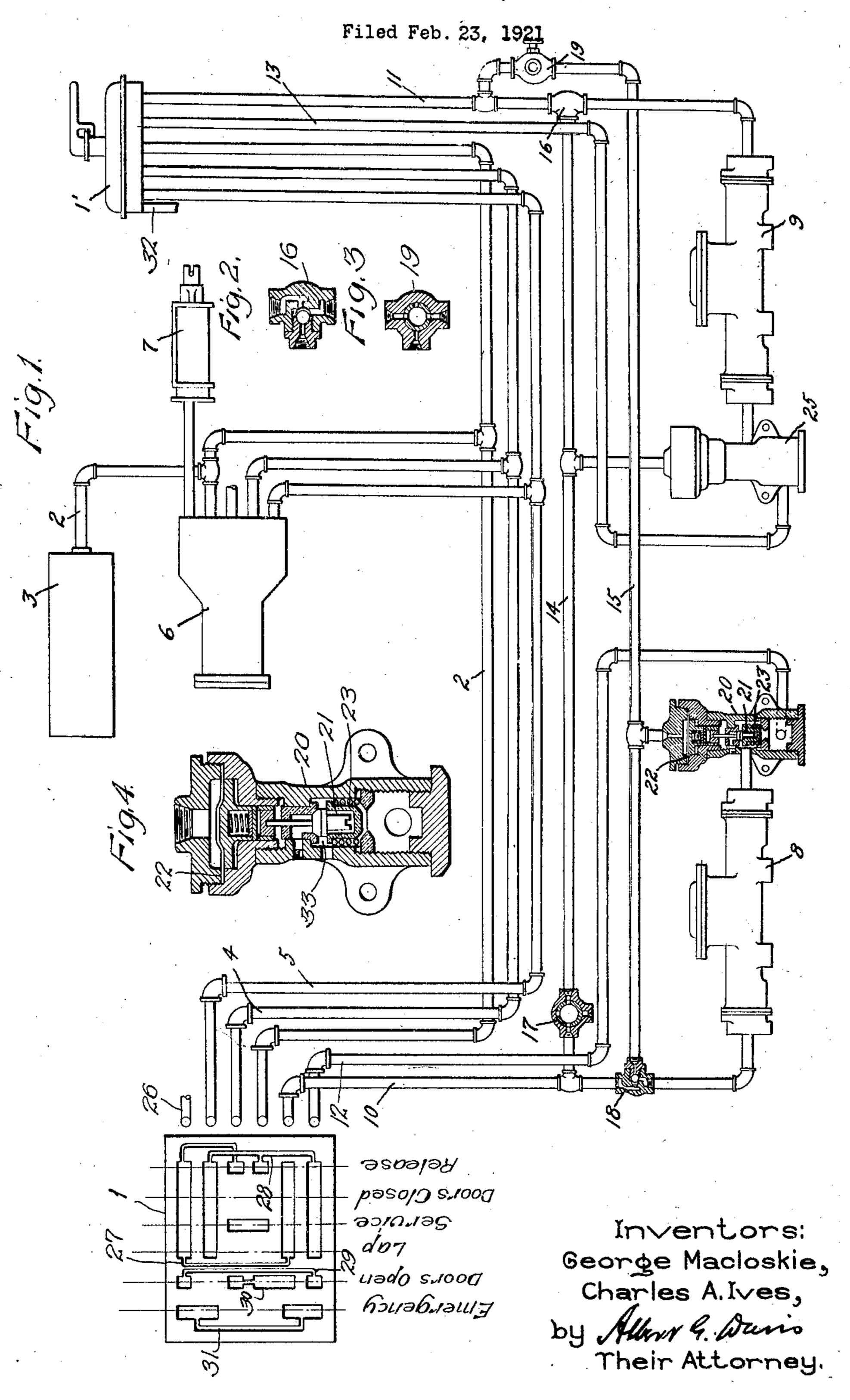
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CAR DOOR CONTROL EQUIPMENT



UNITED STATES PATENT OFFICE.

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CAR-DOOR-CONTROL EQUIPMENT.

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Our invention relates to car door control shown in order to simplify the drawing.

ally provided with a door at each end and the motorman's valve 1. end only.

claims. In the accompanying drawing Fig. 1 is a 26 by a passage 31. diagrammatic view partially in section of a The motorman's valve 1' is arranged in a drawing, the brake equipment comprises a motorman's valve 1 at one end of the car, a motorman's valve 1' at the opposite end, a reservoir pipe 2 connected to the main res-³⁰ ervoir 3, a straight air pipe 4, an emergency pipe 5, an emergency valve 6 and a brake cylinder 7. This brake equipment is standard apparatus and since it is well known in the art, it is believed that a further descrip-

The motorman's valve 1 in addition to being arranged to control the brakes of the car also controls a fluid operated door engine 8 for operating the car door at that end of the 40 car. The motorman's valve 1' is also arranged to control a fluid operated door en-

of the car.

tion thereof is unnecessary.

positions. In order to illustrate the various lap positions the door engine 8 maintains 105 an outline of the motorman's valve 1' is gine 9 maintains the doors controlled there- 110

equipments, and particularly to such equip- The connections which are made by the ments for use on one-man cars which are ar-motorman's valve 1' when in its different ranged to be controlled from either end. operating positions are the same as those 5 One-man cars of the above type are usu-shown in the diagrammatic development of 66

these doors are so arranged that the motor- The motorman's valve 1 is arranged so man can open and close the door only at the that when it is in the release, door closed, end from which he is operating the car. It service and lap positions the door opening is sometimes desirable, however, that both pipe 10 is connected to the exhaust pipe 26 65 doors be controlled by the motorman from by a passage 27 and the door closing pipe 12 the operating end and it is an object of our is connected to the emergency pipe 5 by a invention to provide an arrangement where-passage 28. When the motorman's valve by the motorman may control both doors si- 1 is in the door open position, the door closmultaneously or the door at the operating ing pipe 12 is connected to the exhaust pipe 70 26 by a passage 29 and the door opening Our invention will be better understood pipe 10 is connected to the reservoir pipe $\bar{2}$ from the following description taken in con-by a passage 30. When the motorman's nection with the accompanying drawing, and valve 1 is in the emergency position, the its scope will be pointed out in the appended door opening pipe 10 and the door closing 75 pipe 12 are connected to the exhaust pipe

car door and brake control equipment em- similar manner so that the door opening bodying our invention. As shown in the pipe 11 is connected to the exhaust pipe 800 32 and the door closing pipe 13 is connected to the emergency pipe 5 when the valve 1' is in the release, door closed, service and lap positions; and the door closing pipe 13 is connected to the exhaust pipe 32 and the 85 door opening pipe 11 is connected to the reservoir pipe when the valve 1' is in the door open position; and the door opening pipe 11 and door closing pipe 13 are connected to the exhaust pipe 32 when the valve go

1' is in the emergency position.

The door engines are arranged in any suitable manner, examples of which are well known in the art, so that when fluid pressure is admitted to the door opening side 95 thereof and the door closing side thereof is gine 9 for operating the car door at that end connected to atmosphere, the door engines open the car doors controlled thereby, and The door engines 8 and 9 are provided when fluid pressure is admitted to the door with door opening pipes 10 and 11 and door closing side thereof and the door opening 100 closing pipes 12 and 13 respectively. side thereof is connected to atmosphere, the In the system shown in the drawing, the door engines close the doors controlled theremotorman's valves 1 and 1', which may by. Therefore, when the motorman's valve be of any suitable type, have six operating 1 is in the release, door closed, service and connections that are made by the motor- the doors controlled thereby closed, and man's valves when in their different operat- when the valve 1 is in the door open posiing positions, a diagrammatic development tion the door engine 8 opens the doors conof the motorman's valve 1 is shown. Only trolled thereby. Similarly, the door en-

by closed when the motorman's valve 1' is man's valve 1 is installed. This cut out cock in the release doors close, service and lap is arranged so that in one position it estab-

emergency position the door opening and pipes 11 and 15 and establishes communicaclosing pipes connected thereto are connected to atmosphere so that the doors may be

operated by hand.

With the arrangement heretofore described, it will be observed that each motorman's valve controls only one door engine. Sometimes it is desirable to operate both door engines simultaneously from one end and at other times it is desirable to operate only one door engine. In order that this desired result may be obtained, the following arrangement is shown in the drawing for ac-

complishing this result.

The door opening pipes 10 and 11 are connected together by the pipes 14 and 15. The pipe 14 is connected to the door opening pipe 11 by means of a double check valve 16 preferably of the well known ball type and 25 sectionally illustrated on a relatively large scale in Fig. 2. This check valve is so arranged that, when the door opening pipe 11 is supplied with fluid under pressure through the motorman's valve 1', communication be-30 tween pipe 14 and the door opening side of the door engine 9 is cut off, and when fluid under pressure is admitted to the pipe 14 communication is cut off between the door opening pipe 11 and the door opening side 35 of the door engine 9 and communication is established between pipe 14 and the door off cock 17 is placed in the pipe 14 at the opposite end of the car from where the 40 motorman's valve 1' is installed. This cut off cock which is similar in construction to the cut off cock 19 sectionally illustrated on a relatively large scale in Fig. 3 is so arranged that in one position it establishes 45 communication between the door opening pipe 10 and pipe 14 and in another position cuts off this communication between the pipes 10 and 14 and connects the pipe 14 to atmosphere. The pipe 15 is connected to 50 the door opening pipe 10 by means of a double check valve 18 of the same construction as the check valve 16. This check valve sure is supplied to the door opening pipe 10 tween door opening pipe 10 and the pipe 14 through the motorman's valve 1 communica- and establishes communication between the 120 60 pipe 10 and the door opening side of the tween the pipe 15 and atmosphere. The 125

positions and opens the doors when the valve lishes communication between the door open-1' is in the door open position.

ing pipe 11 and pipe 15 and in another posi-When either motorman's valve is in the tion cuts off this communication between the 7 tion between pipe 15 and atmosphere.

> The communication between the door closing pipe 12 and the door closing side of the door engine 8 is controlled by a door operat- 71 ing valve 20 which is sectionally illustrated on a relatively large scale in Fig. 4. This door operating valve comprises a double beat valve 21 operated by a diaphragm 22, one side of which is subject to the pressure in 8% the pipe 15 and the other side of which is subject to the pressure of a spring 23. When there is no pressure in the pipe 15 the valve 20 is held in the position shown in the drawing, in which position the double beat valve 85 21 establishes communication between the door closing pipe 12 and the door closing side of the door engine 8. When fluid under pressure is admitted to the pipe 15 the diaphragm 22 of the valve 20 is moved down- 90 wardly and the double beat valve 21 cuts off communication between the door closing pipe 12 and the door closing side of the door engine 8 and establishes communication between the door closing side of the door 95 engine 8 and the passage 33 which is connected to atmosphere.

The communication between the door closing pipe 13 and the door closing side of the door engine 9 is controlled by a door operat- 100 ing valve 25 of the same construction as the opening side of the door engine 9. A cut valve 20. This valve 25 is so arranged that when there is no fluid under pressure in the pipe 14 communication is established between the door closing pipe 13 and the door 105 closing side of the door engine 9, but when there is fluid under pressure in the pipe 14 communication between the door closing pipe 13 and the door closing side of the door engine 9 is cut off and communication estab- 110 lished between the door closing side of the

door engine 9 and atmosphere.

The operation of the equipment shown is as follows: Let it be assumed that the motorman's valve 1 is at the operating end of the 115 car. If it is desired to control the door at the operating end only, the cut out cock 17 is 18 is so arranged that when fluid under presturned so that it cuts off communication betion is cut off between the door opening pipe pipe 14 and atmosphere. The cut out cock 10 and the pipe 15, and when fluid under 19 is also turned so that it cuts off communipressure is admitted to the pipe 15 commu- cation between the door opening pipe 11 and nication is cut off between the door opening pipe 15 and establishes communication bedoor engine 8, and communication is estab- motorman's valve at the non-operating end lished between pipe 15 and the door open- is placed in lap position, which is a door ing side of the door engine 8. A cut out closing position, and therefore the door closcock 19 is placed in the pipe 15 at the oppo- ing pipe 13 at the non-operating end is sup-65 site end of the car from where the motor-plied with fluid under pressure from the 130

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various door positions. For example, if it end the brake valve 1 is moved to its door opening position in which fluid under pressure is supplied from the reservoir pipe 2 to the door opening pipe 10 and the door closing pipe 12 is connected to atmosphere. No fluid under pressure flows from the pipe 10 to the pipe 15 because the fluid pressure in the pipe 10 moves the check valve 18 so that it cuts off communication between pipes 10 and 15. In order to prevent the pressure 25 from building up in the pipe 15 due to the check valve 18 leaking, the valve 19, which is at the non-operating end, is arranged to connect the pipe 15 to atmosphere when it is operated to cut off communication between 30 pipes 15 and 11. Since there is no fluid under pressure in the pipe 15 at this time, the double beat valve 21 of the door opening valve 20 remains in its normal position so that the communication between the door 35 closing pipe 12 and the door closing side of the door engine 8 is maintained. Since the door opening side of the door engine 8 is supplied with fluid under pressure and the door closing side is connected to atmos-40 phere it operates to open the door controlled thereby. When it is desired to close the door at the operating end of the car, the motorman's valve 1 is moved to a door closing position in which fluid under pressure is sup-45 plied to the door closing pipe 12 and the door opening pipe 10 is connected to atmosphere. Fluid under pressure is thereby supplied to the door closing side of the door engine 8 whereupon it operates to close the door at the operating end.

Let it now be assumed that both doors of The cut out cock 17 which is at the operating from the spirit and scope of our invention 120 munication between the door opening pipe all such modifications and changes. 10 and the pipe 14 so that pipe 14 is sup- What we claim as new and desire to secure plied with fluid under pressure each time by Letters Patent of the United States, is: the motorman's valve 1 is moved to the door 1. In a car door control equipment, the 125 opening position. The admission of fluid combination of a fluid operated door engine under pressure to the pipe 14 causes the at each operating end of the car for opercheck valve 16 which is at the non-operating ating a door thereat, a source of fluid presend, to move so that it cuts off communica- sure, a manually controlled door valve at

emergency pipe 5 and the door opening pipe—the door opening side of the door engine 9 11 at the same end is connected to atmos- and establishes communication between the phere. It will be apparent therefore that pipe 14 and the door opening side of the the door at the non-operating end is held door engine 9 so that fluid under pressure is to closed independently of the motorman's supplied thereto. The admission of fluid 70 valve at the operating end.

under pressure to the pipe 14 also operates The brake equipment on the car may be the door valve 25 at the non-operating end controlled in the usual manner from the op- to cut off communication between the door erating end by moving the motorman's valve closing pipe 13 and the door closing side of 10 1 to the various brake positions. The door the door engine 9 and to establish communi- 75 at the operating end may be controlled also cation between the door closing side of the by moving the motorman's valve 1 to the door engine 9 and atmosphere. Therefore, it will be apparent that each time the motoris desired to open the door at the operating man's valve 1 at the operating end is moved to the door opening position both of the door 80 engines 8 and 9 are operated to open the doors controlled thereby. When the motorman's valve 1 is moved to a door closing position the pipe 14 is connected to atmosphere through the pipe 10. This exhausts 85 the door opening side of the door engine 9 and reduces the pressure on the top of the diaphragm 22 of the door operating valve 25. When the pressure in the pipe 14 drops to a predetermined value the valve 25 is re- 90 stored to its normal position by the spring 23 in which position communication is again established between the door closing pipe 13 and the door closing side of the door engine 9 whereupon the door engine 9 is operated 95 to close the door at the non-operating end of the car. From the above description it will be apparent that when the car is operated from the end where the motorman's valve 1 is situated, the door engine 8 only 100 is controlled by the motorman when the cut out cock 17 is in one position, and the door engines 8 and 9 are simultaneously controlled by the motorman when the cut out cock 17 is in the other position. Furthermore, it 100 will be evident from the above description that when the car is operated from the other end, the motorman will be able to control the door engine 9 only when the cut out cock 19 is in the position in which it es- 11" tablishes connection between the pipe 15 and atmosphere and will be able to control the door engines 8 and 9 simultaneously when the cut out cock 19 is in the position in which it establishes communication between the 113 door opening pipe 11 and the pipe 15.

the car are to be controlled from the op- While we have shown one embodiment of erating end, which we assumed to be the our invention various modifications and end where the motorman's valve 1 is situated. changes may be made without departing end is now turned so that it establishes com- and we aim to cover in the appended claims

tion between the door opening pipe 11 and each operating end of the car arranged to 130

establish suitable communication between valve at each end arranged when in the door 5 sociated with each engine and adapted to be sure is suplied thereto and to establish com- 70 to the car arranged to prevent the door valve the door opening pipe of the engine at the 75 at the other end.

15 combination of a fluid operated door engine to be operated by the fluid pressure 80 20 establish suitable communication between closing position and the door valve at the 85 25 be controlled by the door valve at the other corresponding end and the valve means asso- 90 end of the car so that both engines are ciated with the door engine at the other end. 30 responding end from controlling the valve thereat, each engine having a door opening 85 end.

said source and the engine at the correspond-closing position to establish communication ing end of the car to effect the opening and to the door closing pipe of the engine at the closing of the door thereat, valve means as- corresponding end so that fluid under prescontrolled by the door valve at the other munication between the door opening pipe end of the car to effect the operation of the of said engine and atmosphere and arranged engine with which it is associated, and a when in the door opening position to estabmanually controlled device at each end of lish communication between said source and at the corresponding end from controlling corresponding end and to establish comthe valve means associated with the engine munication between the door closing pipe of said engine and atmosphere, valve means 2. In a car door control equipment, the associated with each engine and adapted at each operating end of the car for operat- in the door opening pipe of the other ing a door thereat, a source of fluid pres- engine to effect the operation of the engine sure, a manually controlled door valve at with which it is associated when the door each operating end of the car arranged to valve at the corresponding end is in the door said source and the engine at the correspond- other end is in the door opening position, ing end of the car to effect the opening and and a manually controlled valve at each closing of the door thereat, a valve means end of the car for controlling the communiassociated with each engine and adapted to cation between the door opening pipe at the

simultaneously operated, and a manually 5. In a car door control equipment, the controlled device at each end of the car ar- combination of a fluid operated door engine ranged to prevent the door valve at the cor- at each end of the car for operating a door means associated with the engine at the other pipe and a door closing pipe, a source of fluid pressure, a manually controlled door 3. In a car door control equipment, the valve at each end of the car arranged when combination of a fluid operated door engine in the door closing position to establish 35 at each end of the car for operating a door communication to the door closing pipe of 10m thereat, each engine having a door opening the engine at the corresponding end so that pipe and a door closing pipe, a source of fluid under pressure is supplied thereto and fluid pressure, a manually controlled door to establish communication between the valve at each end arranged when in the door opening pipe of said engine and atdoor closing position to establish communi- mosphere and arranged when in the door 100 cation to the door closing pipe of the en- opening position to establish communicagine at the corresponding end so that fluid tion between said source and the door openunder pressure is supplied thereto and to ing pipe of the engine at the corresponding establish communication between the door end and to establish communication between opening pipe of said engine and atmosphere the door closing pipe of said engine and at- 110 and arranged when in the door opening po-mosphere, a valve device in each door opensition to establish communication between ing pipe adapted to be operated by the fluid said source and the door opening pipe of pressure in the door opening pipe at the the engine at the corresponding end and to other end of the car to cut off communicaestablish communication between the door tion between the door opening pipe in which 116 closing pipe of said engine and atmosphere, said valve device is connected and the door and valve means associated with each engine opening side of the engine at the end of the and adapted to be operated by the fluid pres- car at which the respective valve device is sure in the door opening pipe of the other located and to establish communication beengine to effect the operation of the engine tween the door opening side of said engine 120 with which it is associated when the door and the door opening pipe at the other end valve at the corresponding end is in the door of the car, and a valve device in each door closing position and the door valve at the closing pipe adapted to be operated by the other end is in the door opening position. fluid pressure in the door opening pipe as-4. In a car door control equipment, the sociated with the engine at the other end 125 combination of a fluid operated door engine of the car to cut off communication between at each end of the car for operating a door the door closing pipe in which said valve thereat, each engine having a door opening device is connected and the door closing side pipe and a door closing pipe, a source of of the engine at the end of the car at which fluid pressure, a manually controlled door the respective valve device is located and to 130

combination of a fluid operated door engine each door opening pipe adapted to be oper-5 at each end of the car for operating a door ated by the fluid pressure in the door open- 70 thereat, each engine having a door opening ing pipe at the other end of the car to cut off pipe and a door closing pipe, a source of communication between the door opening fluid pressure, a manually controlled door pipe in which the valve device is connected in the door closing position to establish com-the end of the car at which the respective is munication to the door closing pipe of the valve device is located and to establish comfluid under pressure is supplied thereto of said engine and the door opening pipe 15 the door opening pipe of said engine and door closing pipe adapted to be operated by 80 door opening position to establish com- associated with the engine at the other end corresponding end and to establish com-vice is connected and the door closing side 35 device in each door opening pipe adapt- establish communication between said door ed to be operated by the fluid pressure closing side of said engine and atmosphere. in the door opening pipe at the other end of 8. In a car door control equipment, the 90 the car to cut off communication between combination of a fluid operated door engine the door opening pipe in which said valve at each end of the car for operating a door device is connected and the door opening thereat, each engine having a door opening side of the engine at the end of the car at pipe and a door closing pipe, a source of which the respective valve device is located fluid pressure, a motorman's valve at each 95 and to establish communication between the end of the car arranged when in the lap podoor opening side of said engine and the sition to establish communication to the door door opening pipe at the other end of the closing pipe of the engine at the correspondcar, a valve device in each door closing pipe ing end so that fluid under pressure is sup-35 adapted to be operated by the fluid pressure plied thereto and to establish communication 100 in the door opening pipe associated with the between the door opening pipe of said engine engine at the other end of the car to cut off and atmosphere, and arranged when in the communication between the door closing door opening position to establish communipipe in which said valve device is connected cation between said source and the door and the door closing side of the engine at the end of the car at which the respective valve device is located and to establish com- tion between the door closing pipe of said munication between said door closing side of engine and atmosphere, a valve device in the engine and atmosphere, and a manually controlled valve at each end of the car for controlling the communication between the door opening pipe at the corresponding end and the valve devices at the other end of the car.

7. In a car door control equipment, the combination of a fluid operated door engine at each end of the car for operating a door thereat, each engine having a door opening pipe and a door closing pipe, a source of the other end, a valve device in each door fluid pressure, a motorman's valve at each closing pipe adapted to be operated by the 120 end of the car arranged when in the lap posi-fluid pressure in the door opening pipe astion to establish communication to the door sociated with the engine at the other end of closing pipe of the engine at the correspond the car to cut off communication between the ing end so that fluid under pressure is sup- door closing pipe in which the valve device plied thereto and to establish communication is connected and the door closing side of 125 between the door opening pipe of said engine the engine at the end of the car at which and atmosphere, and arranged when in the the respective valve device is located and to door opening position to establish communi- establish communication between said door cation between said source and the door closing side of said engine and atmosphere, opening pipe of the engine at the corre- and a manually controlled valve at each end 130

establish communication between said door sponding end and to establish communicaclosing side of the engine and atmosphere. tion between the door closing pipe of said 6. In a car door control equipment, the engine and atmosphere, a valve device in valve at each end of the car arranged when and the door opening side of the engine at engine at the corresponding end so that munication between said door opening side and to establish communication between at the other end, and a valve device in each atmosphere and arranged when in the the fluid pressure in the door opening pipe munication between said source and the of the car to cut off communication between door opening pipe of the engine at the the door closing pipe in which the valve demunication between the door closing pipe of the engine at the end of the car at which of said engine and atmosphere, a valve the respective valve device is located and to

opening pipe of the engine at the corre-105 sponding end and to establish communicaeach door opening pipe adapted to be operated by the fluid pressure in the door open- 110 ing pipe at the other end of the car to cut off communication between the door opening pipe in which the valve device is connected and the door opening side of the engine at the end of the car at which the respective 113 valve device is located and to establish communication between said door opening side of said engine and the door opening pipe at

other end of the car.

controlling valve device at each end of the tioned door control pipe for cutting off comdoor controlling valve device to the door both of the other door control pipes and for 10 engine, and a double check valve for con-establishing communication between said

pipes to the door engine.

10. In a car door control apparatus, the to said door engine. 15 controlling valve device at each end of the combination with a door engine, two door 20 controlling valve device through its control valve, valve devices responsive to fluid pres-25 pipe.

11. In a car door control apparatus, the combination with two door engines, of a door controlling valve device at each end of the car, a door control pipe leading from ³⁰ each controlling valve to each door engine, and a double check valve for controlling communication from each control pipe to

one of said door engines.

85 combination with a door engine, of two a door closing pipe leading from one of said trol pipe leading from each door controlling a door opening pipe leading from the other

leading from each door controlling valve door controlling valves. device to the door engine, and a valve device 18. In a car door control equipment, the operated by fluid pressure in one of said con- combination with a door engine, two door 110 trol pipes for establishing communication controlling valves, a door opening pipe and and for closing communication from said door controlling valves to said door engine, control pipe and door engine to the other control pipe.

combination with a door engine, two door door opening pipe for cutting off communibe leading from one of said door controlling door opening and closing pipes leading from trol pipes for cutting off communication other door controlling valve. between said door engine and another of said In witness whereof, we have hereunto set 125 door control pipes.

15. In a car door control equipment, the combination with a door engine, two door

of the car for controlling the communication controlling valves, two door control pipes 65 between the door opening pipe at the corre-leading from one of said door controlling sponding end and said valve devices at the valves to said engine, another door control pipe leading from the other door controlling 9. In a car door control apparatus, the valve to said door engine, and valve devices combination with a door engine, of a door responsive to fluid pressure in said last men- 70 car, a door control pipe leading from each munication between said door engine and trolling communication from said control door engine and the door control pipe lead- 75 ing from said other door controlling valve

combination with a door engine, of a door 16. In a car door control equipment, the car, a door control pipe leading from each controlling valves, two door control pipes 80 door controlling valve device to the door leading from one of said door controlling engine, and a double check valve operated valves to said engine, another door control by the pressure of fluid supplied from one pipe leading from the other door controlling pipe for opening communication from said sure in said last mentioned door control 85 control pipe to the door engine and for pipe for cutting off communication between closing communication from said control both of the other door control pipes and said pipe and the door engine to the other control door engine and for establishing communication between said door engine and the door control pipes leading to said other door con- 90 trolling valve, and a manually controlled valve for controlling communication between said valve devices and the door control pipe leading from said other door controlling valve.

17. In a car door control equipment, the combination with a door engine, two door 12. In a car door control equipment, the controlling valves, a door opening pipe and door controlling valve devices, a door con- door controlling valves to said door engine, 100 valve device to the door engine, and a double door controlling valve to said door engine, check valve for controlling communication and valve means responsive to fluid pressure 40 from said control pipes to the door engine. in said last mentioned door opening pipe 13. In a car door control equipment, the for cutting off communication between said 105 combination with a door engine, of two door door engine and the door opening and closcontrolling valve devices, a door control pipe ing pipes leading from said one of said

from said control pipe to the door engine a door closing pipe leading from one of said a door opening pipe leading from the other door controlling valve, valve means respon- 115 14. In a car door control equipment, the sive to fluid pressure in said last mentioned controlling valves, two door control pipes cation between said door engine and the valves to said engine, another door control said one of said door controlling valves, and 120 pipe leading from the other door controlling a manually controlled valve for controlling valve to said door engine, and means respon-communication between said valve means sive to fluid pressure in one of said door con- and the door opening pipe leading from said

our hands this 19th day of February, 1921.

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