United States Patent

[11] **3,552,580**

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[21] Appl. No. **706,484**
[22] Filed **Feb. 19, 1968**
[45] Patented **Jan. 5, 1971**
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[54] **AUTOMATIC TRAIN LINE CONNECTOR**
11 Claims, 8 Drawing Figs.

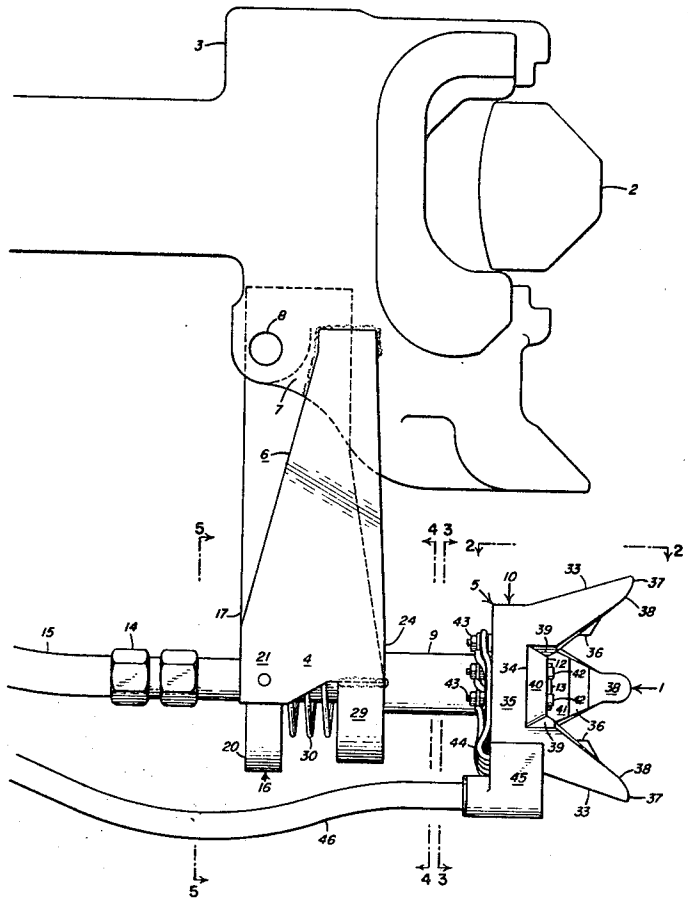
[52] **U.S. Cl.** **213/1.3,** 213/76
[51] **Int. Cl.** **B61g 5/10,** B61d 7/00
[50] **Field of Search** 213/1.3, 76; 280/421, 422; 339/10; 285/63, 58

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ABSTRACT: A connector suspendable from a mechanical railway coupler for automatically connecting train air and electric lines incident to mechanical coupling of adjoining railway cars, a coupler member of the connector having a head carrying gathering wings and normally yieldably held in coupling position but released therefrom and universally angleable on contact with a mating connector for aligning the heads and also having wedging surfaces on the head to compensate for wear.



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SHEET 1 OF 2

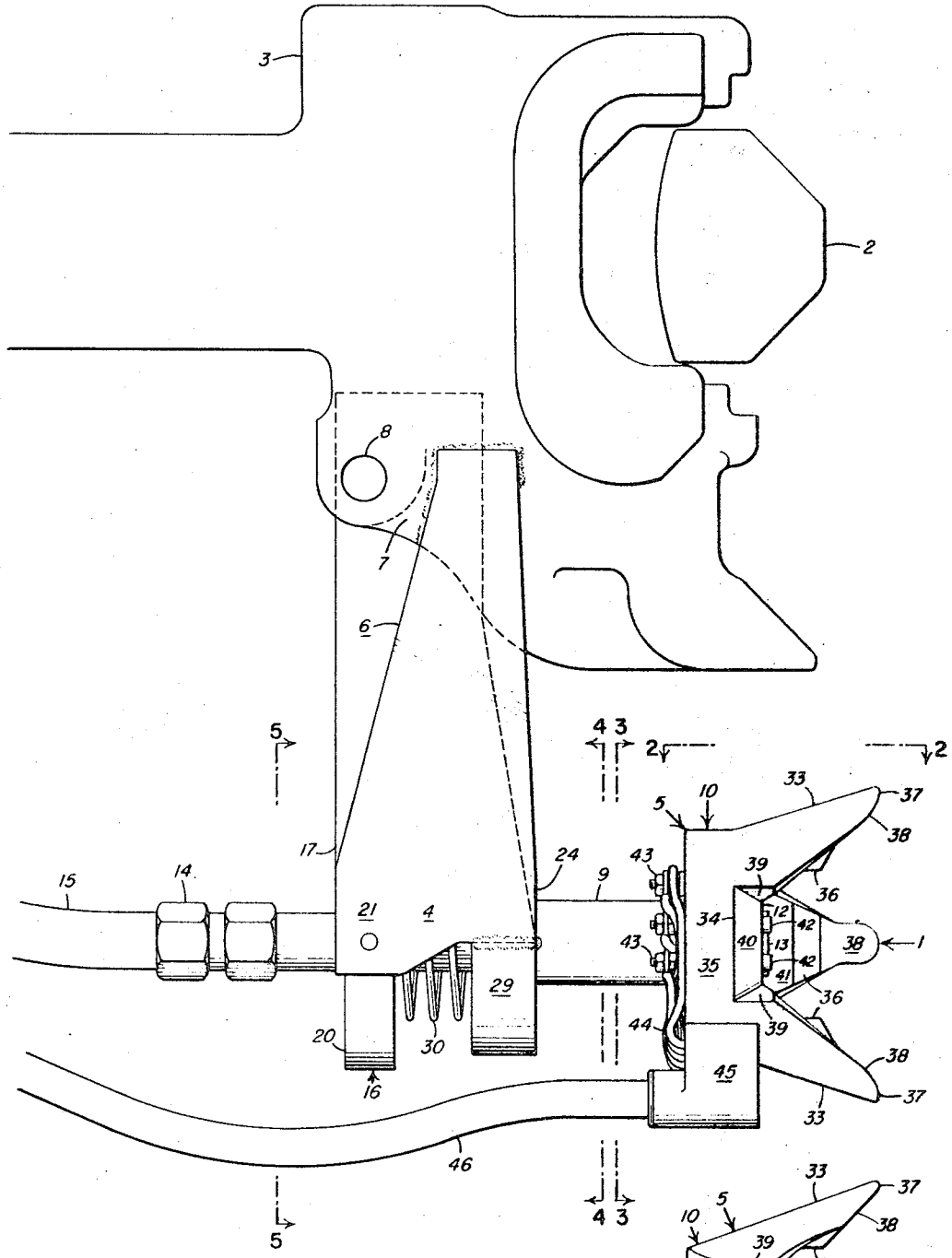


FIG. 1

FIG. 2

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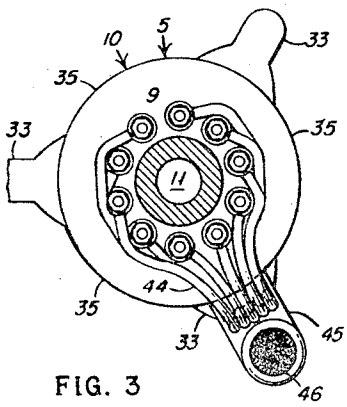


FIG. 3

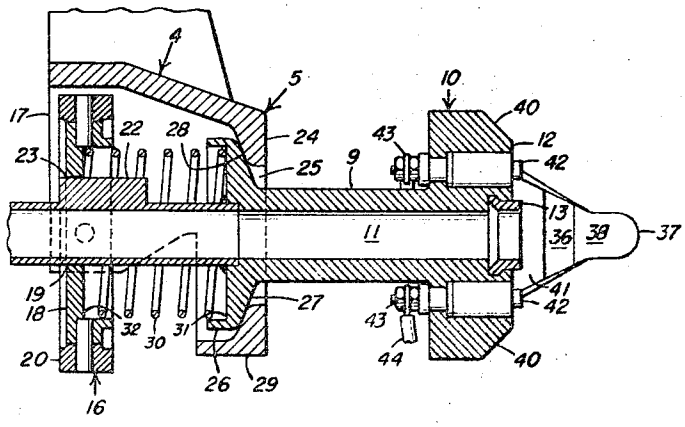


FIG. 7

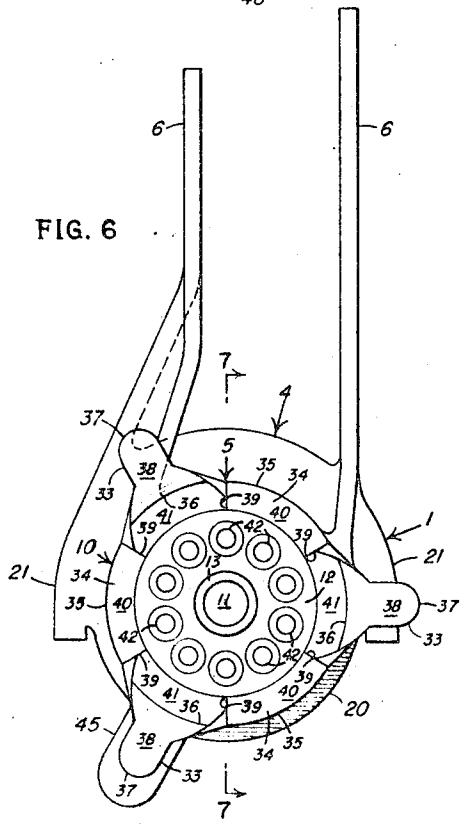


FIG. 6

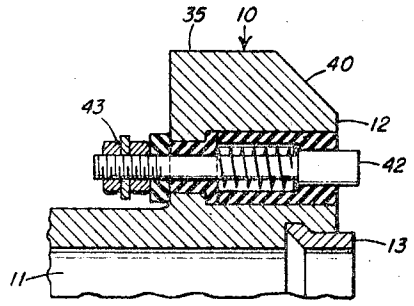


FIG. 8

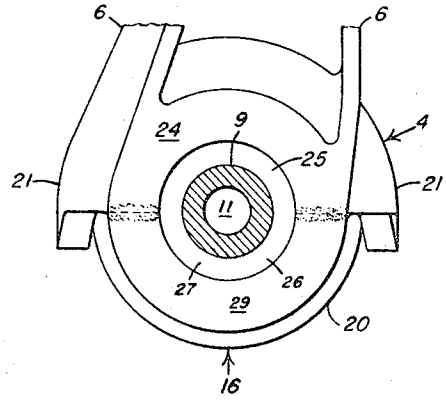


FIG. 4

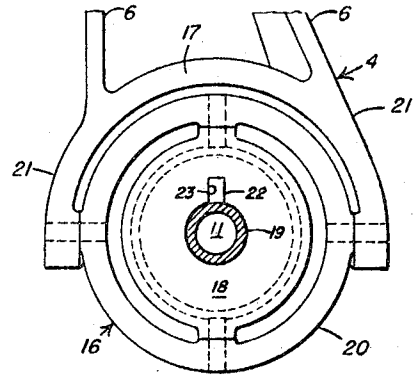


FIG. 5

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AUTOMATIC TRAIN LINE CONNECTOR

BACKGROUND OF THE INVENTION

While it is commonplace to equip rapid transit and other passenger cars in noninterchange service for automatically connecting train air and electric lines between cars incident to mechanical coupling of the latter, passenger cars in interchange service and freight cars customarily are equipped only for automatic mechanical coupling and any air and electric lines must be manually connected. Whether passenger or freight, railway cars for interchange service are required to be equipped with A.A.R. standard knuckle-type couplers, currently mainly the Types E, F and H. Recognizing the potential danger to operators in going between cars for manually connecting at least the brake air lines with which all cars are equipped, proposals have been made for combining A.A.R. standard couplers with at least air connectors for enabling air lines to be connected automatically as cars are mechanically coupled.

The present standard couplers are not themselves well-adapted to accommodate inbuilt air couplers and, while the standard Type H passenger car coupler is almost comparable in minimizing relative play when coupled to the automatic hook-type coupler generally used on rapid transit cars, there is substantial play between freight car couplers even when both are the Type F and even more when both are the Type E. As an air line connection must be tight to be effective and the requisite tightness cannot well exist in the presence of substantial play, an automatic air line connector for a freight car coupler must be capable of establishing and maintaining a tight connection with a mating connector over the range of relative movement of the mechanical couplers on which they are mounted. It is with an improved solution of this problem that the present invention is particularly concerned.

SUMMARY OF THE INVENTION

The primary object of the present invention is to provide an improved automatic train line connector for mounting on a mechanical coupler, a coupler member of which in a coupling operation will automatically align and interlock against relative movement with a coupler member of a mating connector, is universally angleable when coupled for maintaining the alignment and on uncoupling will automatically return to coupling position.

Another object of the invention is to provide an automatic train line connector for a mechanical coupler which automatically compensates for wear in the interlock of its coupler member with that of a mating connector.

The improved connector has a housing suspendable from a mechanical coupler and a coupler member mounted for relative longitudinal and universal movement in and having a hollow shank extending longitudinally through the housing. A head of the coupler member at the front end of its shank carries air and, preferably, electric-coupling elements, the former connectable through the hollow shank to a train air line, and having aligning wings and therethrough being interlockable against rotation and for longitudinal wedging to a head of a mating connector. Keyed for limited relative rotation to the housing, the shank carries in the housing a collar normally spring-urged forwardly against a seat in the front of the housing for positioning the head, when uncoupled, in coupling position. In the preferred connector the spring acts rearwardly against a gimbal in the housing for enabling the coupler member to angle universally when coupled.

The foregoing and other objects and features of the invention will appear hereinafter in the detailed description, be particularly pointed out in the appended claims and be illustrated in the accompanying drawings, in which:

FIGURE DESCRIPTION

FIG. 1 is a side elevational view of a preferred embodiment of the improved connector of the present invention applied to a suitable mechanical coupler;

FIG. 2 is a fragmentary plan view taken along lines 2–2 of FIG. 1;

FIG. 3 is a fragmentary vertical sectional view taken along lines 3–3 of FIG. 1;

FIG. 4 is a fragmentary vertical sectional view taken along lines 4–4 of FIG. 1;

FIG. 5 is a fragmentary vertical sectional view taken along lines 5–5 of FIG. 1;

FIG. 6 is a front elevational view of the improved connector of FIG. 1 removed from the mechanical coupler;

FIG. 7 is a fragmentary vertical sectional view taken along lines 7–7 of FIG. 6; and

FIG. 8 is a fragmentary vertical sectional view taken through the head of the coupling member on the section of FIG. 7 but on an enlarged scale.

GENERAL DESCRIPTION

Referring now in detail to the drawings in which like reference characters designate like parts, the improved automatic train line connector of the present invention is adapted for application to a mechanical railway coupler for automatically connecting train service lines incident to the mechanical coupling of adjoining railway cars. As exemplary of the invention, a preferred embodiment of the improved connector, designated as 1, has been applied to a mechanical coupler 2, which suitably is an A.A.R. standard Type F freight car coupler.

Conveniently suspended from the head 3 of the mechanical coupler 2, the improved connector 1 is comprised of a housing 4 and a coupler member or coupler 5, the former always and the latter normally substantially centered laterally on or aligned vertically with the head and both spaced therebelow. For mounting it on the head 3, the housing 4 suitably has integral or rigid therewith a pair of laterally spaced upstanding arms 6 which at their upper ends straddle or embrace and are welded or otherwise fixed to side surfaces 7 on opposite sides of a lower rear portion of the head, clear, in the case of the illustrated F coupler, of the hole 8 in which the rotor (not shown) of that coupler's locklift assembly is seated. Mounted in the housing 4, the coupler member 5 has a shank or stem 9 extending longitudinally therethrough and, forwardly of the housing, a head 10 at the front of and preferably integral with the shank.

The coupling member's shank 9 is hollow and has an air passage 11 extending longitudinally therethrough and the head 10 for each train air line required to be connected. If, as in the illustrated freight car application, there is only one train air line to contend with, the brake air line, the passage 11 suitably will be a central bore through the shank 9 and centered and opening forwardly onto a preferably flat front face 12 of the head 10 through a rubber or like gasket or grommet 13 inset into and projecting forwardly from the face for sealing connection to a like gasket on the air line of a mating connector. At its opposite or rear end, the shank 9 is connected by a suitable union 14 to a flexible hose 15 leading rearwardly to the usually rigid within car section (not shown) of the brake air line.

Through its shank 9, the coupler member 5 is mounted for relative longitudinal or axial and universal movements in the housing 4 and also is limited in rotation relative thereto. For the relative universal movement, the preferred mounting is a gimbal 16 mounted in the rear part and obstructing or partially closing the otherwise open rear end 17 of the housing 4. The gimbal 16 has an inner ring 18 centrally apertured, as at 19, to slidably receive or pass the shank 9 and an outer ring 20 surrounding the inner ring and pivoted at right angles thereto and to sidewalls 21 of the housing. While slidable or shiftable longitudinally or axially relative to the inner ring 18 through the aperture 19 therein, the shank 9 is limited in rotation relative to the inner ring therethrough the housing 4, conveniently by a key, rib or fin 22 fixed to or rigid with and outstanding radially from the shank and sliding or fitting in a slot 23 opening radially from the aperture, the key being of sufficient lon-

gitudinal extent to remain in the slot over the range of relative longitudinal movement of the shank and the inner ring.

By contrast with its openness at the rear, the housing **4** has a fixed front wall **24** spaced forwardly from the gimbal **16** and having a central aperture **25** of sufficient diameter of area not only to receive and pass the adjoining part of the shank **9** but also to accommodate relative universal angling of the shank in the gimbal over the range required in the particular installation to enable the connector **1** to maintain alignment with a matting connector. Within the housing between the front wall **24** and the gimbal **16**, the shank **9** has integral or rigid with or fixed to it a radially outstanding annular collar **26** having at the front a suitably spherically or arcuately convex front or bearing face or surface **27** concentric with the shank and normally with the aperture **25** in the front wall **24** and normally seating in and bearing against a rearwardly facing, correspondingly concave seat or socket **28** in the front wall about or surrounding and concentric with the aperture. The collar **26** is of greater diameter than the aperture **25** so as not to be able to pass therethrough, and, to facilitate assembly, the front wall **24** has an initially separate lower part **29** which is welded or others otherwise fixed or secured in place after the collar has been inserted in the housing. Limited in forward movement by engagement of the collar **26** with the seat **28**, the shank **9**, normally or when the coupler member **5** is uncoupled, is held against movement in its forward position by the corresponding concavity and convexity, respectively, of the seat and the front face **27** by spring means suitably in the form of an encircling coil spring **30** in the housing **4** and acting longitudinally thereof between a rearwardly facing, preferably peripherally skirted spring seat **31** on the rear of the collar and a forwardly facing spring seat or socket **32** on the inner ring **18** outwardly of or around the central aperture **19** therein.

The front face **12** of the head **10** of the coupler member **5** preferably is both flat and normal to the shank **9** and air passage **11** therethrough. For aligning during coupling and interlocking in alignment when coupled with a head of a mating connector, the head **10** has arranged about the periphery or perimeter of its face **12** a plurality of forwardly and outwardly projecting aligning wings or prongs **33** and a plurality of wing seats or pockets **34**. To enable it to couple with a head of another coupler member, regardless of the end of each car presented for coupling, each wing **33** and seat **34** must be wholly to one or the other side of the vertical center line of the face **12** and that line must divide the head at the front into counterpart of interfittable sides. Meeting these basic requirements of mating coupler, couplers, the preferred head **10**, for the usual freight car or other application involving only one train air line, preferably is cylindrical rearwardly of the wings **33** and seats **34**, the front face **12**, correspondingly, is circular or annular and concentric with the head and there are a multiplicity and preferably three of the wings, one horizontally disposed at one side of the vertical center line of the face and the others diagonally disposed at the other side.

When coupled, the horizontally disposed wing is intended to be embraced or straddled by and gripped between the diagonally disposed wings of the mating coupler member and in the preferred construction the wings **33** and seats **34** alternate about and together completely surround the face **12** and are of equal width or span so that each subtends one-sixth of the face's circumference. Thus, on coupling with a head of a mating coupler member, each of the wings **33** will fit in a seat between and be laterally engaged by a pair of adjoining heads, so preventing relative rotation of the heads. At the same time the wings of each coupler will extend rearwardly over or longitudinally overlap the cylindrical side surface **35** on the head of the other coupler rearwardly of its seats **34** and present for engagement therewith inwardly facing concentric and coradial or equal radius cylindrical faces or surfaces **36** for locking the heads against relative radial or transverse movement. For guiding themselves and those of the mating head into the seats **34** on the heads during a coupling operation, the wings **38** taper at the sides forwardly toward their front ends or tips **37** and between those ends and the cylindrical faces **36** together present forwardly flairing gathering or guide faces **38** for guiding the cylindrical faces toward the cylindrical side surfaces **35** of the heads.

Given the preferred flat radially disposed shoulders **39** on the wings **33** at opposite sides of each seat **34** for engaging the confronting shoulders of and holding the included or sandwiched wing in its seat, the foregoing construction enables the coupler member **5** to be provided with a gathering range sufficient for automatic coupling in a particular installation and a pair of such members to gather and align during coupling and thereafter interlock against relative rotative and radial movements without dependence therefor upon the associated mechanical couplers **2**. The coupling members are of course dependent upon the mechanical couplers for restraint against relative longitudinal movement after they have been coupled and, by normally projecting the front faces **12** of the members forwardly of the coupling line of the mechanical couplers so that in coupling the collars **25** on their shanks **9** are pushed rearwardly out of their seats **28** in the associated housings **4**, the springs **30** are then brought into play to accommodate or compensate longitudinally for any play between the mechanical couplers. The unseating of the collars **26** during coupling also enables each coupler member to pivot or swing universally relative to its housing **4** on its gimbal **16** and thus ensures against relative cocking of the heads both during coupling and while coupled.

The one shortcoming of the construction so far described is that it does not compensate for wear in the engaging surfaces on the heads **10** of a pair of the coupler members. However, the preferred coupler member **5** is capable of compensating for such wear by having a wedging or double wedge interfit with a mating head. For this purpose the seats **34** between the wings **33** have frustoconical-wedging surfaces **40** tapered or converging forwardly toward the plane and merging at the front with the perimeter of the front face **12**. Correspondingly, the insides of the wings **33** over the parts thereof seatable in the seats of a mating head have frustoconical-wedging faces **41** rearwardly convergent or tapered at the same incline or slope toward and merging with the face's perimeter. Consequently, when a pair of the coupler members **5** are coupled, the wedging surfaces **40** in the seats **34** of each will be wedged into the wedging faces **41** on the wings **33** of the other member and the pressure of the associated springs **30** will take up any wear.

If the railway car on which the improved connector **1** is installed has both air and electric train service lines, the connector can readily perform double duty in automatically connecting the lines of both types. To adapt it for such duty, the illustrated coupler member **5** has mounted in its head **10** and projecting forwardly from its front face **12** a plurality of electric contacts or coupling elements **42** suitable suitably arranged in a ring around the rubber air-coupling element or gasket **13**. Although not limited thereto, the illustrated electric contacts **42** are end contactable spring-projected contact pins insulatedly mounted in and extending longitudinally through the head **10** outwardly of the shank **9** and carrying at the rear of the head binding posts or other suitable electrical fittings **43**, each for connection to an electrical lead **44**. Conveniently, these leads lead individually to a junction box **45** suitably mounted on the back of the lowermost of the wings **33**, and are connected therethrough to the within car sections of any train electric lines by a multiple conduit flexible electric cable **46**.

If the amperages in the electric lines are of an order to produce arcing on coupling, suitable disconnect switching should be provided somewhere between the ends of the contacts **42** and the lines. In turn, flow of air through the air passage **11**, when the coupler member **5** is uncoupled, may be controlled by a suitable automatic inbuilt valve (not shown) or in lieu thereof a valve (not shown) similar to the conventional angle cock mounted on the end of the car and conveniently operable without going between cars by an operating rod (not shown) extending across the end.

Normally or when uncoupled, the coupler member **5** of the improved connector **1** will be held against movement in the housing **4** in a position in which its extended gathering range will enable it to couple automatically with a mating coupler member, with the aligning wings **33** properly disposed by the antirotational keying of the shank in the housing. So normally positioned, the coupler member **5** in a coupling operation will present its aligning wings to those of a mating coupler member and, as the operation proceeds, be guided as necessary by the wings into preliminary alignment with the mating member.

Toward the end of the operation the normal disposition of the front face **12** of the head **10** forwardly of the coupling line of the mechanical coupler will unseat the collar **26** from the socket **28** so that the coupler member can angle if need be relative to the housing **4** into final alignment with the mating member, with the heads interlocked and wedged together and the gaskets **13** in sealing engagement and the contacts **42** in contact for connecting the air and electric lines. Too, if, as preferred the cylindrical head side surfaces **35** and wing faces **36** of a pair of mating coupler members are of such depth or longitudinal extent as to engage prior to engagement of the gaskets **13** and contacts **42** thereof, the latter thereby will be squared for and relieved of any lateral thrust on contact in the final increment of coupling. Thereafter, while coupled, the mated coupler members, while locked against movement relative to each other, will angle and shift longitudinally as necessary relative to their housings to compensate for relative movement of the mechanical couplers. Conversely, in an uncoupling operation, the coupler member, once free of the pressure of the mating member, will automatically be returned to coupling position for the next coupling operation by the action of the spring **30** on the collar **26**.

From the above detailed description it will be apparent that there has been provided an automatic train line connector which, while otherwise useable, is particularly suited for adapting a car equipped with a standard knuckle-type coupler for automatic connection of any train lines. It should be understood that the described and disclosed embodiment is merely exemplary of the invention and that all modifications are intended to be included that do not depart from the spirit of the invention.

I claim:

1. In a railway coupler assembly including a mechanical coupler, an automatic train line connector comprising a housing mountable on the mechanical coupler, a coupler member having a head and aligning means on said head for aligning during and interlocking on coupling with a head of a mating coupler member, positioning means supporting said coupler member within said housing, said positioning means uniformly providing for limited relative horizontal and universal movement of said coupler member therein, and means acting between said housing and member for holding said member when uncoupled in coupling position.

2. An automatic train line connector according to claim **1**, wherein the housing is fixed to and suspended from a head of the mechanical coupler, the coupler member includes a shank rigid with and extending rearwardly from the head thereof, and the positioning means include cooperating means on the shank and housing for limiting relative rotation therebetween, means on the shank inside and seatable in a rearwardly facing seat in the housing, and spring means acting against the housing and forwardly on said inside means for normally yieldably holding said inside means in said seat.

3. An automatic train line connector according to claim **2**, wherein the shank extends rearwardly from the head of the coupler member longitudinally through the housing, and including a gimbal mounted in the housing and universally mounting said shank therein.

4. An automatic train line connector according to claim **3**, including laterally spaced arms rigid with and upstanding from the housing and embracing and fixed to surfaces at opposite sides of the head of the mechanical coupler, passage means extending longitudinally through the shank and opening forwardly onto a front face of the head of the coupler member and connected rearwardly to within car train air line means, said shank extending through and being slidable longitudinally in a central aperture in an inner ring of the gimbal, a front wall on said housing and having an aperture longitudinally aligned with said central aperture and of a diameter to pass and accommodate relative angling of the shank, a rearwardly facing concave seat in said wall about said aperture therein, collar means fixed to the shank between the gimbal and said front wall and having a forwardly facing correspondingly convex surface seatable in said seat, spring means acting longitudinally between said inner ring and said collar means for normally seating said surface in said seat and longitudinally aligning the shank therewith, and key means on and radially outstanding from the shank and received over the range of relative longitudinal movement of the shank and housing in slot means in said inner ring opening outwardly from said central aperture for limiting relative rotation of the shank and housing.

5. An automatic train line connector according to claim **1**, including spring means acting forwardly on the coupler member and normally yieldably holding a front face of the head forwardly of the coupling line of the mechanical coupler, and wedge means on the head separate from said aligning means and on coupling wedgeable by said spring means longitudinally against wedge means on a head of a mating coupler member for holding said heads in longitudinal alignment despite wear of engaging surfaces.

6. An automatic train line connector according to claim **5**, wherein the aligning means on the head are a plurality of aligning wings extending forwardly from the head's front face and a plurality of seats circumferentially spacing and alternating about the front face with said wings, and the wedge means are wedging surfaces in said seats and wedging faces on insides of said wings.

7. An automatic train line connector according to claim **6**, wherein the wedging surfaces and faces are frustoconical and taper at the same angle respectively forwardly and rearwardly toward the front face.

8. An automatic train line connector according to claim **7**, wherein there are a multiplicity of each of the aligning wings and seats all of the same width.

9. An automatic train line connector according to claim **7**, including air and electric train line connecting elements mounted in the head and normally projecting forwardly from the front face thereof and each connected to the related train line.

10. An automatic train line connector according to claim **9**, wherein the coupler member includes a shank fixed at the front to the head and extending rearwardly therefrom longitudinally through the housing for mounting the coupler member therein, the shank has a central bore extending longitudinally therethrough and connected at the rear to a train air line and opening at the front centrally onto the head's front face, and the electric-coupling elements are a plurality of contacts insulatedly mounted in and extending through the head outwardly of the shank and spaced about the gasket.

11. An automatic train air line connector according to claim **9**, including cylindrical surfaces on the head and wings and engageable in a coupling operation with mating surfaces on a mating coupler member prior to contact of the connecting elements of said coupler members for squaring said elements for and eliminating lateral thrust thereon on contact thereof.