10 and the jumper head 11 are split vertically along the center line CL shown in Fig. 2 and joined together by a plurality of bolts 29, as shown in Fig. 1, for convenience in the wiring assembly and repair of the connector. In this manner all contact surfaces are visible and accessible for inspection and cleaning. Furthermore, the internal recesses in the present connector need not be filled with insulating gum, which in previous designs has interfered with the inspection and repair of the current conducting parts of the connector.

In order to prevent damage to the receptacle 10 or the jumper head 11 and the current conducting parts in case the cars of a train are inadvertently uncoupled without first removing the jumper head from the receptacle in the usual manner, one side of the jumper head is removably hinged to one side of the receptacle by a separable hinge 31 and the other side of the jumper head is releasably latched to the receptacle by means of a latch 32 which is pivotally mounted on the receptacle 10. The latch 32 is normally biased to the closed position by a spring 33 and it may be manually released to permit the jumper head to be removed from the receptacle by pressing on a handle 34 of the latch 32.

As shown, the latch 32 is provided with a tip 35 for engaging a shoulder 36 on the jumper head 11, and the latch 32 is so designed that the tip 35 will break away at the point 37 in case of excessive strain on the latch as a result of the cars being uncoupled.

Furthermore, the hinge 31 comprises slotted members 38 on the receptacle 10 and a pin 39 carried by the jumper head 11. A cam 41 is also carried by the jumper head 11 and is so disposed that it will engage the receptacle 10 to lift the pin 39 out of the slotted members 38 when the latch 32 is released, thereby removing the jumper head from the receptacle without injury. It will be understood that the latch 32 may be replaced at a relatively small cost in case of breakage by the accidental uncoupling of the cars.

A suitable gasket 42 is provided to seal the joint between the jumper head 11 and the receptacle 10 and a similar gasket 43 is provided for sealing the joint between the jumper head and the jumper cable 12.

In order to make the coupling and uncoupling of the connector easier, the jumper cable 12 enters the jumper head 11 at an angle, as shown. The angular mounting permits the hinge pin 39 to be inserted readily in the slotted members 38 and the jumper head to be inserted in the receptacle 10 in such a manner that the weight of the cable assists in forcing the contact members 28 against the contact fingers 18, and causes the contacting surfaces to engage with a sliding tangential motion instead of a straight line motion, as in previous designs of connectors.

In the embodiment of the invention shown in Figs. 3 to 7, inclusive, in which like parts are designated by the same reference characters as in Figs. 1 and 2, the receptacle 10 is of a rectangular shape, and is so designed that it may be utilized where a relatively small amount of horizontal space is available for the connector. The jumper head 11 is removably hinged to the receptacle 10 and may be removed from the receptacle in much the same manner as described hereinbefore. As shown in Figs. 3 and 4, the receptacle 10 may be mounted in a suitable opening in a wall 45 of a locomotive cab and secured thereto by bolts 46.

As shown in Fig. 7, a plurality of resilient contact fingers 51 are disposed in four rows in the receptacle 10. The contact fingers 51 are connected to conducting members 52, which are mounted on an insulating block 53 disposed in the receptacle 10. The members 52 are connected to the conductors 16 by suitable terminal connectors 54. As shown, the conductors 16 enter the receptacle 10 through a pair of pipes or conduits 55 in the bottom of the receptacle.

A like number of cooperating contact members 56 are disposed in the jumper head 11 to engage the contact fingers 51 when the jumper head 11 is in position in the receptacle 10. As shown in Fig. 7, the contact members 56 are of a wedge shape in order that the contact pressure between the resilient fingers 51 and the members 56 will be gradually increased as the jumper head is inserted into the receptacle. The contact members 56 are mounted on an insulating block 57 which is disposed in the jumper head 11, and they are electrically connected to the conductors 17 by terminal connectors 58. The conductors 17 enter the jumper head through the flexible jumper cable 12, which is secured to the head by

means of the clamp 13 in the manner hereinbefore described.

As explained hereinbefore, one side of the jumper head 11 is removably hinged to one side of the receptacle 10 by a separable hinge 31, and the other side of the jumper head is releasably latched to the receptacle by means of a latch 32 which, in the present structure, is disposed at the bottom of the receptacle.

As shown particularly in Figs. 5 and 6, the latch 32 is pivoted between a pair of depending lugs 59 on the bottom of the receptacle 10. The latch 32 is provided with a rounded jaw 61, disposed to engage a hook 62 which is secured to the bottom of the jumper head 11.

In order that the latch will be automatically released by a predetermined pull on the jumper head 11, it is biased to the closed position by a pair of off-center compression springs 63. In this manner, the latch 32 may be utilized as a lever to draw the jumper head 11 tightly against the receptacle, and it is releasably held in the closed position by the springs 63. The latch may be released by means of the handle 34, in which case a rounded jaw member 64 engages the end of the hook 62 to force the jumper head out of the receptacle. The latch is also releasably held in the open position by means of the off-center springs 63. A stop member 65 is disposed on the handle 34 and engages one of the depending lugs 59 to limit the travel of the handle. In this manner, the jumper head is automatically released from the receptacle in case the cars of the train are inadvertently uncoupled without first disconnecting the jumper head from the receptacle.

In order to protect the contact fingers in the receptacle 10 from dirt and moisture when the jumper head is removed from the opening in the receptacle, a slidable cover 66 is provided at the top of the receptacle. As shown in Figs. 3 and 4, when the cover 66 is in the raised position it is supported by a bracket 67 provided at the top of the receptacle. An anti-rattling device 68 is provided in the bracket 67 to resiliently engage the cover 66. The cover is provided at its lower edge with a lip 69, which may be engaged to raise the cover when it is desired to insert the jumper head 11 in the receptacle 10.

As shown in Fig. 3, the cover 66 drops to a position in which the hinge 31 is covered when the jumper head is inserted in the receptacle 10. Furthermore, the cam 41, which, as previously explained, functions to raise the hinge pin 39 out of the slotted members 38 when the jumper head is removed from the receptacle, also functions to raise the cover to the position shown by the dotted lines in Fig. 3 when the jumper head is removed, thereby preventing injury to the cover in case the cars are uncoupled without first removing the jumper head. It will be understood that the cover 66 is lowered by gravity to its lowermost position to close the opening in the receptacle when the jumper head is completely removed from the receptacle. A gasket 71 and a depending lug 72 on the cover 66 function to exclude dirt and moisture from the receptacle when the cover is closed and also from the hinge 31 when the cover is in the position shown in Fig. 3.

From the foregoing description it is apparent that I have provided a connector which is suitable for connecting a large number of conductors, such as the control conductors which run from one car to another of an electric train, and which

may be easily coupled and uncoupled. Furthermore, the present connector may be so constructed that it will not be damaged in case the cars of a train are accidentally uncoupled without the connector being first uncoupled.

Since numerous changes may be made in the above-described construction, and different embodiments of the invention may be made without departing from the spirit and scope thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. In a connector, in combination, a receptacle, a jumper head disposed in the receptacle, a separable hinge disposed at one side of the receptacle, and a spring-biased latch disposed at the other side of the receptacle to releasably retain the jumper head in the receptacle, said latch having a tip designed to break off under a predetermined strain, thereby releasing the jumper head from the receptacle.

2. In a connector, in combination, a receptacle, a jumper head disposed in the receptacle, a separable hinge disposed at one side of the receptacle, a spring-biased latch disposed at the other side of the receptacle to releasably retain the jumper head in the receptacle, said latch having a tip designed to break off under a predetermined strain, thereby releasing the jumper head from the receptacle, and cam means for separating said hinge when said latch is broken, thereby disengaging the jumper head from the receptacle.

3. In a connector, in combination, a receptacle, a jumper head disposed in the receptacle, a slotted hinge member on one side of the receptacle, a cooperating hinge pin carried by the jumper head and disposed in said slotted hinge member when the jumper head is in the receptacle, a latch disposed at the other side of the receptacle to releasably retain the jumper head in the receptacle, and curved cam means disposed on the jumper head adjacent the hinge member to lift said hinge pin from said slotted hinge member when the latch is released, thereby removing the jumper head from the receptacle.

4. In a connector, in combination, a receptacle, a jumper head removably hinged to the receptacle, a plurality of contact fingers resiliently mounted in said receptacle, cooperating contact members mounted in said jumper head and having inclined surfaces disposed to engage said contact fingers when the jumper head is inserted into the receptacle, thereby gradually increasing the pressure between the contact fingers and the contact members, latch means for releasably retaining the jumper head in the receptacle, and cam means having a curved surface disposed to engage the receptacle thereby disengaging said contact fingers and contact members when said latch means is released.

5. In a connector, in combination, a receptacle, a jumper head disposed in the receptacle, a separable hinge disposed at one side of the receptacle for removably hinging the jumper head to the receptacle, a pivoted latch disposed at the other side of the receptacle to releasably retain the jumper head in the receptacle, and spring means for so biasing said latch to the closed position that it is automatically opened by a predetermined pull on the jumper head.

6. In a connector, in combination, a receptacle, a jumper head disposed in the receptacle, a separable hinge disposed at one side of the recep-

5 tacle for removably hinging the jumper head to the receptacle, and a cover slidably disposed on the receptacle to cover the opening therein for the jumper head when the head is removed from the receptacle, said cover being disposed to protect said hinge when the jumper head is in the receptacle.

10 7. In a connector, in combination, a receptacle, a jumper head disposed in the receptacle, a separable hinge disposed at one side of the receptacle for removably hinging the jumper head to the receptacle, a spring-biased latch disposed

at the other side of the receptacle to releasably retain the jumper head in the receptacle, cam means disposed on the jumper head to separate said hinge when the latch is released, and a cover slidably disposed on the receptacle to cover the opening therein for the jumper head when the head is removed from the receptacle, said cam means engaging one side of the receptacle to raise the jumper head and slidably raise said cover when the jumper head is removed from the receptacle.

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