Oct. 25, 1966 W. B. JEFFREY ETAL 3,280,990

AUTOMATIC AIR AND ELECTRIC RAILWAY CAR COUPLER

Filed July 6, 1965 3 Sheets-Sheet 1

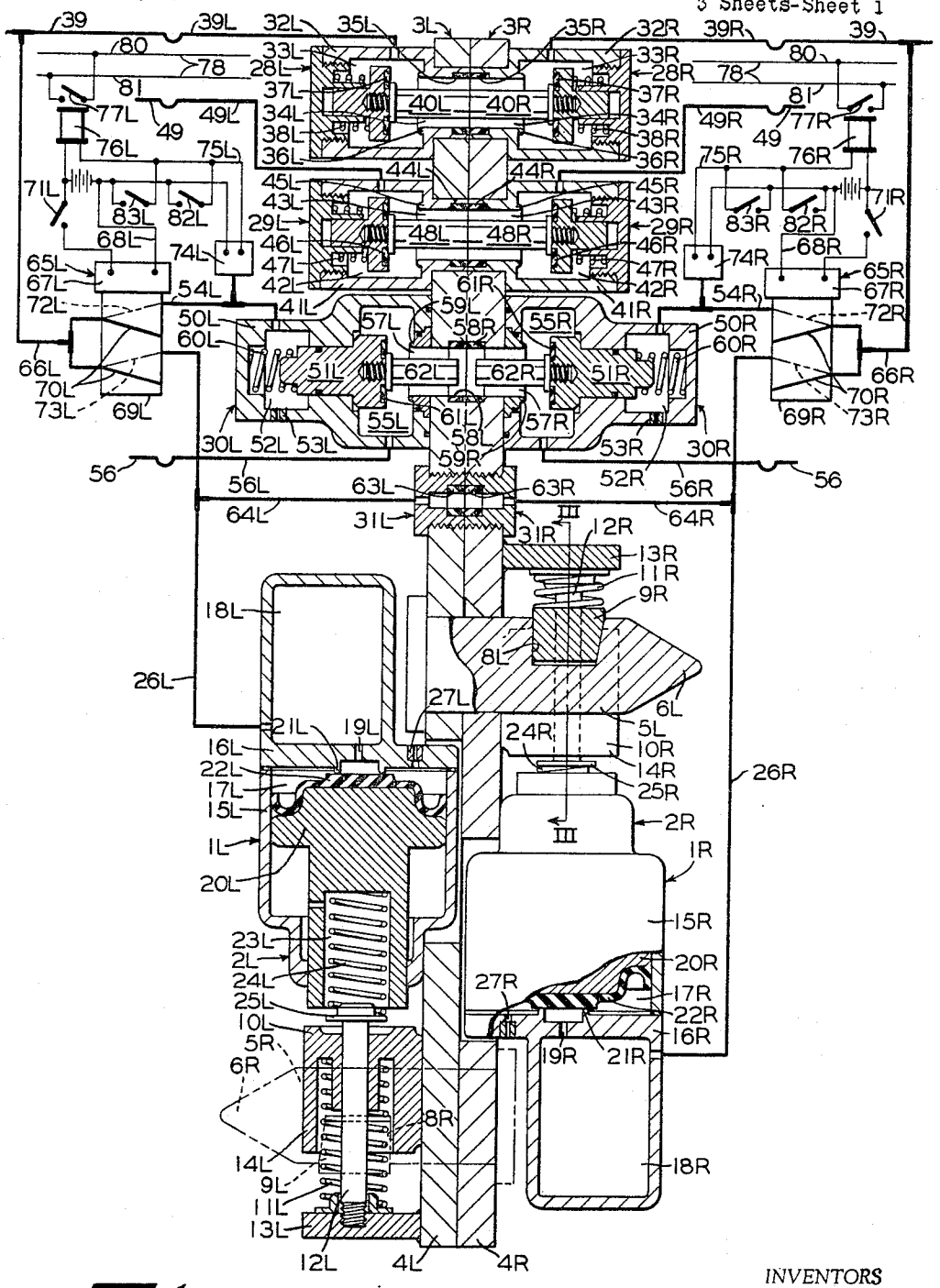


FIG. 1

INVENTORS
William B. Jeffrey
BY Richard K. Frill
A. A. Steinmiller
Attorney

Oct. 25, 1966 W. B. JEFFREY ETAL 3,280,990

AUTOMATIC AIR AND ELECTRIC RAILWAY CAR COUPLER

Filed July 6, 1965

3 Sheets-Sheet 2

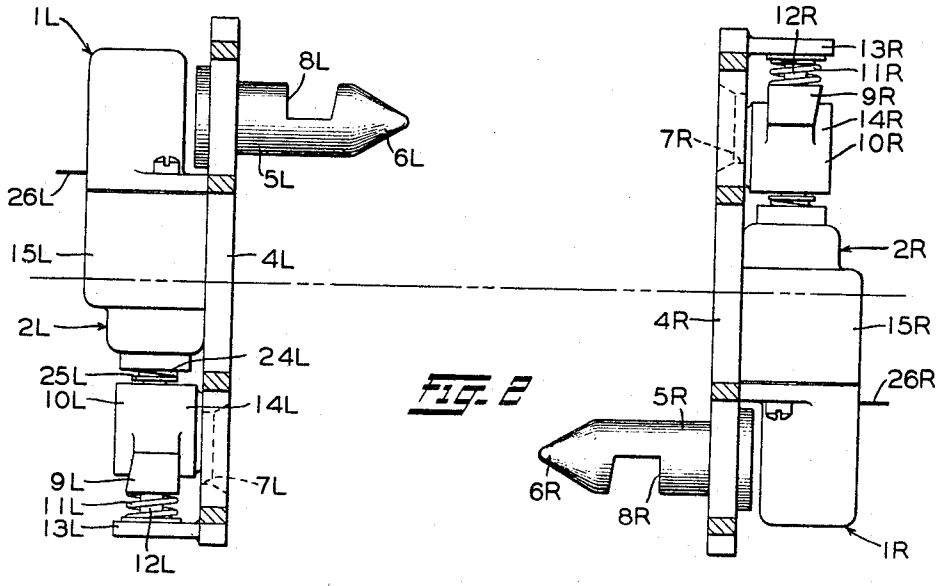


Fig. 2

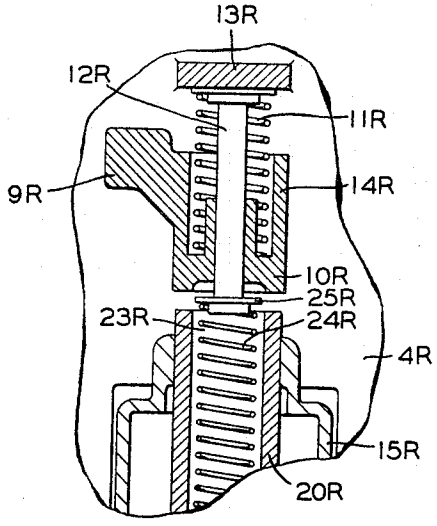


Fig. 3

INVENTORS
William B. Jeffrey
BY Richard K. Frill
A. A. Steinmiller
Attorney

Oct. 25, 1966 W. B. JEFFREY ETAL 3,280,990

AUTOMATIC AIR AND ELECTRIC RAILWAY CAR COUPLER

Filed July 6, 1965 3 Sheets-Sheet 3

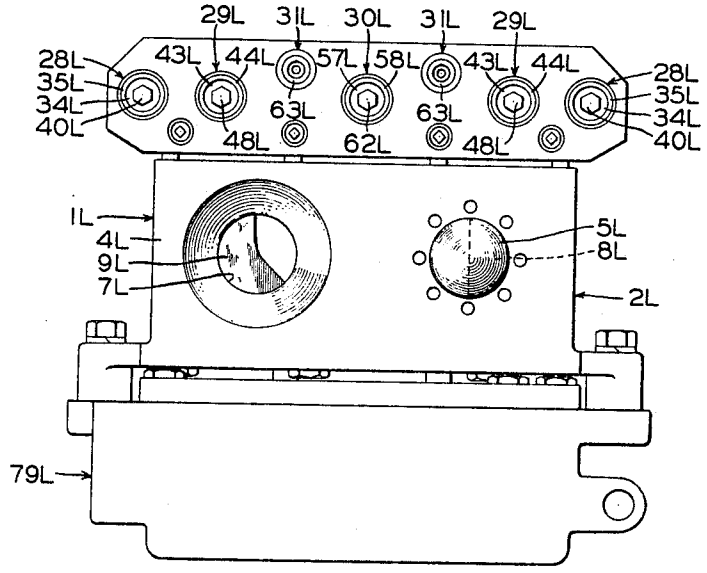


Fig. 4

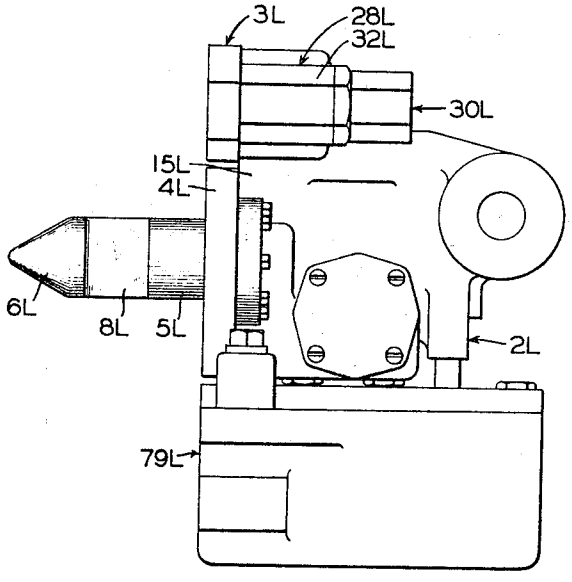


Fig. 5

INVENTORS
William B. Jeffrey
BY Richard K. Frill
A. O. Steinmiller
Attorney

United States Patent Office 3,280,990 Patented Oct. 25, 1966

3,280,990

AUTOMATIC AIR AND ELECTRIC RAILWAY CAR COUPLER

William B. Jeffrey, Irwin, and Richard K. Frill, Pittsburgh, Pa., assignors to Westinghouse Air Brake Company, Wilmerding, Pa., a corporation of Pennsylvania

Filed July 6, 1965, Ser. No. 469,485
16 Claims. (Cl. 213—76)

This invention relates to automatic railway car couplers and, more particularly, to automatic railway car couplers including means for also automatically coupling fluid pressure hoses and electrical conductors carried on the cars to provide continuity of the air lines and electrical circuitry throughout the length of the train.

The automatic coupler herein disclosed is primarily intended to be used, though not necessarily limited to such use, on captive railway equipment or cars used in rapid transit or commuter type trains. Although automatic couplers of the type for affecting automatic coupling of the fluid pressure hoses, the electrical conductors and the vehicles simultaneously are presently known and in use, the more common type of couple which is used on railway cars of the type comprising passenger, express or freight trains intended for long-distance hauling and from which trains individual cars may be cut out and transferred from one railroad to another, is the type which merely performs the single function of coupling the cars together. The hose and electrical connections must be made manually after the cars have been coupled, such manual connections requiring a considerable amount of time, particularly if a number of cars are to be joined into a train. On the long-distance type train, however, the additional time required for manually making the hose and electrical connections after the cars have been coupled is usually not critical. On the other hand, a minimum amount of time in coupling cars making up the rapid transit type train is desirable. Moreover, since it is captive equipment, there is no problem of transferral from one railroad to another. Although, as was previously noted, fully automatic couplers for effecting simultaneous coupling of the hoses, electrical conductors and the vehicles are presently known, such couplers are bulky, complex in structure and, therefore, costly to produce.

The principal object of this invention, therefore, is to provide an improved automatic railway car coupler which automatically effects simultaneous connections of the air hoses and electrical conductors at the time that the cars are coupled to each other, which is characterized by simplicity in function and structrue to provide trouble-free service, and which is, therefore, more economical to produce

Basically, the automatic railway car coupler in which the invention resides, comprises two matching coupler heads each to be mounted in normal manner on the ends of respective cars and each being provided with a coupler face complementarily disposed relative to the other so as to make abutting engagement when the cars are coupled together. Each of the coupler heads is also provided with guide pins, properly disposed hose connections opening to the coupler face, and mating electrical connectors, said guide pins serving to align the coupler heads and, therefore the hose and electrical connections, when the cars are coupled, the complementary coupler faces coming into abutting relation to form airtight connections between the respective hose connections and electrical contact between the electrical connectors. Respective spring-biased latches on each coupler head lock the guide pins in coupled position, while respective fluid pressure operable pistons carried on each coupler head and operably controlled by and electrically-operated solenoid valve device serve to

unlock the latches by applying a hammer-like blow on the latches when the cars are to be uncoupled. The electrical connecting portions carried on the coupler heads are also provided with self-guiding means for insuring proper connection of the electrical conductors for the electrical circuitry of the train.

In the drawings, FIG. 1 is a schematic plan view, mostly in section, of a portion of an automatic coupler shown in coupled relation, including various pipes and control devices associated therewith, and with a pipe-connecting portion shown rotated 90° out of its normal position for convenience of illustration; FIG. 2 is a plan view, in outline and on a smaller scale than FIG. 1, showing mating coupler heads of the coupler shown in FIG. 1, but in an uncoupled relation; FIG. 3 is an elevational view, in section and on the same scale as FIG. 1, taken along line III—III of FIG. 1 as viewed in the direction indicated by the arrows; FIG. 4 is an elevational head-on view, in outline, of one of the mating coupler heads; and FIG. 5 is an elevational side view, in outline, of the coupler head shown in FIG. 4.

Description and operation

As shown in FIG. 1, the automatic railway car coupler embodying the invention comprises two mating coupler heads, which, for convenience with respect to the relative position in which they are shown in the drawing, are designated with the reference characters 1L and 1R, the letters "L" and "R" being suffixed thereto for designating the left-hand coupler head and the right-hand coupler head, respectively, as viewed in the drawing. Since the mating coupler heads 1L and 1R are similar in structure, all corresonding components thereof will be hereinafter identified by similar reference numerals, but modified by the suffix letters "L" or "R" to thereby designate whether reference is being made to the left-hand coupler head 1L or the right-hand coupler head 1R.

The coupler heads 1L and 1R, which are shown in a plan view in FIG. 1 of the drawings, comprise respective mounting body portion on which respective latch portions 2L and 2R and respective pipe-connecting portions 3L and 3R are supported, said pipe-connecting portions being actually disposed above the latch portions, as shown in FIGS. 4 and 5, but which, for convenience of description and illustration in FIG. 1, have been rotated 90° so that the details thereof may be shown in the plane of the drawing along with the details of said latch portions. As shown in FIG. 5, the mounting body portion, on which the latch portion 2L is supported, is provided with a bore for receiving a pin (not shown), whereby the coupler head 1L may be flexibly mounted on the draft gear (not shown) in the usual position at the end of the center sill (not shown) of the respective railway car (not shown) so that when the two cars are brought together, respective oppositely facing face plates 4L and 4R supported on the mounting body portions of the coupler heads 1L and 1R, respectively, make abutting engagement with each other. In the horizontal or plan view of FIG. 2, the coupler heads 1L and 1R are illustrated in a separated or uncoupled relationship, the line of movement toward or away from each other being indicated by a broken line.

For purposes of convenience, only one of the coupler heads, say 1L in this case, will be described in detail with the understanding that the corresponding component parts in the counterpart mating coupler head 1R will be assigned corresponding reference numerals but modified by the suffix letter "R," as above noted. It should be understood, therefore, that in any instance hereinafter, when a part is identified by a reference numeral modified by a suffix letter "L" or "R," there is a corresponding part in one or the other of the coupler heads

even though such corresponding part may not be actually shown in the drawings or mentioned specifically in the description thereof.

The coupler head 1L, therefore, further comprises a guide pin 5L projecting perpendicularly from the face plate 4L. The guide pin 5L has a tapered end 6L to insure insertion of the guide pin into an axially disposed guide bore 7R formed in the face plate 4R of the coupler head 1R, the respective axes of said guide pin and guide bore being correspondingly radially spaced from the respective axes of the two coupler heads, or, in other words, equidistantly spaced from a vertical plane passing through the longitudinal center line of the car. Thus, when the two railway cars are brought together to be coupled, the guide pins 5L and 5R enter the oppositely disposed guide bores 7R and 7L, respectively, and thereby effect proper alignment of the two coupler heads 1L and 1R.

The guide pin 5L disposed on the face plate 4L is further provided with a notch 8L into which a foot portion 9R of a latch member 10R of the coupler head 1R (see details in FIG. 3) is adapted to be biased by a spring 11R, said foot portion riding up the tapered end of the guide pin 5L against the biasing action of said spring when the coupler heads are brought together. Thus, when the face plates 4L and 4R make abutting contact, both foot portions 9L and 9R of the respective latch members 10L and 10R are simultaneously forced into the respective notches 8R and 8L into respective latching positions to thereby lock the coupler heads 1L and 1R in a coupled relationship until released in a manner to be hereinafter described. The ends of each of the notches 8L and 8R adjacent the tapered portions 6L and 6R, respectively, as well as the corresponding adjacent abutting sides of the foot portions 9R and 1L are complementarily tapered so as to provide constant axially directed forces toward each other to maintain the face plates 4L and 4R in constant abutting contact and thereby eliminate vibration and possible damage to the coupler by any lost motion between the two coupler heads.

Although, for convenience, all sectionalized details of the latch portions 2L and 2R, as viewed in FIG. 1, are shown in the plane of the drawing, it should be understood that in the physical structure such may not necessarily be the case, as, for example, the axes of the guide pins 5L and 5R actually lie in a plane closer to the viewer than the axes of the latch portions 2L and 2R, as viewed in FIG. 1. The guide pin 6R, therefore, has been shown in phantom outline in FIG. 1 so as not to obscure the other details of the latching mechanism, which are to be henceforth described.

The biasing spring 11L encircles a guide rod 12L on which the latch member 10L is coaxially slidable (see FIG. 3), one end of said spring bearing against a spring seat 13L fixed perpendicularly to the face plate 4L, while the other end bears against the base of a cavity formed in a cylindrical portion 14L of the latch member 10L, said cylindrical portion having a coaxially disposed bore to permit sliding movement thereof on the guide rod 12L and on which cylindrical portion the foot portion 9L is carried.

As shown in FIG. 1, a casing 15L is supported on the face plate 4L and is divided by a separating wall 16L into two fluid pressure chambers 17L and 18L communicable with each other via a passageway 19L formed in said separating wall, a piston 20L cooperating with said casing and said separating wall to define said chamber 17L. The end of passageway 19L opening into chamber 17L is enlarged and surrounded by an annular valve seat 21L on which a valve member 22L, carried concentrically on the end of piston 20L adjacent chamber 17L, is adapted to seat for cutting off communication between chambers 17L and 18L. A stem portion extends coaxially from the side of piston 20L opposite

chamber 17L, which stem portion is axially aligned with the guide rod 12L, projects exteriorly of casing 15L, terminates a predetermined distance short of the end of guide rod 12L and has a coaxial cavity 23L formed therein and in which a biasing spring 24L is compressed between the base of said cavity and a spring seat 25L carried on the adjacent end of guide rod 12L. The spring 24L serves to bias the piston 20L and, therefore, the valve member 22L toward a normal position in which said valve member is seated on valve seat 21L to cut off communication between chambers 17L and 18L and in which the latch member 10L moves to a latching position wherein the foot portion 9L may engage the notch 8R, as will be more fully explained hereinafter. A pressurized fluid delivery conduit or pipe 26L is connected to chamber 18L, while chamber 17L is open to atmosphere via a restricted opening or choke 27L for a purpose to be hereinafter disclosed.

In describing the pipe-connecting portions 3L and 3R of the respective coupler heads 1L and 1R, it again will be understood that only one of said pipe-connecting portions, in this case 3L, will be specifically described with all corresponding parts of portion 3R being assigned corresponding reference numerals but modified with the suffix letter "R," as above explained. Pipe-connecting portion 3L, as previously noted, is actually disposed above the latch portion 2L when the coupler head is mounted on the vehicle, but solely for convenience is shown in the same plane, that is, the plane of the drawing, as the latch portion 2L in FIG. 1.

The pipe-connecting portions 3L and 3R each comprises a pipe-connecting face plate for supporting the several pipe connectors which, when coupled, provide the necessary connections for the various fluid pressure conduits or pipes associated with the brake system which, in this case is the well-known combined straight-air and automatic brake system. Since a detailed description of the brake system is not deemed essential to an understanding of the invention, it is considered sufficient to merely say that the combined straight-air and automatic brake system comprises a straight-air portion and an automatic portion, both of which can be operated independently of each other by the operator by manipulating an engineer's brake valve in the control unit or car of the train. On trains of the rapid transit type such as those for which the present coupler is primarily intended, the straight-air portion of the brake system is used primarily for all normal braking operations, whereas the automatic portion is provided as a back-up brake in case of failure of the straight-air portion. Further specific comments relating to the straight-air and automatic portions of the brake system will appear hereinafter as deemed necessary.

The structure and function of the pipe-connecting portion 3L, which comprises a feed valve pipe connector 28L, a straight-air pipe connector 29L, a brake pipe connector 30L and a coupler operating pipe connector 31L will be best understood if reference is made to the diagrammatic illustration thereof in FIG. 1 of the drawings while reading the description immediately following.

The feed valve pipe connector 28L comprises a casing 32L supported on the face plate of the pipe-connecting portion 3L and has a chamber 33L which opens via a connecting passage 34L to the abutting surface of said face plate to register with a corresponding opening on the abutting surface of the face plate of the pipe-connecting portion 3R, when the coupler heads 1L and 1R are in a coupled relationship, said corresponding opening being connected via a connecting passage 34R with chamber 33R of the feed valve pipe connector 28R. The ends of connecting passages 34L and 34R adjacent the abutting surfaces of the pipe-connecting face plates are surrounded by annular sealing elements 35L and 35R, respectively, to provide an airtight seal therebetween in the coupled relationship of the coupler heads 1L and 1R, the opposite ends of said connecting passages being surrounded by

respective annular valve seats 36L and 36R. A valve member 37L disposed in chamber 33L is biased by a spring 38L toward a seated position relative to valve seat 36L, in which seated position communication between connecting passage 34L and a segment 39L of a feed valve pipe 39 connected to chamber 33L is cut off.

The feed valve pipe 39, as is well known by those skilled in the art, serves as a source of fluid at a preselected pressure for supplying pressurized fluid to various control devices on the cars making up the train, one of such devices to be more fully described hereinafter. It is necessary, therefore, that uninterrupted communication be maintained through the feed valve pipe 39, which runs throughout the entire length of the train by being connected between adjacent cars by the coupler heads 1L and 1R. To insure uninterrupted communication through the feed valve pipe 39 extending through the cars making up the train, the valve members 37L and 37R are provided with respective valve stems 40L and 40R extending perpendicularly therefrom and toward each other through the connecting passages 34L and 34R to have the respective free ends thereof make abutting contact with each other, when the coupler heads 1L and 1R are in a coupled relationship, said valve stems being of such length as to hold said valve members in respective unseated positions relative to the respective valve seats 36L and 36R, thereby maintaining said uninterrupted communication. Of course, upon uncoupling of the coupler heads 1L and 1R, the valve stems 40L and 40R are separated from each other and the springs 38L and 38R, therefore, cause the valve members 37L and 37R to be moved to respective seated positions on the valve seats 36L and 36R, respectively, so that the fluid pressure is prevented from escaping from the feed valve pipe 39 when two adjacent cars are uncoupled.

The straight-air pipe connectors 29L and 29R, similarly to the feed valve pipe connectors 28L and 28R, comprise, respectively, casings 41L and 41R, chambers 42L and 42R, connecting passages 43L and 43R, annular sealing elements 44L and 44R, valve seats 45L and 45R, valve members 46L and 46R, biasing springs 47L and 47R, and valve stems 48L and 48R. In this instance, however, the chambers 43L and 43R are connected to segments 49L and 49R of a straight-air pipe 49 which is the control conduit of the straight-air portion of the brake system above mentioned. In that the straight-air pipe connectors 29L and 29R are identical in structure to the feed valve pipe connectors 28L and 28R, and therefore function in identical manner as said feed valve pipe connectors, it is not deemed necessary to further amplify on such structure and function of said straight-air pipe connectors.

The straight-air pipe 49, as is well known to those familiar with the art, serves as the control conduit for the straight air portion of the brake system for effecting a brake application and release thereof, and, therefore, similarly to the feed valve pipe 39, must extend throughout the entire length of the train. Normally the straight-air pipe 49 is open to atmosphere and therefore maintained at atmospheric pressure when the brakes are in a released state. In order to effect a brake application, the operator causes the straight-air pipe 49 to be closed to atmosphere and charged with fluid pressure by operating an independent brake valve (not shown) located in the control car, the degree of said application being commensurate with the degree of pressure to which said straight-air pipe is charged. Any degree of reduction of pressure in the straight-air pipe 49, as caused by the operator, effects a corresponding reduction of the brake application, unless such pipe pressure is reduced all the way to atmospheric pressure at which a complete release of the brake application is effected. It is essential, therefore, for proper control of the brakes, that communication throughout the entire length of the straight-air pipe 49 be uninterrupted. This uninterrupted communication is insured by the valve stems 48L and 48R in a manner similar to that performed by valve stems 40L and 40R associated with feed valve pipe connectors 28L and 28R, respectively.

The brake pipe connectors 30L and 30R are also identical in structure to each other and, therefore, only one side, the connector 30L in this case, will be described in detail, it being again understood that all corresponding elements will be designated with similar reference numerals but distinguished by the suffix letters "L" and "R," as above explained.

The brake pipe connector 30L comprises a casing 50L having a piston member 51L axially operable therein and cooperative with said casing to form on one side of said piston member a fluid pressure control chamber 52L open to atmosphere via a restricted opening or choke 53L and connected to a pressurized fluid delivery conduit 54L, and on the other side of said piston member a connecting chamber 55L connected to a brake pipe segment 56L of a brake pipe 56. The connecting chamber 55L opens to the abutting surface of the pipe-connecting face plate on the coupled head 1L via a connecting passage 57L which is adapted to register with a correspondingly disposed opening on the abutting surface of the pipe-connecting face plate on the coupler head 1R, when said coupler heads are in a coupled relationship, said correspondingly disposed opening being connected via a connecting passage 57R with connecting chamber 55R of the brake pipe connector 28R. The ends of connecting passages 57L and 57R adjacent the abutting surfaces of the pipe-connecting face plates are encircled by annular sealing elements 58L and 58R, respectively, to provide an airtight seal therebetween in the coupled position of the coupler heads 1L and 1R, the opposite ends of said connecting passages being encircled by respective annular valve seats 59L and 59R. A spring 60L, disposed in control chamber 52L, biases the piston member 51L toward a position in which a valve member 61L carried on the side of said piston adjacent connecting chamber 55L occupies a seated position relative to the valve seat 59L to cut off communication between the connecting passage 57L and brake pipe segment 56L through said connecting chamber. When fluid pressure in connecting chamber 55L exceeds the combined opposing forces of spring 60L and fluid pressure in control chamber 52L, piston member 51L is moved in the opposite direction to a position in which valve member 61L occupies an unseated position relative to the valve seat 59L to provide communication between brake pipe segment 56L and connecting passage 57L.

The brake pipe 56 serves as the control conduit of the automatic portion of the brake system, which automatic portion, as above noted, is provided on the train as a safety measure and may be used in the event of failure of the straight-air portion of the brake system. Operation of the automatic portion, in case of necessity, is effected by manipulation of the engineer's brake valve by the operator in the control car. Briefly, as is understood by those skilled in the art, a brake application and release thereof is effected when the operator manipulates the engineer's brake valve to cause reduction and increase, respectively, of fluid pressure in the brake pipe 56 which, through connections of hoses at each end of the cars making up the train, runs throughout the entire length of the train. It is evident, therefore, just as in the case of the feed valve pipe 39 and the straight-air pipe 49, that communication throughout the entire length of brake pipe 56 must be kept open at all times, even if a brake pipe reduction for effecting a brake application were of such a degree as would occur, for example, when brake pipe pressure is reduced to zero for effecting an emergency application, as to render the biasing springs 60L and 60R effective for moving pistons 51L and 51R and, therefore, valve members 61L and 61R toward respective seated positions on valve seats 59L and 59R. Of course, if, in such a situation, the valve members

61L and 61R were permitted to move all the way to their respective seated positions, communication between brake pipe segments 56L and 56R, and, therefore, through brake pipe 56 would be cut off. To prevent seating of the valve members 61L and 61R and consequent interruption of communication through the brake pipe 56 when a brake pipe pressure reduction of such a degree is made, therefore, each of the piston members 51L and 51R is provided with respective piston stems 62L and 62R extending coaxially therefrom and toward each other through the respective connecting passages 57L and 57R. The lengths of the piston stems 62L and 62R are such as to have their respective free ends make abutting engagement at such a point that the travel of the respective piston members 51L and 51R, as effected by springs 60L and 60R should a sufficient brake pipe pressure reduction be effected, is terminated short of the point where the respective valve members 61L and 61R would seat on valve seats 59L and 59R. Thus, uninterrupted communication through the brake pipe 56 is insured.

The coupler operating pipe connectors 31L and 31R are correspondingly disposed on the oppositely facing pipe-connecting face plates, respectively, and are each provided with respective sealing elements 63L and 63R so that an airtight connection is effected, when the coupler heads 1L and 1R are coupled, between two branch pipes 64L and 64R connected to delivery pipes 26L and 26R, respectively, said delivery pipes being connected to delivery ports (not shown) of respective electro-magnet valve devices 65L and 65R. The delivery pipes 54L and 54R leading to the break pipe connectors 30L and 30R are also connected to delivery ports (not shown) of the electro-magnet valve devices 65L and 65R, respectively. A supply pipe 66L connects inlet ports (not shown) of the valve device 65L to the feed valve pipe 39.

FIG. 4 of the drawings more accurately illustrates the actual structure of the coupler head 1L and the respective relative positions occupied by the pipe-connecting portion, the latch portion and the electrical circuitry connecting portions comprising asid coupler head. It will be observed as shown in FIG. 4, that the pipe-connecting portion 3L of the coupler head 1L is actually provided with two feed valve pipe connectors 28L, two straight-air pipe connectors 29L and two coupler operating pipe connectors 31L, as is the pipe-connecting portion 3R (not shown) of the coupler head 2R. In addition, though not shown in the drawings, the two feed valve pipe connectors 28L are connected in parallel relation by a common pipe (not shown) to the portion 39L of the feed valve pipe 39, the two straight-air pipe connectors 29L and the two coupler operating pipe connectors 31L being similarly connected by respetcive common pipes (not shown) to the straight-air pipe 49 and to branch pipe 64L, respectively. The brake pipe connectors 30L and 30R are centrally located on the respective pipe-connecting portions 3L and 3R. By providing two of each of the connectors 28L, 29L and 31L, with each pair connected in parallel relation, as above described, it is thus possible to make proper connection of the respective fluid pressure pipes even when the cars, on which the coupler heads are mounted, are turned end-for-end. Since the brake pipe connectors 30L and 30R are centrally disposed, it should be apparent that it is not necessary to have two of such brake pipe connectors on each coupler head.

Since the electro-magnet valve devices 65L and 65R are identical structurally and functionally, only one of said devices, namely, the device 65L, will be described in detail, it being understood, as previously explained, that corresponding elements of the device 65R will be assigned corresponding reference numerals but modified by the suffix letter "R."

The electro-magnet valve device 65L, which is represented diagrammatically, is suitably situated at the end of the car on which the coupler head 1L is mounted and is provided for uncoupling operation of the coupler in a manner to be more fully explained hereinafter, it being understood that one such valve device is provided at each end of each car for controlling operation of the respective couplers at the respective ends and that one or the other of the electro-magnet valve devices on the adjacent ends of two adjacent cars is utilized to effect uncoupling of the coupler between said two adjacent cars depending upon which portion of the train is to be left standing, as will later be explained. The electro-magnet valve device 65L comprises a solenoid portion 67L connected in an electrical circuit 68L for operating a valve portion 69L, which, during such time that the electrical circuit is open and therefore said solenoid portion is electrically deenergized, is biased toward and occupies a cut-off position in which communication between the supply conduit 66L and the delivery conduits 54L and 26L is closed, said cut-off position being represented diagrammatically in the drawing by the solid lines 70L. Upon closing of the electrical circuit 68L, as effected by closing an electrical coupler-operating switch 71L conveniently located on the end of the car adjacent coupler head 1L, and therefore energization of the solenoid portion 67L, the valve portion 69L is operated to a supply position in which communication between supply pipe 66L and delivery pipes 54L and 26L is established via respective passage means 72L and 73L represented diagrammatically in the drawing by respective broken lines.

The delivery pipe 54L is also connected to a fluid pressure operable electrical switch device 74L which normally occupies an open position and is interposed in an electrical circuit 75L for controlling an electrical relay 76L. Pressurization of delivery pipe 54L, when the valve portion 69L is in its supply position due to energization of solenoid portion 67L of valve device 65L, causes the switch 74L to be operated to a closed position for closing circuit 75L and thereby effect energization of the winding of relay 76L. Energization of the winding of relay 76L causes a normally open contact member 77L of the relay to be operated to a closed position, said contact member being connected across a power loop circuit 78, the purpose of which will be hereinafter disclosed. Of course, deenergization of solenoid portion 67L of the valve device 65L causes the valve portion 69L to be restored to its cut-off position to cut off supply of pressurized fluid to pipe 54L, whereby fluid pressure in said pipe and therefor that acting on pressure switch 74L is dissipated at a predetermined restricted rate via said pipe, control chamber 55L of the brake pipe connector 30L and choke 53L. The pressure switch device 74L resumes an open position after a predetermined delay determined by the flow rate capacity of choke 53L, in which open position circuit 75L is thereby opened to deenergize the winding of relay 76L. Closing of the contact member 77L and the delay in reopening thereof during uncoupling operation, in the manner above described, assures that the power loop circuit 78, which extends throughout the train, remains closed on that portion of the train to be moved for the length of time required for the uncoupling operation and until an automatically operable switch, associated with the coupler head 1L on the rear end of the last car of the train portion being moved, is closed for maintaining said power loop circuit closed thereafter. The power loop circuit 78 and its function will be described in greater detail hereinafter.

The mating coupler heads 1L and 1R of the automatic car coupler further comprise respective electrical circuitry connecting portions 79L and 79R, the details of which are not deemed essential to an understanding of the invention and, therefore, have not been shown. The electrical circuitry connecting portions 79L and 79R are supported on the respective mating coupler heads 1L and 1R underneath the latch portions 2L and 2R, as may be seen in FIGS. 4 and 5 of the drawings wherein said

portion 79L is shown in outline. The electrical circuitry connecting portion 79L, for example, comprises a plurality of mating connectors (not shown) adapted to engage correspondingly disposed connectors (not shown) on the connecting portion 79R (not shown) for making appropriate electrical connections when the mating heads 1L and 1R are brought together in coupled relation. As is the case with the latch portions 2L and 2R and the pipe-connecting portions 3L and 3R, the electrical connecting portions 79L and 79R are identical in structure relative to each other.

The electrical circuitry connecting portion 79L, as well as the portion 79R, is provided with a hinged protective cover plate (not shown) which automatically swings into a protective position in front of the electrical connectors when the mating heads 1L and 1R are uncoupled to thereby protect said connectors from dirt or accidental blows from foreign objects. When the two mating heads 1L and 1R are brought together to be coupled, the protective cover plate on the respective mating heads are automatically retracted into a recessed position by mechanical linkage (not shown) which is actuated by the coupling operation, thereby exposing the electrical connectors so that they may make connecting engagement with the connectors (not shown) on the electrical circuitry connecting portion 79R of the coupler head 1R.

The power loop circuit 78, which extends throughout the entire length of the train, comprises two electrical conductors 80 and 81 which are connected serially from car to car through the electrical circuitry connecting portions of the coupler heads. Since electrical current is supplied through the power loop circuit 78 to various equipment on the train, such as the tail and stop lights on the rear end and the operator's controller on the lead car, for example, it is essential that the continuity of said loop circuit be maintained without interruption in order not to lose control of the train. Such continuity is normally provided through the electrical connectors of the electrical circuitry connecting portions 79L and 79R when in a coupled relation. Since the coupler head on the rear end of the last car in the train, however, is not coupled to a mating coupler head, other means must be provided for maintaining continuity of the power loop circuit 78 in such a situation.

Each of the electrical circuitry connecting portions of the coupler heads, such as the electrical circuitry connecting portion 79L on the coupler head 1L, is provided with an automatically operable electrical switch 82L, for example, which is the automatically operable switch referred to above in connection with the power loop circuit 78 and is shown diagrammatically in FIG. 1 of the drawings. Switch 82L, which is connected across circuit 75L in parallel relation to pressure switch 74L, may be a simple spring-biased plunger type switch operable to a closed position, when the cover plate of the connecting portion 79L is completely closed, and to an open position when said cover plate is in its recessed position. Of course, in the closed position of switch 82L, relay 76L is actuated to effect closing of the power loop circuit 78. Thus, if switch 82L happens to be the one carried by the coupler head at the rear end of the last car in the train, then, of course, said switch is closed because the cover plate of the electrically circuitry connecting portion 79L is in its closed position, and the power loop circuit 78 is closed at the rear end of the train. If switch 82L, however, is the one carried by the coupler head on the end of the car being cut out of the train, such as when coupler head 1L is uncoupled from coupler head 1R, closing of said switch is effected when said coupler heads are completely separated and the cover plate of portion 79L has had an opportunity to assume its closed or protective position. Continuity of the power loop circuit 78 is thus automatically effected by operation of switch 82L or the corresponding switch on any car being uncoupled from another, upon complete separation of the coupler heads, and said continuity is assured and maintained by operation of pressure switch 74L, as above described, during such uncoupling operation.

Another electrical switch 83L, which is also shown diagrammatically in FIG. 1 and is connected across circuit 75L in parallel relation to switches 74L and 82L, is provided on the electrical circuitry connecting portion 79L and on each of the other such connecting portions for emergency use. The electrical connectors (not shown) on each of the electrical circuitry connecting portions, such as connecting portions 79L, may be carried by respective spring-biased sliding members (not shown), which, in the event of electrical malfunctioning on one of the cars causing said car to be disabled or adversely affecting operation of the other cars, may be manually operated to respective retracted positions for disengaging said electrical connectors and thus interrupting the electrical circuitry connection through said connectors. Switch 83L, however, is so arranged that, upon manual operation of the sliding member to its retracted position and prior to complete separation of the electrical connectors, said switch is operated to a closed position in which relay 76L is actuated to maintain power loop circuit 78 closed as long as the sliding member is in its retracted position. Latching means (not shown) are provided for maintaining the sliding member in its retracted position until manually released, whereupon switch 83L is operative to an open position.

By providing switch 83L, as above described, a disabled car does not necessarily have to be cut out of the train to be temporarily abandoned, but may be coupled to the rear of the train (unless it is already the last car) to be towed to the maintenance depot. With the disabled car coupled to the rear of the train, the car adjacent thereto becomes the rearmost operative car. But since the two cars are coupled to each other, the cover plate on the coupler head cannot assume its closed position for closing switch 82L. Switch 83L, however, on the rearmost operative car can be closed, as above described, thus electrically isolating the disabled car and, at the same time, closing the power loop circuit 78 for maintaining continuity thereof and control of the train.

In operation, assuming that two cars, on which the coupler heads 1L and 1R are mounted, are moved toward each other. Upon contact of the coupler heads 1L and 1R, the tapered portions 6L and 6R of the guide pins 5L and 5R enter the guide bores 7R and 7L, respectively, and thereby effect proper alignment of said coupler heads and at the same time allow the foot portions 9R and 9L of latch members 10R and 10L to ride up said tapered portions of the guide pins until the face plates 4L and 4R make abutting contact. Upon contact of face plates 4L and 4R, the foot portions 9R and 9L positionally register with the notches 8L and 8R of the guide pins 5L and 5R so as to be forced thereinto by springs 11R and 11L, respectively, to effect locking of the heads 1L and 1R in a coupled relationship. As was previously noted, the complementary tapered contacting surfaces at one end of the foot portions 9R and 9L and of the notches 8L and 8R, acting cooperatively with the biasing effect of the springs 11R and 11L, maintain said foot portions firmly engaged and thereby also keep the abutting surfaces of the face plates 4L and 4R firmly in contact with the each other to prevent any lost motion or vibration therebetween.

Engagement of the coupler heads 1L and 1R in a coupled relation also effects abutting contact of the face plates of the pipe-connecting portions 3L and 3R and, therefore, air-tight connections of the feed valve pipe connectors 28L and 28R, the straight-air pipe connectors 29L and 29R, the brake pipe connectors 30L and 30R, and the coupler operating pipe connectors 31L and 31R. The valve stems 40L and 40R of the feed valve pipe connectors 28L and 28R make abutting engagement to unseat and maintain the respective valve members 37L

and 37R in unseated positions and thereby establish and maintain communication between the feed valve pipe segments 39L and 39R and through feed valve pipe 39, in the manner above described. The valve stems 48L and 48R of the straight-air pipe connectors 29L and 29R effect and maintain communication between straight-air pipe segments 49L and 49R and through straight-air pipe 49 in a similar manner.

Upon initial abutting contact of the piston stems 62L and 62R of the brake pipe connectors 30L and 30R, the respective valve members 61L and 61R, which, prior to such abutting contact, occupy a seated position relative to the respective valve seats 59L and 59R, are unseated to expose the entire areas of the pistons 51L and 51R adjacent connecting chambers 55L and 55R, respectively, to brake pipe pressure prevailing in said connecting chambers. Assuming the pressure in control chambers 52L and 52R to be at atmospheric pressure, the brake pipe pressure, which may be on the order of 70 p.s.i. when the brake pipe 56 is fully charged, in connecting chambers 55L and 55R maintains the pistons 51L and 51R and, therefore, the piston stems 62L and 62R in an axially spaced-apart relationship so as to keep the valve members 61L and 61R in respective unseated positions and thereby maintain communication between the brake pipe segments 56L and 56R and through said brake pipe. Although, even if brake pipe pressure is reduced to below a certain degree in the event a brake application is effected through the automatic brake portion of the brake system, the piston stems 62L and 62R, in the manner previously described, will prevent seating of the valve members 61L and 61R.

Of course, with the coupler heads 1L and 1R in coupled relation, communciation between branch pipes 64L and 64R is established through the coupler operating pipe connectors 31L and 31R.

Coupling of the coupler heads 1L and 1R also effects coupling engagement of the electrical circuitry connecting portions 78L and 78R in the manner previously set forth herein.

When two cars or portions of the train are to be uncoupled, which is effected by operation of one or the other of the electro-magnet valve devices 65L or 65R when the solenoid portion thereof is energized, it is important that the correct one of said electro-magnet valve devices be actuated, depending upon whether the left-hand or right-hand car, as viewed in the drawing, is to be moved. This is necessary, as will be more fully explained, in order to prevent an untimely brake application, particularly on that portion of the train to be moved, which would normally result by separation of the brake pipe connectors 30L and 30R and due to the inherent operating characteristics of the automatic portion of the brake system. This aspect of the uncoupling operation will become more evident as the operation is described in greater detail. For purposes of describing the uncoupling operation, therefore, let it be assumed that the left-hand side of the train, which includes the car on which the coupler head 1L is mounted, is to be uncoupled and moved from the right-hand side, which includes the car on which the coupler head 1R is mounted and is to be left standing. Since the left-hand portion of the train is to be moved, the trainman must effect energization of the electro-magnet valve device 65L mounted on the left-hand car adjacent the end on which the coupler head 1L is mounted rather than the electro-magnet valve device 65R, as above mentioned and for reasons which will become evident.

To unlock the coupler heads 1L and 1R so that the cars may be separated, the trainman closes the coupler operating switch 71L to effect closing of electrical circuit 68L, thereby causing the solenoid portion 67L of the electro-magnet valve device 65L to be energized and effect operation of the valve portion 30L in its supply position. With the valve portion 30L in its supply position, communications 72L and 73L are opened to provide supply of pressurized fluid from supply pipe 66L to delivery pipes 54L and 26L.

Pressurization of delivery pipe 54L causes pressure switch 74L to be closed for actuating relay 76L, in the manner above described, to cause contact member 77L to be operated to its closed position and thereby maintain continuity of the power loop circuit 78 for the train during the uncoupling operation until the cover plate on the electrical circuitry connecting portion 79L assumes its closed position, at which time the automatically operable switch 84L picks up the relay 76L to maintain said power loop circuit closed.

At the same time that fluid pressure is supplied to the pressure switch 73L, pressurized fluid is also supplied from the delivery pipe 54L to control member 52L of the brake pipe connector 30L. Due to the restrictive rate at which the choke 53L permits fluid pressure to escape from control chamber 52L, fluid pressure builds up in said chamber almost instantaneously and, along with spring 60L, is effective for moving the piston member 51L and the valve member 61L toward the valve seat 59L to insure seating of said valve member on said valve seat, if not before, immediately after separation of the cars when connecting passage 57L is exposed to atmospheric pressure. Seating of valve member 61L on valve seat 59L prevents reduction of brake pipe pressure in brake pipe segment 56L and, therefore, in brake pipe 56 on the left-hand portion of the train when the cars are separated, thereby preventing an untimely brake application on that portion of the train or car which is to be moved, as would normally occur, as above explained, with the automatic portion of the brake system when a reduction of pressure is made to the brake pipe 56. On the other hand, since the electro-magnet valve device 65R on the right-hand car or portion of the train, which is to be left standing, is not energized, pressurized fluid is not supplied to the control chamber 52R to assist the spring 60R in seating valve member 61R. Thus, upon separation of the two portions of the train, fluid pressure in brake pipe segment 56R will reduce via connecting chamber 55R and connecting passage 57R sufficiently to effect a brake pipe reduction and a consequent brake application before spring 60R can effect seating of valve member 61R. In this manner, the brakes are automatically set on the portion of the train left standing. This characteristic of the automatic brake portion of the brake system thus also provides a safety feature in that, should any part of the train unintentionally become separated from the remainder of the train, pressure in the brake pipe 56 on both portions of the train would vent to atmosphere via connecting chambers 55L and 55R and connecting passages 57L and 57R to reduce sufficiently for causing a brake application to be effected before the springs 60L and 60R would be effective for seating valve members 61L and 61R, because under these conditions there would be no pressure in either of the control chambers 52L and 52R to cause prompt seating of said valve members upon train separation.

Also, at the same time that the electro-magnet valve device 65L is energized to supply pressurized fluid to pressure switch 74L and control chamber 52L of brake pipe connector 30L via communication 72L and delivery pipe 54L, such pressurized fluid from supply pipe 66L is also supplied to pressure chamber 18L of latch portion 2L via communication 73L in the valve device 65L and delivery pipe 26L, and to pressure chamber 18R of the latch portion 2R via said communication, delivery pipe 26L, branch pipe 64L, pipe connectors 31L and 31R, branch pipe 64R and delivery pipe 26R. Such fluid pressure builds up simultaneously in both pressure chambers 18L and 18R until the pressure acting on the areas of the valve members 22L and 22R enclosed within the valve seats 21L and 21R, respectively, is sufficient for overcoming opposition of springs 24L and 24R to cause

initial unseating of said valve members. Upon unseating of the valve members 22L and 22R, fluid pressures prevailing in chambers 18L and 18R immediately charge pressure chambers 17L and 17R to become effective over the larger areas of pistons 20L and 20R and cause sudden axial movement of said pistons from their normal positions, in which the stem portions of said pistons are out of contact with the adjacent ends of latch members 10L and 10R, toward said latch members to thereby impart a hammer-like blow on the adjacent ends of said latch members, thus dislodging the foot portions 9L and 9R of said latch members from the notches 8R and 8L, respectively, and moving the latch members to respective unlatched positions. With the latch members 10L and 10R operated to their respective unlatched positions, the coupler heads 1L and 1R, and therefore the respective cars on which they are carried, may be separated by pulling away the left side of the train. When the coupler heads 1L and 1R are separated, fluid pressure in chambers 17L and 17R is permitted to escape therefrom to atmosphere via passageways 19L and 19R, chambers 18L and 18R, pipes 26L and 26R, pipes 64L and 64R, and connectors 31L and 31R, respectively, whereupon the latch members 10L and 10R are restored to their respective latching positions by the springs 11L and 11R. Of course, some of the fluid pressure in chambers 17L and 17R also escapes via the chokes 27L and 27R. The primary purpose of chokes 27L and 27R, however, is to provide a means via which fluid pressure in chambers 17L and 17R may escape in the event that the hammer-like blows delivered by the pistons 20L and 20R, respectively, do not succeed in dislodging the latch members 10L and 10R, or either one, from the respective notches 8R and 8L. In such an event, the trainman can effect successive operations of the pistons 20L and 20R, as often as is necessary and after the fluid pressure in chambers 17L and 17R has been dissipated via the chokes 27L and 27R, respectively, until unlatching results. It should be apparent that the escape means 27L and 27R must be restricted in order to allow sufficient build-up of pressure in chambers 17L and 17R for operating the pistons 20L and 20R, respectively.

When the two cars or train portions are completely separated, the trainman releases, that is, opens, the coupler operating switch 71L thus deenergizing solenoid portion 67L of the electro-magnet valve device 65L for causing the valve portion 69L to be restored to its normal cut-off position in which supply of pressurized fluid from supply pipe 66L to the pressure switch device 74L, to control chamber 52L of the brake pipe connector 30L, and to the pressure chambers 18L, 17L and 18R, 17R of the latch portions 2L and 3L, respectively, is cut off. With fluid pressure supply from supply pipe 66L thus cut off, fluid pressure acting on pressure switch 74L and in control chamber 52L of the brake pipe connector 30L is gradually dissipated via delivery pipe 54L and choke 53L in said brake pipe connector. With complete dissipation of fluid pressure in pressure switch 74L, said pressure switch is restored to its open position. Relay 76L, however, remains energized because switch 82L is now closed, as was above explained. The delay of venting of fluid pressure from the pressure switch 74L imposed by the choke 53L, however, insures a sufficient length of time for the automatically operable switch 82L to have been operated to its closed position for maintaining continuity of the power loop circuit 78 on the left-hand car or train portion closed during operation or movement thereof.

Moreover, the delay of venting of fluid pressure from control chamber 52L insures that such pressure in said chamber, acting with spring 60L, will retain the valve member 61L seated until the two train portions are completely separated, after which said spring, along with brake pipe pressure in connecting chamber 55L acting on the area of piston 51L exposed thereto, is sufficient for retaining said valve member seated against atmospheric pressure acting on the exterior thereof.

Having now described the invention, what we claim as new and desire to secure by Letters Patent, is:

1. In an automatic railway car coupler apparatus having one coupler head carried on one car and a counterpart mating coupler head carried on another car, the combination of:

(a) a plurality of latch devices each of which is carried in part by one of the coupler heads and in part by the other coupler head and each of which is operative for automatically locking the coupler heads to each other,

(b) a plurality of piston devices at least one of which is carried on one of the coupler heads and at least one of which is carried on the other coupler head, each of said piston devices being operable responsively to fluid pressure acting thereon for unlocking respective ones of said latch devices,

(c) a source of fluid under pressure,

(d) conduit means via which operating fluid under pressure may be supplied from said source to said piston devices,

(e) valve means interposed in said conduit means and having a cut-off position, in which supply of fluid under pressure through the conduit means to said piston devices is cut off, and being operable to a supply position in which supply of fluid under pressure thereto via said conduit means is effected, and

(f) passage means formed in each of the coupler heads and registering with each other in the locked condition of the coupler heads, said passage means providing communication between the piston devices on the respective coupler heads whereby fluid under pressure supplied via said conduit means is communicated simultaneously to all of said piston devices.

2. The combination, as defined in claim 1, further characterized in that said valve means comprises respective valve devices, one on each of the cars and each of which devices is actuable alternatively and independently of the other for effecting said supply or cutoff of fluid under pressure to said plurality of piston devices.

3. Automatic railway car coupler apparatus comprising, in combination:

(a) a first coupler head carried on one car,

(b) a counterpart mating coupler head carried on another car,

(c) a face plate carried on each of said first coupler head and said counterpart mating coupler head in a disposition perpendicular to the longitudinal axis of the respective car for making abutting contact with each other in said coupled relation of the coupler heads,

(d) latch means carried in part by said first coupler head and in part by said counterpart mating coupler head and being operative to automatically lock the coupler heads in said coupled relation upon abutment of said face plates with each other,

(e) a source of fluid under pressure,

(f) piston means operable responsively to fluid under pressure acting thereon for unlocking said latch means,

(g) conduit means via which operating fluid under pressure may be supplied from said source to said piston means,

(h) registering passage means formed in the coupler heads for providing a plurality of airtight fluid pressure connections between the coupler heads when in their said coupled relation,

(i) one of said fluid pressure connections of said registering passage means providing communication via which fluid under pressure supplied through said conduit means is communicated to said piston means,

(j) valve means interposed in said conduit means and

having a cut-off position, in which supply of fluid under pressure through the conduit means to said piston means is cut off, and being operable to a supply position in which supply of fluid under pressure thereto via said conduit means is effected, and

(k) valve apparatus interposed in said registering passage means, said valve apparatus being operative in the uncoupled relation of the coupler heads for closing to atmosphere the passage means on the respective coupler heads providing at least one of the fluid pressure connections and being cooperative upon initial abutting contact of the face plates of the coupler heads for opening communication through the last said one of said fluid pressure connections and thereafter being operably responsive to fluid pressure in the fluid pressure connection for maintaining said communication open in the coupled relation of the coupler heads.

4. The combination, as defined in claim 3, wherein said valve apparatus interposed in the said registering passage means providing at least one of the fluid pressure connections comprises:

(a) a piston valve element having opposite sides of different pressure areas in each of the registering passage means of the last said one fluid pressure connection,

(b) means biasing each of said piston valve elements toward a position in which the larger of the pressure areas thereof seats on an annular valve seat formed in said passage means whereby to cut off said passage means from atmosphere,

(c) stem means projecting from the larger pressure area on each of said piston valve elements and of such length as to abut each other cooperatively in the coupled relation of the coupler heads to effect unseating of the piston valve elements from their respective cooperating annular valve seats to thereby open the fluid pressure connection between the registering passage means, the piston valve elements being maintained unseated by the fluid pressure in the passage means after initial unseating thereof by reason of the fluid pressure acting on the larger pressure area thereof,

(d) the smaller of the pressure areas of each of said piston valve elements being exposed to fluid pressure acting thereon in a chamber for assisting said biasing means in urging said piston valve element toward seated position on its corresponding annular valve seat, and

(e) means for controlling the supply of fluid pressure to the last said chamber.

5. The combination, as defined in claim 4, wherein said valve means interposed in said conduit means is adapted to provide said means for controlling the supply of fluid under pressure to said chamber.

6. The combination, as defined in claim 4, further characterized in that each of the chambers adjacent the respective smaller pressure areas is provided with a restricted atmospheric vent for delaying venting of fluid pressure acting in said chambers for a predetermined period of time after cutoff of the supply of fluid under pressure thereto to thereby insure the effectiveness of such fluid pressure acting in the last-mentioned chambers to effect positive seating of the respective piston valve elements in their respective seated positions.

7. Automatic railway car coupler apparatus comprising, in combination:

(a) a first coupler head carried on one car,

(b) a counterpart mating coupler head carried on another car and adapted to be locked in coupled relation with said first coupler head,

(c) a face plate carried on each of said first coupler head and said counterpart mating coupler head in a disposition normal to the longitudinal axis of the respective car for making abutting contact with each other in said coupled relation of the coupler heads,

(d) a plurality of latch devices each of which is carried in part by said first coupler head and in part by said counterpart mating coupler head and each of which is operative to lock the coupler heads in said coupled relation,

(e) a plurality of piston devices at least one of which is carried on said first coupler head and at least one of which is carried on the counterpart mating coupler head, each of said piston devices being operable responsively to fluid pressure acting thereon for unlocking respective ones of said latch devices,

(f) a source of fluid under pressure,

(g) conduit means via which operating fluid pressure may be supplied from said source to said piston devices,

(h) valve means interposed in said conduit means and having a cut-off position in which supply of fluid under pressure through the conduit means to said piston devices is cut off, and being operable to a supply position in which supply of fluid under pressure thereto via said conduit means is effected, and

(i) registering passage means disposed partly on said first coupler, head and partly on said counterpart mating coupler head for providing a plurality of airtight fluid pressure connections between the coupler heads when in their said coupled relation,

(j) one of said fluid pressure connections of said registering passage means providing communication between the piston devices on the respective coupler heads whereby fluid under pressure supplied via said conduit means is comunicated simultaneously to all of said piston devices.

8. The combination, as defined in claim 7, further characterized in that said valve means comprises respective valve devices, one on each of the cars and each of which valve devices is actuable alternatively and independently of the other for effecting said supply or cutoff of fluid under pressure to said plurality of piston means.

9. In an automatic railway car coupler of the type having a coupler head carried on one car adapted to be locked with a counterpart mating coupler head carried on another car, a coupler head comprising:

(a) a body portion by which the coupler head is secured to the car,

(b) a face plate fixed on said body portion perpendicularly to the longitudinal center line of the car and adapted for making abutting contact with a correspondingly disposed face plate on the counterpart mating coupler head in a coupled relation of the coupler heads,

(c) said face plate having a guide pin projecting perpendicularly therefrom and a guide bore formed therein in spaced relation to said guide pin, said guide pin having a notch therein and said guide pin and guide bore being adapted to register with a guide bore and a guide pin, respectively, correspondingly disposed on the face plate of a counterpart mating coupler head,

(d) a latch member carried on said body portion and biased in a direction for engaging the notch formed in the guide pin on the face plate of the counterpart mating coupler head, for locking the coupler head in coupled relation to its counterpart coupler head, and

(e) piston means supported on said body portion and operable for delivering a hammer blow to said latch member for causing disengagement thereof from the notch of the guide pin on the counterpart coupler head to unlock the coupler head.

10. The combination, as defined in claim 9, further characterized in that the guide pin and guide bore on the said face plate are disposed on opposite sides of a vertical plane passing through the longitudinal center line of the car, and equidistant therefrom.

11. The combination, as defined in claim 9, further characterized by biasing means for biasing said latch member into locking engagement in the notch of the respective guide pin upon abutting contact of said face plates for effecting such locking of the coupler heads in said coupled relation.

12. The combination, as defined in claim 9, wherein said piston means comprises:

(a) a casing having a pressure chamber therein adapted to be charged with and relieved of pressurized fluid, and

(b) a piston member having a stem portion extending coaxially from one side of said piston toward and in axial alignment with said latch member,

(c) said piston and stem portion having respective normal positions in which the free end of said stem portion is out of contact with said latch member and being axially movable toward said latch member responsively to charging of said chamber with pressurized fluid to cause said free end of said stem portion to impart a hammer blow on said latch member for dislodging the latch member from said notch in the respective guide pin.

13. The combination, as defined in claim 12, wherein said piston member has a pressure area thereon, a portion of said pressure area being exposed to fluid pressure prevailing in said pressure chamber in the normal position of said piston member and the entire pressure area being exposed to such pressure in said pressure chamber upon initial axial movement of said piston member responsively to said fluid pressure acting on said portion of the pressure area, said piston member thereby being effective upon exposure of the entire pressure area to such pressure in said chamber for imparting said hammer blow to said latch member.

14. The combination, as defined in claim 12, wherein said casing is provided with a restricted opening to atmosphere via which pressurized fluid is relieved from said pressure chamber at a predetermined rate for delaying return of said latch member to its said latching position.

15. The combination, as defined in claim 12, wherein said coupler head further comprises:

(a) an electrical circuitry connecting portion so disposed as to register with an electrical circuitry connecting portion of the counterpart mating coupler head when the coupler heads are in coupled relation, and

(b) a pipe-connecting portion so disposed as to register with a pipe-connecting portion of the counterpart mating coupler head for effecting airtight connections between fluid pressure pipes on the respective cars when said coupler heads are in coupled relation.

16. The combination, as defined in claim 15, wherein said pipe-connecting portions on the respective coupler heads provide a communication, when the coupler heads are in coupled relation, via which pressurized fluid may be supplied simultaneously to the pressure chambers of the piston means on both the coupler heads.

References Cited by the Examiner

UNITED STATES PATENTS

1,223,223	4/1917	Tomlinson	213—212
1,639,717	8/1927	Averill	213—212
1,989,894	2/1935	Tomlinson	213—76
2,239,823	4/1941	Larsson	213—212
2,553,809	5/1951	Canetta et al.	213—76
2,883,069	4/1959	Candlin et al.	213—212
3,067,883	12/1962	Cameron	213—212

FOREIGN PATENTS

557,276	7/1962	France.

References Cited by the Applicant

UNITED STATES PATENTS

2,553,809	5/1951	Canetta et al.
3,067,883	12/1962	Cameron.

ARTHUR L. LA POINT, *Primary Examiner.*

DRAYTON HOFFMAN, B. F. FAUST,
Assistant Examiners.