May 22, 1951 J. CANETTA ET AL 2,553,809

AUTOMATIC COUPLER APPARATUS

Filed Sept. 16, 1947 2 Sheets-Sheet 1

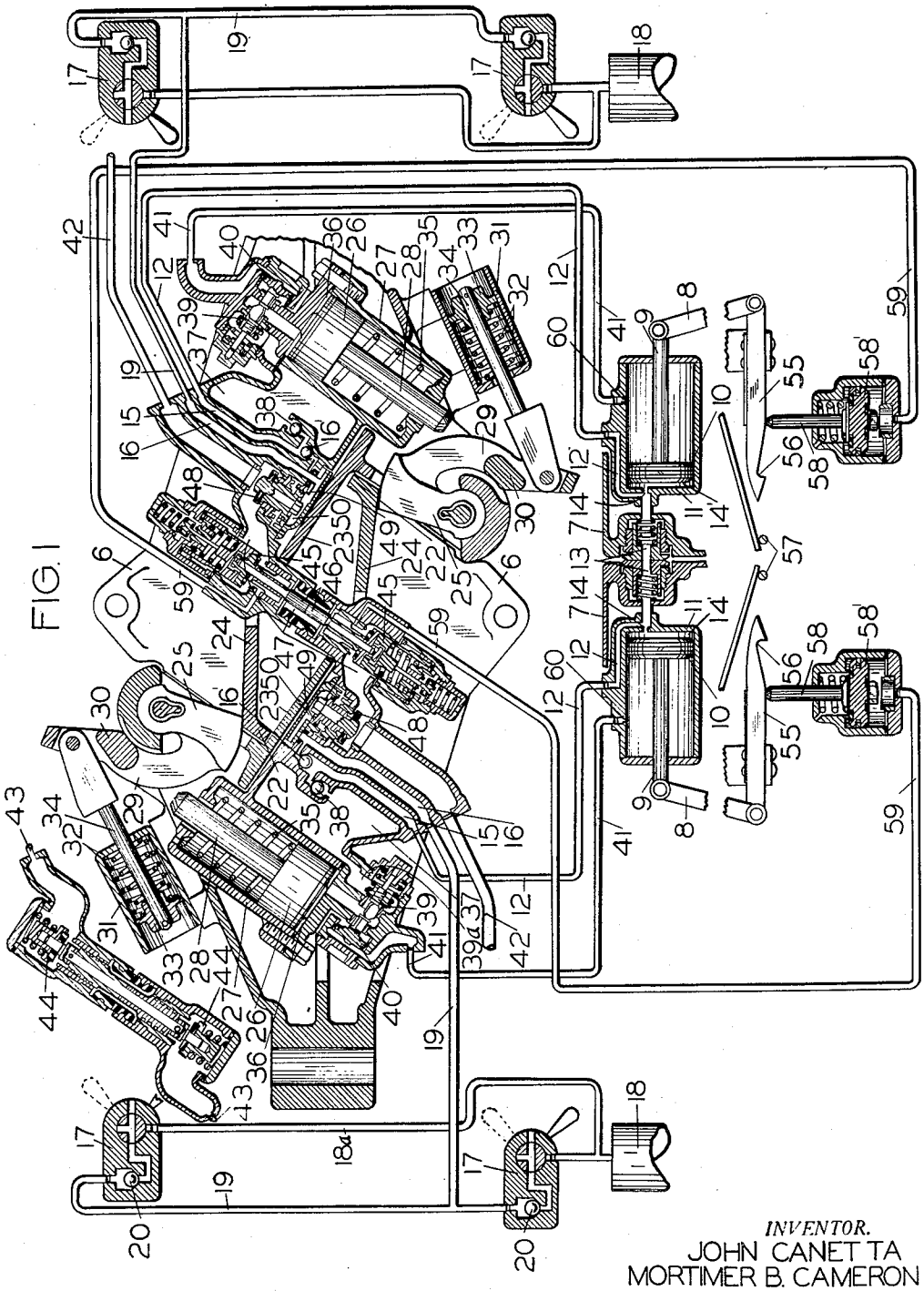


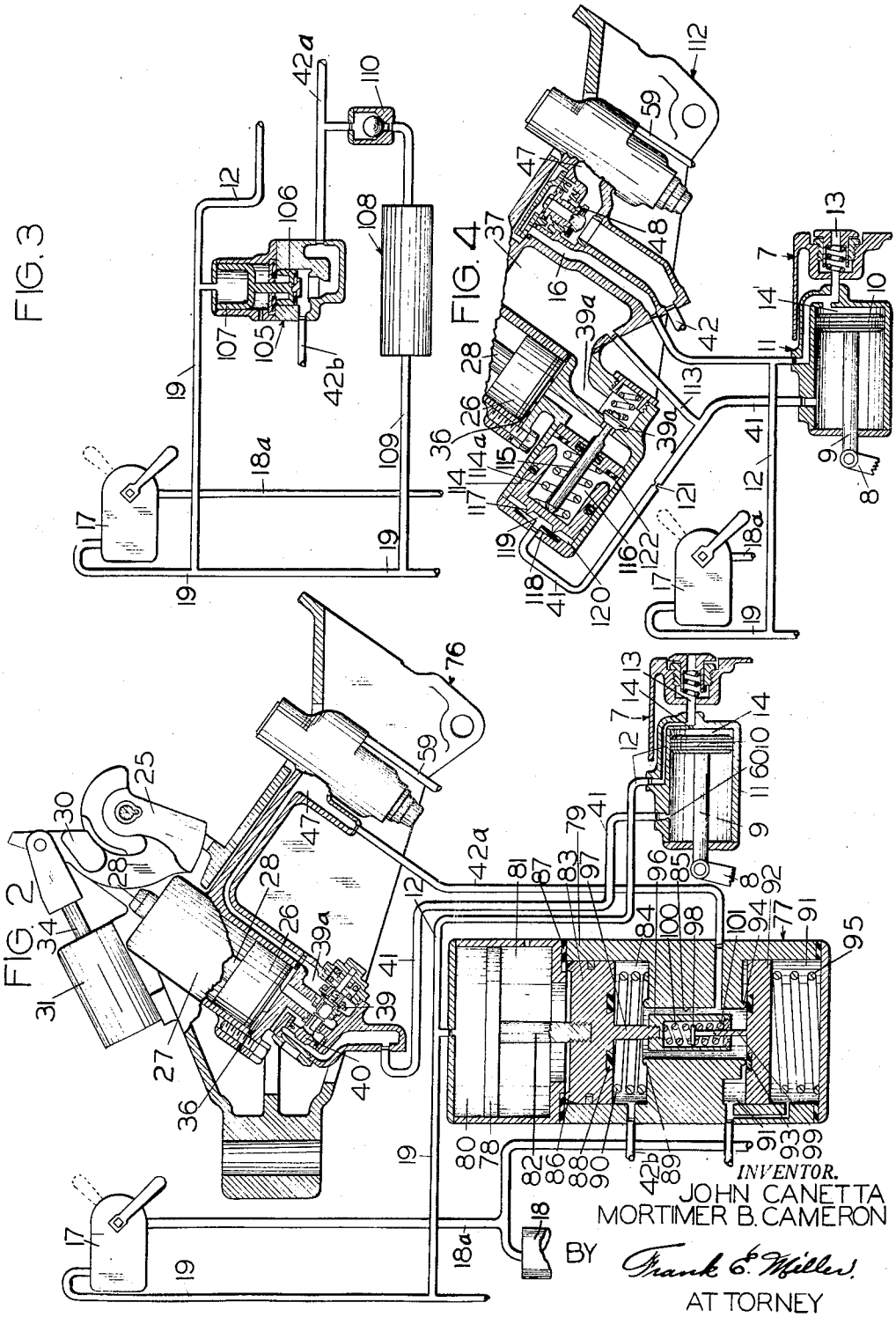
FIG. 1

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AUTOMATIC COUPLER APPARATUS

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21 Claims. (Cl. 213—76)

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This invention relates to automatic coupler apparatus and more particularly to coupler apparatus for coupling vehicles employing an electro-fluid pressure braking system.

In United States Letters Patent No. 1,571,222 issued to Harry F. Woernley, February 2, 1926, there is shown automatic coupler apparatus for coupling cars of a train, and for connecting main reservoir and brake control train pipes and train wires between the cars. Uncoupling of the apparatus is effected by simultaneous supply of fluid under pressure from the main reservoir train pipe, connected through the interlocked coupler heads, to fluid pressure actuated unlocking means in each of said heads. It is undesirable to employ air from the brake control pipe for actuating the unlocking means due to possible interference with control of the brakes on the train and also due to the possibility of causing an application of brakes when not desired. Further, in case the brake control pipe were a conventional emergency pipe or brake pipe which is vented to effect an emergency application of brakes, there would be no fluid pressure therein under such a condition for actuating the unlocking means, so that cars could not be uncoupled. Therefore, in a train employing a braking system having no main reservoir train pipe connected through the car couplers, there is no suitable source of fluid under pressure in the coupling heads for effecting uncoupling thereof.

It is therefore a principal object of the invention to provide an improved automatic coupler apparatus of the above type particularly adapted for use on a train having no main reservoir train pipe connected between cars through the coupler heads and which can be uncoupled from either car.

Other objects and advantages of the invention and features of novelty will be apparent from the following description taken in connection with the accompanying drawings.

In the accompanying drawings; Fig. 1 is a diagrammatic view, partly in outline and partly in section, of a combined automatic car, train pipe, and train wire coupling apparatus, embodying one form of the invention, and shown locked in coupled relationship with its counterpart; and Figs. 2, 3, 4 are diagrammatic views, respectively, of three other embodiments of the invention, each being substantially limited to those details necessary to adequately disclose the invention.

Description Fig. 1

Referring to Fig. 1 of the drawings, the reference numerals 6 designate two counterpart car and train pipe couplers carrying the usual electric train wire couplers 7 which may be similar to those shown and described in detail in aforementioned U. S. Patent No. 1,571,222 each containing a movable slide (not shown) which carries a plurality of electric contacts. For actuating the movable slide and compressing a contact advancing spring (not shown) each train wire coupler 7 comprises a lever 8. One end of the lever 8 is connected by a rod 9 to a train wire contact retrieving piston 10 contained in a piston cylinder 11. A supply and control pipe and passage 12 is connected to a port 13 leading from the cylinder 11 to the meeting face of the electric train wire coupler. The two ports 13 in counterpart couplers are adapted to register when the couplers are coupled so that fluid under pressure supplied to the pipe and passage 12 in one coupler will flow by way of the registering ports 13 to the corresponding passage and pipe 12 in the counterpart coupler 7. According to one feature of the invention, a restricted opening or choke 14 is provided in the connection between passage 12 and a fluid pressure chamber 14', formed in the cylinder 11, so that fluid under pressure supplied to said passage, in a manner to be later described, will flow at a restricted rate into said chamber for actuating the piston 10. This limits the rate of movement of the piston 10 so that fluid under pressure will be supplied to both pipes 12 via ports 13, in the counterpart couplers 7, before the respective pistons 10 reach the end of their travel, for reasons which will hereinafter be explained.

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The pipe 12 connected to each train wire coupler 7 leads to the respective car coupler 6 wherein it is connected to a supply and control passage 15 formed in the head of the respective car coupler. The passage 15 is adapted to be supplied with fluid under pressure by way of a connected control and supply passage 16 also formed in the respective head. A ball check valve 16' prevents backflow of fluid under pressure from the passage 15 to the passage 16.

Two identical, manually operable uncoupling valve devices 17, adapted to be mounted on each of the two cars carrying the counterpart couplers 6, 7 and preferably at the adjacent ends of said cars, are provided for controlling the coupler apparatus. Each valve device 17 is operable to an uncoupling position for effecting supply of fluid under pressure from a suitable source, such as a pipe 18a open to a main reservoir 18, to a pipe 19 connected to the supply and control

passage 16 in the respective coupler 6, and to another position for cutting off supply of fluid under pressure to said pipe. A check valve 20 is associated with each device 17 which prevents backflow of fluid under pressure from the pipe 19 into said device 17.

As usual, each car coupler 6 has a nose portion 22 adapted to engage the counterpart coupler in a recess 23. Each nose portion 22 is provided with a surface 24 adapted to be engaged by a cam face of a pivoted latch 25 carried by the counterpart car coupler, for the purpose of locking the counterpart couplers in coupled relation.

The mechanism for operating each of the latches to effect unlocking of the couplers comprises an unlocking piston 26 contained in a cylinder 27 which forms an integral part of the respective coupler, said piston being connected to an operating stem 28.

Each latch 25 carries an arm 29 having an anvil lug 30 arranged in line with the stem 28. The lug 30 is normally separated from the end of the stem 28 when the latch 25 is in the locking position, as shown in the drawing.

Associated with each car coupler 6 is a spring box 31 containing heavy coil springs 32 which engage a collar 33 secured to a stem 34. The stem 34 is pivotally connected to the arm 29 so that the pressure of the springs 32 acts through the stem 34 to urge the respective latch 25 to its locking position.

Each piston 26 is subject on one side to the pressure of a coil spring 35, and on the opposite side to pressure of fluid in a pressure chamber 36, the pressure of the spring 35 being sufficient to move the piston 26 to its rest position, as shown in the drawing, when fluid under pressure is released from the chamber 36.

In accordance with a feature of the invention, a volume reservoir 37 is provided, preferably within and integral with each car coupler 6, for storing fluid under pressure to be supplied to chamber 36 for operating the respective piston 26, said reservoir 37 being open to the respective passage 15 by way of a check valve 38 to prevent backflow of fluid under pressure from said reservoir to said passage.

In each car coupler 6 the supply of fluid under pressure from the reservoir 37 to the chamber 36 for effecting operation of the piston 26 is controlled by a relay valve 39 contained in a chamber 39a and adapted to be opened by a piston 40 in response to fluid under pressure supplied thereto from a control pipe 41 which is connected to the supply and control pipe 12 by way of the cylinder 11. Upon release of fluid under pressure from control pipe 41 the piston 40 will permit closing of valve 39 and release of fluid under pressure from chamber 36.

The couplers 6 have cooperating conduits for coupling fluid pressure train pipes between cars, such as a brake pipe 42, and a straight air pipe 43. The fluid pressure conduits are arranged in vertical alignment in actual construction but in order to clearly show the operation, the straight air pipe connection through the coupler is shown in Fig. 1 at one side of the coupler. The conduit through the couplers 6 for the straight air pipe 43 is controlled by a tappet valve 44 in each coupler, which valves are unseated at the final part of the coupling movement of said couplers. Reference numeral 47 designates the brake pipe conduit through the couplers 6, communication through said conduit being controlled by a piston valve 45 in each coupler, which valves are

held unseated, when the counterpart coupler heads are connected, by tappets 46 mounted in said conduit.

A brake pipe closing valve 48 is disposed within each coupler 6 for controlling communication through the brake pipe conduit 47. The valve 48 is subject to pressure of fluid in the brake pipe conduit 47 for opening said valve and is connected to one side of a piston 49 of greater area than said valve. Piston 49 is subject on the opposite side to pressure of fluid in a chamber 50 which is constantly open to the supply and control passage 16.

Each electric train wire coupler 7 further comprises a trigger arm 55 for locking the lever 8 and piston 10 against movement when the couplers are uncoupled. Arm 55 is pivotally connected at one end to the lever 8 and is provided with a hook 56 adapted to engage a fixed pin 57 when the parts of the coupler are in an uncoupled position.

Each train wire coupler 7 further comprises a rod 58 adapted to be operated by pressure of fluid on a piston 58' for tripping the arm 55. A pipe 59 connected to the brake pipe conduit 47 intermediate the piston valve 45 and the tappet 46 of the respective coupler 6 is provided for conveying fluid under pressure to actuate piston 58 when conduit 47 is connected through counterpart coupled couplers 6. The part of conduit 47 adjacent the meeting face of the couplers and also pipe 59 will be open to atmosphere at that meeting face when the couplers are in uncoupled condition.

Control pipe 41 opens into the interior of the cylinder 11 via a restricted port 60 which is so disposed as to be open to the chamber 14' when this piston 10 is in its outermost position, a position opposite to that in which it is shown in the drawing.

Prior to coupling two cars, both the car and train pipe couplers 6 and the electric train wire couplers 7 are disengaged, and all valve devices 17 are positioned as shown, preventing supply of fluid under pressure to pipes 19. The ports 13 in the train wire couplers 7 are disconnected and open to atmosphere so that in both of said couplers, the chambers 14', and passage and pipes 12, and the passages 15 and 16, and chambers 50 in the car couplers 6, and the pipes 19 connected thereto, are open to atmosphere by way of the ports 13. Pistons 10 will be disposed in an outermost position in the respective cylinders 11, and held therein by the trigger arms 55 in engagement with pins 57, with ports 60 open to chambers 14'. Respective pipes 41 will be open to atmosphere via chambers 14' to permit seating of valves 39 for closing off the reservoirs 37 from the chambers 36 in cylinders 27 and for opening said chambers to atmosphere, so that the springs 35 will be holding stem 28 attached to piston 26 disposed away from anvil lug 30 of latch 25. In each car coupler 6 the piston valve 45 will be closed so that pressure of fluid in the connected portion of brake pipe 42 will hold the cut-off valve 49 unseated. The valve 44 will be seated, closing the end of the connected portion of the straight air pipe 43.

In operation, when two cars are brought together for coupling, the counterpart couplers 6, 7 will engage in the usual manner, and in the coupled position, the latches 25 will assume locked position, as shown in the drawing. In coupling, the piston valves 45 will be lifted from their seats by engagement of the tappets 46, so that com-

munication will be established through the brake pipe 42 via the conduit 47. Fluid under pressure will then become effective on pistons 58' to actuate rods 58 to trip the trigger arms 55 to allow pistons 10 to move to their innermost position in which they are shown in the drawing and to allow the electric train wire contacts to engage with their counterparts. The valves 44 will be unseated by their tappets and communication established through the straight air pipe 43.

In order to uncouple, a valve 17 on one car is turned to its uncoupling position to admit fluid under pressure from a source of supply on that car, such as the main reservoir 18, to the control and supply pipe 19 and thence to passage 16 in the coupler 6 on said car. Fluid under pressure thus supplied to passage 16 on the one car will flow to chamber 50, where it will act on the piston 49 to close the respective brake pipe cut-off valve 48. Fluid under pressure supplied to passage 16 on the one car will also flow past check valve 16' to passage 15 and the connected supply and control pipe 12, and also past check valve 38 to reservoir 37 for storing sufficient volume of fluid under pressure in said reservoir to operate the respective unlocking piston 26. Fluid under pressure supplied to the pipe 12 on the one car will flow therefrom into the passage 12 in the respective electric coupler, and via the registering ports 13 to the corresponding passage and pipe 12 and into the passage 15 in the counterpart coupler 6, whence it will flow via ball check valve 38 into the corresponding reservoir 37 to store a volume of fluid under pressure for operating the corresponding unlocking piston 26. At the same time, in each of the cylinders 11 in the electric train wire couplers 7, fluid under pressure from the respective passages 12 will flow at a controlled rate to the chamber 14' in each cylinder by way of its choke 14. The piston 10 in cylinder 11 will then be moved by pressure of fluid in chamber 14 at a rate which gives ample time for charging of both of the reservoirs 37 in the counterpart car couplers 6 prior to said piston opening the restricted port 60 to chamber 14.

When the pistons 10 move out to the end of their stroke, the restricted ports 60 opening into the control pipes 12 will be uncovered so that fluid under pressure will then flow from chambers 14' through said pipes to the pistons 40 in the coupler 6. The relay valves 39 will then be opened by pressure of fluid on pistons 40 to admit fluid from the respective volume reservoirs 37 to the pressure chambers 36 which will move the pistons 26 outwardly to deliver a hammer blow on the lugs 30 and then through said lugs actuate the latches 25 out of engagement with shoulders 24 of the nose portions 22 of the counterpart coupler.

Since the pistons 10 in both counterpart couplers 7 move at substantially the same time and rate as governed by the chokes 14, fluid under pressure will be supplied to both control pipes 12 to effect operation of both of the uncoupler pistons 26 simultaneously to unlock the car couplers 6 and permit separation of the cars.

It is to be noted that the check valves 16' are so interposed in the respective passages 16 relative to the respective brake pipe closing valve chambers 50 that when the valve 48 on the one car is closed in the above described manner, the check valve 16' on the other car will prevent the flow of fluid under pressure from the passage 15 into the respective chamber 50 on such car, and therefore the brake pipe closing valve 48 on this car will not be closed. With this arrangement, an emergency reduction in pressure of fluid in the brake pipe of the car or cars parted from the train will be effected for applying the brakes on said car or cars. If check valve 16' is removed, fluid under pressure supplied to passage 15 will flow to brake pipe closing valve chamber 50 and will effect closure of the valve 48, so that a reduction in brake pipe pressure will not thereby be caused in the car or cars parted from the train.

Description Fig. 2

The coupler apparatus disclosed in this embodiment of the invention comprises a car and train pipe coupler 76 and a brake pipe closing valve device 77 both of which differ from the structures shown in Fig. 1, as will be pointed out later. The apparaus further comprises the train wire coupler 7 and uncoupling valve devices 17 (only one of which is shown) disclosed in Fig. 1 of the drawing and described in connection therewith.

The car and train pipe coupler 76 differs from the structure shown in Fig. 1 in that it does not embody the volume or reservoir 37, brake pipe closing valve 48, check valves 16', 38 and passages 15, 16; and the relay valve chamber 39*a* is open directly to the brake pipe conduit 47 therein.

The brake pipe closing valve device 77 is preferably interposed in the brake pipe to the rear of the coupler 76, the portion of said brake pipe between said device and coupler being designated by reference numeral 42*a*, while the portion connected to said device and extending to the opposite end of the car is designated by the reference numeral 42*b*.

The brake pipe closing valve device 77 comprises a piston 78 slidably disposed in a suitable bore within a casing 79 and subject to pressure of fluid in a chamber 80 at one side and atmospheric pressure in a chamber 81 at its opposite side. The chamber 80 is constantly open to the control pipe 19 so that fluid under pressure supplied thereto will be supplied also to said chamber. Piston 78 is rigidly connected by means of a rod 82, extending through chamber 81, to a piston valve 83 of smaller diameter than that of piston 78. The piston valve 83 is slidable within a bore in casing 79 and is subject, in common with piston 78, to atmospheric pressure in chamber 81 on its one side, and to pressure of fluid in a chamber 84 on its opposite side. The chamber 84 is constantly open to the portion 42*b* of the brake pipe, and said chamber is connected to one end of a central bore 85 to which bore is connected the portion 42*a* of the brake pipe. An annular seat rib 86 is provided on piston valve 83 projecting into chamber 81 for sealing engagement with a resilient ring 87 carried by the casing to prevent leakage of fluid under pressure from chamber 84 past said piston valve to atmospheric chamber 81. A resilient seat ring 88, secured in an annular groove on the under side of piston valve 83, is provided for sealing engagement with an annular seat rib 89 formed in the casing around the bore 85, for closing portion 42*a* from portion 42*b* of the brake pipe. A compression spring 90 is disposed in chamber 84 between the casing and the piston valve 83 to urge said valve in the direction of chamber 81.

The opposite end of the bore 85 opens into a supply chamber 91 which is constantly open to the fluid pressure supply pipe 19*a*. A supply valve 92 is slidably disposed in chamber 91 and is provided with a resilient seat ring 93 for sealing engagement with an annular rib 94 encircling

bore 85 and projecting into chamber 91. A compression spring 95 is disposed in chamber 91 between the casing and valve 92 in such a manner as to urge said valve to a seated position on rib 94 for closing off the supply chamber 91 from the brake pipe.

The valve 92 is connected to the valve 83 by resilient means which comprises a cylindrical spring box 96 connected to the piston valve 83 by a rod 97 extending through chamber 84. Box 96 is disposed in the bore 85 and receives a spring seat member 98 which is movable within said box and which is secured to the valve 92 by means of a central rod 99 projecting into said bore. Two compression springs 100 and 101 are arranged within the box 96 on opposite sides of the seat member 98, one end of each spring acting on said member in such a manner as to oppose relative movement between said member and said box and thereby between valves 83 and 92.

The control pipe 19 is connected to the pipe 12 which in turn is connected to the contact retrieving cylinder 11, in the same manner as described in regard to Fig. 1, for supplying fluid under pressure to the relay valve device in the connected counterpart couplers via the respective control pipes 41.

In operation, assume that all parts of the apparatus in Fig. 2 are positioned as shown in the drawings, with latch 25 in locking position and pipe 18a connected to a source of fluid under pressure, such as the fluid pressure reservoir 18 shown in Fig. 1.

To effect unlocking of latch 25, and hence uncoupling of the cars, as will be understood, the manually operated uncoupling valve device 17 is positioned to supply fluid under pressure from the pipe 18a to the pipe 19. Fluid under pressure thus supplied to pipe 19 will flow into chamber 80 of the brake pipe cut off valve device 77 and via pipe 12 to the cylinder 11 on each of the couplers into the corresponding pipe 12 on the counterpart coupler to the chamber 80 in the corresponding valve device 77 and via the choke 14 into chambers 14' to move the piston 10 to uncover port 60 whereupon it will flow to the relay valve device on each counterpart coupler via the control pipe 41, in the identical manner previously described in regard to Fig. 1. In the brake pipe closing valve devices 77, when the pressure of fluid in chamber 80 acting on piston 78 increases sufficiently to overcome action of brake pipe pressure in chamber 84 and of spring 90 acting on piston valve 83, said pressure of fluid will move piston 78 and attached valve 83 to seat said valve on rib 89, thus closing off portion 42b of the brake pipe from portion 42a thereof. Movement of piston 78 and valve 83 will occur rapidly, due to the fact that piston 78 is of greater area than the area of piston valve 83 and that the pressure of fluid in chamber 80 is greater than the brake pipe pressure in chamber 84. The valve 92 will remain seated under the action of pressure of fluid in chamber 91 and of spring 95 while the valve 83 is moved substantially into contact with its seat 89 due to the resiliency of the connection between these two valves. The box 96, however, will move with the valve 83 and act to compress the spring 100, the pressure of which will increase sufficiently at least by the time the valve 83 is seated to unseat the valve 92. Upon unseating of valve 92, fluid under pressure will flow from supply chamber 91 via the bore 85 to the portion 42a of the brake pipe then to brake pipe conduit 47 in the coupler 76 to charge the valve chamber 39a in the relay valve device associated therewith. The seated valve 83 in device 77 prevents the pressure of fluid thus supplied to bore 85 from entering the portion 42b of the brake pipe so as not to disturb operation of the brake on the cars remaining coupled in the train.

The delaying action of the choke 14 in the cylinder 11 functions, in manner adequately described in regard to Fig. 1, to allow the relay valve chamber 39a to become charged with fluid under pressure before fluid under pressure is supplied from chamber 14' in cylinder 11 via port 60 to the control pipe 41 for operating relay valve piston 40 to unseat valve 39. It will be appreciated that upon unseating valve 39, fluid under pressure from chamber 39a, and hence from the brake pipe conduit 47 and supply pipe 18a, is supplied to chamber 36 to operate unlocking piston 26 and through attached stem 28 thereby effect unlocking of latch 30 and consequently uncoupling of the cars.

It should be pointed out that fluid under pressure supplied to the brake pipe conduit 47 in the coupler 76 will flow by way of the piston valves 45, shown in Fig. 1, to the corresponding conduit in the counterpart coupler (not shown in Fig. 2) and will simultaneously charge chamber 39a in the corresponding relay valve device associated with said counterpart coupler. Also, fluid under pressure supplied to pipe 12, as previously described will flow to cylinder 11 in the counterpart coupler via connected ports 13 simultaneously to its supply to said cylinder in the first coupler, and both pistons 10 will respond to uncover the ports 60 for effecting opening of the relay valves 39 in both car couplers at substantially the same time. Consequently, unlocking of the respective latches 82 on both car couplers will be effected at the same time to effect uncoupling of the cars.

Description Fig. 3

In this embodiment of the invention, a brake pipe closing valve device 105 comprising a valve 106 for controlling communication between the portions 42a and 42b of the brake pipe is arranged to be operated by pressure of fluid from the pipe 19 acting on a piston 107 to close said communication upon movement of the uncoupling valve 17 to its uncoupling position. Fluid under pressure thus supplied to pipe 19 is also adapted to flow by way of pipe 12 through the uncoupling cylinder 11 of the train wire coupler 7 to actuate the piston 40 of the relay valve device in the car and train pipe coupler 76 to open the supply valve 39 the same as in the structure shown in Fig. 2.

According to this embodiment of the invention, I provide a volume or reservoir 108, open by a pipe 109 to pipe 19 and connected past a check valve device 110 to the brake pipe portion 42a. This reservoir 108 is adapted to be charged with fluid under pressure, when the uncoupling valve device 17 is moved to uncoupling position, for supply to the portion 42a of the brake pipe and the relay valve chamber 39a to provide adequate pressure and volume of fluid for actuating the unlocking piston 26 to uncouple the counterpart couplers upon operation of the relay valve device. The choke 14 delays operation of the piston 10 to permit flow of fluid under pressure to actuate the relay valve piston 40 so that the reservoir 108 will be adequately charged before opening of the valve 39 in order to effect uncoupling as desired.

Description Fig. 4

In this embodiment of the invention, the car and train pipe coupler designated by the reference numeral 112 contains a brake pipe closing valve 48 like and operative in the same manner as the structure shown in Fig. 1. The coupler 112 also has a chamber or volume 37 open to the relay valve chamber 39*a* for storing fluid under pressure to actuate the unlocking piston 28. The chamber 37 is connected by way of a pipe 113 to the pipe 41 whereby, subsequent to operation of the contact retrieving piston 10 in cylinder 11 in the train wire coupler 7, said chamber will become charged with fluid under pressure from said pipe 41.

According to a feature of this embodiment of the invention, a valve 39*a* is adapted to be opened to establish communication between the volume chamber 37 and unlocking piston chamber 36 by a snap acting piston valve 114 connected to said valve through a stem 115. The piston valve 114 is subject on one side to atmospheric pressure in a vented chamber 116 containing a spring 114*a* for urging said piston valve to its normal position shown in the drawing to permit closing of valve 39. Projecting from the opposite side of the piston valve is an annular seat rib 117 for sealing engagement with a gasket 118. When seated, a chamber 119 within the rib 117 is open to pipe 41 while encircling said rib is a second chamber 120.

The choke 14 is not employed in the cylinder 11 in the train wire coupler 7, as in the structure disclosed in Figs. 1, 2 and 3, but the same final result is obtained by choke 121 interposed in pipe 41 between the relay valve chamber 119 and the pipe 113 to slow down build up of pressure of fluid in said chamber 119 while chamber 37 is being charged, whereby the pressure in chamber 119 of two counterpart couplers will build up substantially in unison.

In operation, when the uncoupling valve device 17 is operated to effect uncoupling of the cars, fluid under pressure supplied thereby to the pipe 19 will flow to and actuate piston 10 in substantially the same manner as before described. At the completion of the stroke of piston 10, pipe 41 will be opened to chamber 14' to permit supply of fluid under pressure to said pipe, also as previously described.

When fluid under pressure is thus supplied to pipe 41 it will equalize into the volume chamber 37, and at the same time will flow at a restricted rate through choke 121 to chamber 119 at one side of the relay piston valve 114. When the chamber 37 becomes charged with fluid at adequate pressure and volume to ensure operation of the unlocking piston 26, a sufficient pressure will be obtained through choke 121 in chamber 119 to unseat piston valve 114 from seat rib 117 against spring 114*a*, whereupon the full area of said piston will become subject to pressure of fluid from pipe 41 and provide a force so exceeding that of said spring as to snap said piston valve to a position defined by contact with a gasket 122, and in which position the valve 39*a* will be opened to permit flow of fluid under pressure from chamber 37 to the unlocking piston chamber 36 to actuate the respective unlocking piston 26. The uncoupling piston in the counterpart coupler will at the same time be actuated, as will be apparent from previous description, whereby the counterpart couplers will be uncoupled.

Summary

It will now be seen that, for automatic coupler apparatus for coupling two vehicles and having brake control pipes but no supply or main reservoir pipe connected through the couplers, I have provided improved control means which may be controlled from either of the vehicles for uncoupling the two couplers without in any way interfering with the control of brakes through the brake control pipes. All fluid pressure for controlling the uncoupling of the two counterpart couplers on two connected cars is provided at the time of uncoupling by or in response to operation of the operator's uncoupling valve on either car, and uncoupling can be obtained regardless of whether the brake control pipes on the vehicle are charged with fluid under pressure or not. Moreover, in case there is fluid pressure only on one of two coupled cars uncoupling of the counterpart couplers can be obtained by operation of the operator's uncoupling valve on the car where there is fluid pressure available.

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

1. In an automatic car coupler carried by one car adapted to be locked with a counterpart coupler on another car, the combination with a source of fluid under pressure on said one car, of fluid pressure piston means for unlocking said car coupler from said counterpart coupler, fluid pressure actuated relay valve means for controlling supply of fluid under pressure to said piston means, a control conduit for conveying fluid under pressure to actuate said relay valve means, a fluid pressure supply conduit for conveying fluid under pressure to said relay valve means for actuating said piston means, manually controlled valve means for controlling supply of fluid under pressure from said source to said control conduit and to said supply conduit, and means for connecting said control conduit and said supply conduit with corresponding similar conduits in said counterpart coupler.

2. In an automatic car coupler, the combination with a source of fluid under pressure, of a movable latch for locking said coupler with a counterpart coupler, fluid pressure actuated piston means for unlocking said latch, a fluid pressure storage reservoir, fluid pressure actuated relay valve means for controlling supply of fluid under pressure from said reservoir to said piston means, and manually operated valve means for controlling supply of fluid under pressure from said source to said reservoir and to actuate said relay valve means.

3. In an automatic car coupler, the combination with a source of fluid under pressure, of a movable latch for locking the coupler with a counterpart coupler, fluid pressure actuated piston means for unlocking said latch, a fluid pressure storage reservoir, a fluid pressure supply conduit for conducting fluid under pressure to said reservoir, fluid pressure actuated relay valve means for controlling supply of fluid under pressure from said reservoir to said piston means, a fluid pressure control conduit for conducting actuating fluid under pressure to said relay valve means, and manually controlled valve means for controlling supply of fluid under pressure from said source to said supply conduit and to said control conduit.

4. In an automatic car coupler, the combination with a source of fluid under pressure, of a

movable latch for locking the coupler with a counterpart coupler, fluid pressure actuated piston means for unlocking said latch, a fluid pressure storage reservoir within said coupler, a fluid pressure supply conduit for conducting fluid under pressure to said reservoir, fluid pressure actuated relay valve means for controlling supply of fluid under pressure from said reservoir to said piston means, a fluid pressure control conduit for conducting actuating fluid under pressure to said relay valve means, manually operative valve means for effecting supply of fluid under pressure from said source to said supply conduit, and means responsive to fluid under pressure supplied to said supply conduit to effect supply of fluid under pressure to said control conduit.

5. In a car and train pipe coupler adapted to be locked into coupling engagement with a counterpart coupler, the combination with a brake pipe conduit therein adapted to be connected to a corresponding brake pipe conduit in said counterpart coupler, brake pipe closing valve means operable upon supply of fluid under pressure to a chamber to close communication through said brake pipe conduit, fluid pressure piston means operable by fluid under pressure for effecting uncoupling, and a fluid pressure reservoir for storing fluid under pressure to be supplied to said piston means, of a first fluid pressure conduit adapted to be supplied with fluid under pressure from a source thereof and connected to said chamber for conveying fluid under pressure thereto, a second fluid pressure conduit connecting said first fluid pressure conduit to said reservoir for conveying fluid under pressure thereto, said second fluid pressure conduit being adapted to be connected to a corresponding second fluid pressure conduit in said counterpart coupler for supplying fluid under pressure to a corresponding reservoir therein, first check valve means for preventing flow of fluid under pressure from said second fluid pressure conduit to said first fluid pressure conduit, and second check valve means for preventing flow of fluid under pressure from said reservoir to said second fluid pressure conduit.

6. In an automatic car and train pipe coupler, the combination with a source of fluid under pressure and a brake pipe, of a movable latch for locking said coupler with a counterpart coupler, fluid pressure actuated piston means for unlocking said latch, a brake pipe conduit extending through said coupler and connected to said brake pipe, fluid pressure actuated relay valve means for controlling supply of fluid under pressure from said conduit to said piston means, and fluid pressure actuated brake pipe closing valve means for closing off said conduit from said brake pipe and for opening said conduit to said source.

7. In an automatic car and train pipe coupler, the combination with a source of fluid under pressure and a brake pipe, of a movable latch for locking said coupler with a counterpart coupler, fluid pressure actuated piston means for unlocking said latch, a brake pipe conduit extending through said coupler and connected to said brake pipe, fluid pressure actuated relay valve means for controlling supply of fluid under pressure from said conduit to said piston means, fluid pressure actuated brake pipe closing valve means for closing off said conduit from said brake pipe and for opening said conduit to said source, manually operated valve means for controlling supply of fluid under pressure to actuate said brake pipe closing valve means, and means responsive to fluid under pressure supplied to said last named valve means to effect supply of fluid under pressure to actuate said relay valve means.

8. In an automatic car and train pipe coupler, the combination with a source of fluid under pressure and a brake pipe, of a movable latch for locking said coupler with a counterpart coupler, fluid pressure actuated piston means for unlocking said latch, a conduit extending through said coupler and connected to said brake pipe, fluid pressure actuated relay valve means for controlling supply of fluid under pressure from said conduit to said piston means, fluid pressure actuated valve means for closing communication between said conduit and said brake pipe, and manually operated valve means for controlling supply of fluid under pressure from said source to said conduit, to said fluid pressure actuated valve means, and to said relay valve means.

9. In an automatic car and train pipe coupler, the combination with a source of fluid under pressure and a brake pipe, of a movable latch for locking said coupler with a counterpart coupler, fluid pressure actuated piston means for unlocking said latch, a conduit extending through said coupler and connected to said brake pipe, fluid pressure actuated relay valve means for controlling supply of fluid under pressure from said conduit to said piston means, fluid pressure actuated valve means for closing communication between said conduit and said brake pipe, a fluid pressure reservoir connected to said conduit for storing fluid under pressure to be supplied thereto, check valve means interposed between said conduit and said reservoir for preventing flow of fluid under pressure from the former to the latter, and manually operated valve means for controlling supply of fluid under pressure from said source to said reservoir, to said fluid pressure actuated valve means, and to said relay valve means.

10. In an automatic car and train pipe coupler, the combination with a source of fluid under pressure and a brake pipe, of a movable latch for locking said coupler with a counterpart coupler, fluid pressure actuated piston means for unlocking said latch, a conduit extending through said coupler and connected to said brake pipe, fluid pressure actuated relay valve means for controlling supply of fluid under pressure from said conduit to said piston means, fluid pressure actuated valve means for closing communication between said conduit and said brake pipe, manually operated valve means for controlling supply of fluid under pressure from said source to said conduit, to said fluid pressure actuated valve means, and to said relay valve means, and choke means interposed between said manually operated valve means and said relay valve means for restricting flow of fluid under pressure only to said relay valve means.

11. A car coupler comprising a body having a coupling face, a brake control conduit extending through said body and open to said face, a brake pipe closing valve in said body operable by fluid under pressure to close communication through said conduit, a reservoir formed in said body, a coupler latch carried by said body, an uncoupling piston in said body operable upon supply of fluid under pressure to a

chamber to move said latch to an uncoupling position, relay means in said body operable by fluid under pressure to establish a fluid pressure supply communication from said reservoir to said chamber, a passage in said body for conveying fluid under pressure to actuate said closing valve and said relay means, and to charge said reservoir, a check valve in said body for preventing back flow of fluid under pressure from said reservoir to said passage, means for connecting said passage to a corresponding passage in a counterpart coupler, and means for delaying operation of said relay means with respect to supply of fluid under pressure to said passage.

12. A combined car and train wire coupler comprising a car coupler body having a coupling face for engaging a counterpart coupler, and train wire coupling means having a meeting face for engagement with a counterpart, a brake control conduit extending through said body and open to said coupling face, a brake pipe closing valve in said body operable by fluid under pressure to close communication through said conduit, a reservoir formed in said body, a coupler latch carried by said body, an uncoupling piston in said body operable upon supply of fluid under pressure to a chamber to move said latch to an uncoupling position, relay means in said body operable by fluid under pressure to establish a fluid pressure supply communication from said reservoir to said chamber, fluid conducting means in said body for conveying fluid under pressure to said closing valve and to said reservoir, a passage in said body for conveying actuating fluid under pressure to said relay means, two check valves in said body disposed in said fluid conducting means between said closing valve and reservoir and arranged to permit flow of fluid under pressure only in the direction to said reservoir, a second fluid conducting means connected to the first fluid conducting means between said check valves and open to said meeting face of said train wire coupling means, and a train wire uncoupling piston in said train wire uncoupling means operable upon movement by fluid under pressure in said second fluid conducting means to supply fluid under pressure to said passage.

13. In an automatic car coupler carried by one car adapted to be locked with a counterpart coupler carried by another car, the combination with a source of fluid under pressure on said one car, of a movable latch for locking engagement with said counterpart coupler, fluid pressure actuated piston means operable upon supply of fluid under pressure to a piston chamber to unlock said latch, a fluid pressure supply pipe, relay valve means operable in response to supply of fluid under pressure to a control chamber to establish connection between said supply pipe and said piston chamber, manually operable valve means operable to a position to effect supply of fluid under pressure from said source to said fluid pressure supply pipe and to said control chamber, and means for conveying fluid under pressure from said valve means to a corresponding supply pipe and to a corresponding control chamber in said counterpart coupler.

14. In each of two identical car couplers adapted to be locked one with the other for coupling two cars together, the combination with a source of fluid under pressure on each of said cars, of a movable latch for locking engagement with the other of said couplers, fluid pressure actuated piston means operable to deliver a hammer blow to said latch for unlocking same upon supply of fluid under pressure to a piston chamber, a fluid pressure reservoir for storing an adequate volume of fluid under pressure for exclusive supply to said piston chamber to assure adequate operation of said piston means to deliver said hammer blow, relay valve means operable to establish connection between said reservoir and said piston chamber upon supply of fluid under pressure to a control chamber, a valve device operable manually to a position to effect supply of fluid under pressure to said reservoir and to said control chamber, and means for connecting the reservoir and control chamber on one of said couplers to the corresponding reservoir and control chamber on the other of said couplers when locked together.

15. In each of two identical car couplers adapted to be locked one with the other for coupling two cars together, the combination with a source of fluid under pressure on each of said cars, of a movable latch for locking engagement with the other of said couplers, fluid pressure actuated piston means operable to deliver a hammer blow to said latch for unlocking same upon supply of fluid under pressure to a piston chamber, a fluid pressure reservoir for storing an adequate volume of fluid under pressure for exclusive supply to said piston chamber to assure adequate operation of said piston means to deliver said hammer blow, relay valve means operable to establish connection between said reservoir and said piston chamber upon supply of fluid under pressure to a control chamber, a valve device operable manually to a position to effect supply of fluid under pressure to said reservoir and to said control chamber, and means for connecting the reservoir and control chamber on one of said couplers to the corresponding reservoir and control chamber on the other of said couplers when locked together, and timing means interposed between said valve device and said control chamber to assure that said reservoir will become charged with fluid under pressure before said relay valve means is operated.

16. In an automatic car coupler carried by one car adapted to be locked with a counterpart coupler carried by another car, the combination with a source of fluid under pressure on said one car, of a movable latch for locking engagement with said counterpart coupler, fluid pressure operated piston means operable to deliver a hammer blow to said latch for unlocking same upon supply of fluid under pressure to a piston chamber, a fluid pressure reservoir for storing an adequate volume of fluid under pressure for exclusive supply to said piston chamber to assure adequate operation of said piston means to deliver said hammer blow, relay valve means operable to establish connection between said reservoir and said piston chamber upon supply of fluid under pressure to a control chamber, a valve device operable manually to a position to effect supply of fluid under pressure to said reservoir and to said control chamber, and choke means interposed between said valve device and said control chamber to assure that said reservoir will become charged with fluid under pressure before said relay valve means is operated.

17. In a car and train wire coupler adapted for locking engagement with a counterpart coupler, the combination with a fluid pressure conduit adapted to be supplied with fluid under pressure, unlocking piston means operable to disestablish said locking engagement upon sup-

ply of fluid under pressure to an unlocking piston chamber, a fluid pressure reservoir connected to said conduit for storing fluid under pressure to be supplied to said piston means, relay valve means operable to effect connection between said reservoir and said unlocking piston chamber, a train wire contact retrieving piston operable to uncover a port by fluid under pressure supplied to a retrieving piston chamber connected to said conduit to effect connection between said retrieving piston chamber and said control chamber, choke means interposed between said conduit and said control chamber to assure that said reservoir will become charged with fluid under pressure from said conduit upon supply of fluid under pressure thereto before said relay valve means is operated, and means for effecting supply of fluid under pressure to said fluid pressure conduit.

18. In a combined car and train wire coupler, the combination with a source of fluid under pressure, of a movable latch for locking engagement with a counterpart coupler, unlocking piston means operable upon supply of fluid under pressure to an unlocking piston chamber to operate said latch to disestablish said locking engagement, a fluid pressure storage reservoir for storing fluid under pressure to be supplied exclusively to said unlocking piston chamber, relay valve means operable upon supply of fluid under pressure to a control chamber to connect said reservoir to said unlocking piston chamber, a train wire contact retrieving piston operable by pressure of fluid supplied to a retrieving piston chamber to uncover a port connecting said retrieving piston chamber to said control chamber, and a valve device operable manually to connect said source to said reservoir and to said retrieving piston chamber.

19. In a combined car and electric train wire coupler, the combination with a source of fluid under pressure, of a movable latch for locking engagement with a counterpart coupler, unlocking piston means operable upon supply of fluid under pressure to an unlocking piston chamber to operate said latch to disestablish said locking engagement, a fluid pressure reservoir within said coupler for storing fluid under pressure to be supplied exclusively to said unlocking piston chamber, relay valve means operable upon supply of fluid under pressure to a control chamber to connect said reservoir to said unlocking piston chamber, a train wire contact retrieving piston operable by pressure of fluid in a retrieving piston chamber to uncover a port connecting said retrieving piston chamber to said reservoir and to said control chamber, and a valve device operable manually to connect said source to said retrieving chamber.

20. In a combined car and electric train wire coupler the combination with a source of fluid under pressure, of a movable latch for locking engagement with a counterpart coupler, unlocking piston means operable upon supply of fluid under pressure to an unlocking piston chamber to operate said latch to disestablish said locking engagement, a fluid pressure reservoir within said coupler for storing fluid under pressure to be supplied exclusively to said unlocking piston chamber, relay valve means operable upon supply of fluid under pressure to a control chamber to connect said reservoir to said unlocking piston chamber, a train wire contact retrieving piston operable by pressure of fluid in a retrieving piston chamber to uncover a port connecting said retrieving piston chamber to said reservoir and to said control chamber, and a valve device operable manually to connect said source to said retrieving chamber, and means interposed between said contact retrieving piston and said control chamber to assure that said reservoir first will be charged with fluid under pressure before said relay valve means is operated.

21. In a car and train wire coupler adapted for locking engagement with a counterpart coupler, the combination with a source of fluid under pressure, of a movable latch for locking engagement with said counterpart coupler, unlocking piston means operable upon supply of fluid under pressure to an unlocking piston chamber to effect disengagement of said latch from said counterpart coupler, a fluid pressure supply conduit, fluid pressure actuated relay valve means operable upon supply of fluid under pressure to a control chamber to establish connection between said fluid pressure supply conduit and said unlocking piston chamber, a train wire contact retrieving piston operable by pressure of fluid supplied to a retrieving piston chamber to uncover a port open to said control chamber, other valve means operable upon supply of fluid under pressure to another valve chamber to establish connection of said source to said supply conduit, and a valve device operable manually to a position to effect connection of said source to said other chamber and to said retrieving piston chamber.

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