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(54) Improvements to vehicle-transporting railway cars

(57) Improvements to vehicle-transporting railway cars comprising movable bridge plate supports which avoid interference with door clearance requirements, and improved end door lock, and a flexible deflector for decreasing air flow about the outer edges of the end doors. The movable bridge plate supports comprise a lower deck bridge plate support which is movable between a retractable position in which it can support the free end of the bridge plate connected to an adjacent car, and an extended position in which it may be pivotally connected to a bridge plate while spanning a door track. An upper deck bridge plate is provided which comprises a movable member and fixed member, with the movable member and fixed member in combination engaging opposite sides of one of a bridge plate for pivotal connection thereto. Each of the lower deck bridge plates includes a support member for engaging the free end of a bridge plate connected to an adjacent car, and includes a foot to support provided by the door track when in extended position. The improved lock includes lubrication conduits extending between external surfaces and lock pin apertures in top and bottom walls which are joined by a channel shaped side wall structure, and further includes circumferentional channels within the interior surfaces of the lock pin apertures to, dispose between pin engaging surfaces therein, for distribution of lubricant. The flexible deflector extends inward from each of the side walls where the outer edges of the end doors to decrease or inhibit air flow around the outer edges without contacting the end doors when in closed position. The bridge plate supports, lock, and deflectors all must be sufficiently strong and durable to withstand loads imposed during railway service over extended periods of years, without failure.

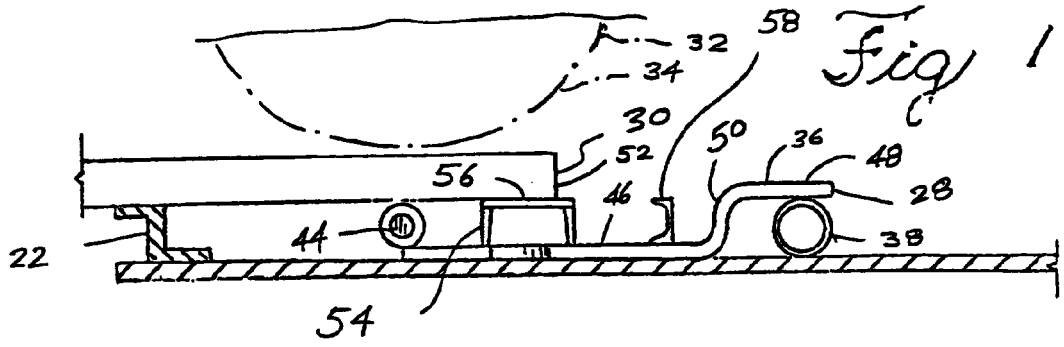

Fig 1

EP 0 983 921 A1

Description

Field of the Invention

[0001] The invention relates generally to railway cars for transporting automotive vehicles, and more particularly to improvements relating to end doors and bridge plate supports at the ends of such railway cars.

Background of the Invention

[0002] Railway cars for carrying automotive vehicles such as passenger cars, light trucks, sport-utility vehicles and the like typically have end doors to provide security, and to reduce entry of dust or other matter. Seals may be provided along one or more edges of the end doors to further limit ingress of particulates, as discussed in U.S. Patent No. 5,765,486.

[0003] One of the difficulties encountered in attempting to seal the outer edges of radial end doors is that the doors traverse an arcuate path, passing between a ladder panel and the side wall, with varying clearances between the door and the adjacent structure. Seals which contact the door will generally increase the force required to open and close the door. Frictional forces which may be relatively small when considered in terms of pounds per linear inch can be prohibitively large when applied over a door height of about 15 ft., or a substantial portion thereof. Frictional forces associated with past attempts to seal the doors' outer edges have made the doors difficult to open and close. Door seals in a railroad environment also must be capable of functioning during and after extended exposure to temperature extremes, sunlight, accumulation of snow and ice, and other environmental factors without failure. Exposure to low temperatures may cause flexible sealing elements to stiffen, increasing opening and closing forces. One of the problems addressed by the invention is to provide an improved means for reducing inflow and outflow of air around the outer edges of the end doors in commercial railway service.

[0004] Another problem addressed by the invention concerns the door locks. The end doors must have the capability to lock securely in open or closed position. Difficulties in operating one door or one door lock can result in costly delays in loading or unloading. Accordingly, it is important that the doors and locks be reliable in terms of being capable of dependable operation without undue difficulty and without failure. Certain locking mechanisms in railway car doors having sliding locking pins employ a generally C-shaped bracket formed of a 1/4 in. plate which is bent to form upper and lower walls extending from a single vertical sidewall. See, e.g., U.S. Patent No. 4,936,227, the disclosure of which is incorporated by reference herein. A grease cup on the upper wall retains a quantity of grease to lubricate the pin. Wear problems have occurred at locations where friction occurs between the locking pins and associated constraining structure. There is a need for an improved lock mechanism that can perform reliably over extended periods of time while withstanding exposure to repeated impact loads, vibration, and other mechanical loads, as well as dust, dirt, weather extremes, and other conditions encountered in railway service over a service life of several years' duration, with reduced wear as compared with the prior art structures.

[0005] Another problem addressed by the invention relates to bridge plate supports. Adjacent the end doors, railway cars for transporting automotive vehicles typically include bridge plate supports welded to each deck to support bridge plates that connect the decks of adjacent rail cars to permit automotive vehicles to be driven between rail cars during loading and unloading, with the rail car doors locked in open position. Typically, each bridge plate is pivotally connected at one end to one car or the other, depending on the direction of travel of the automotive vehicles during loading or unloading. The pivotal connection is placed so that the automotive vehicle tires first engage the bridge plate at the pivotally connected end, rather than the free end, as the vehicle is driven from one rail car to the other. The free end is simply supported from below by the other car, but is not mechanically connected thereto. Each bridge plate support typically includes a pair of sleeves or pipes on opposite sides of one end for receiving pins to connect with both sides of an end of a bridge plate.

[0006] Recently developed radial end door assemblies associated with wider rail car configurations employ door tracks having larger radii of curvature, which can present geometric problems relating to avoidance of interference with bridge plate supports on the lower decks. Also, in the interest of reducing ingress of particulates and improving security, slots in prior art end doors which have provided clearance for upper deck bridge plate supports have been eliminated on some recently-developed radial end doors, which presents a separate problem.

[0007] One aspect of the invention relates to improved bridge plate supports which avoid interference with end doors. Another aspect of the invention relates to an improved end door lock assembly. Another aspect of the invention relates to reducing airflow about the outer edges of the end doors.

Summary of the Invention

[0008] In accordance with one aspect of the invention, there is provided a movable bridge plate support for spanning the door track on the lower deck of an automotive vehicle carrying railway car. Each of the movable bridge plate supports has sufficient strength, stiffness and durability to withstand loads associated with bi-directional travel of automotive vehicles over the bridge plate support and an associated bridge plate during repeated loading and unloading of automotive vehicles over extended periods of railway service. Each of the

bridge plate supports is movable between a retracted position and an extended position. In retracted position, it is disposed inward of and adjacent one of the door tracks, and is capable of supporting an end or tip of a bridge plate connected to an adjacent car. In extended position, it is capable of supporting and interconnecting with an end of a bridge plate while spanning one of the door tracks. The bridge plate support preferably includes at least one support member which, when the bridge plate support is in its retracted position, is positioned on the upper surface thereof to support the tip of a bridge plate. Each of the bridge plate supports preferably pivots on the deck, and rests on the door track in extended position. Tubular supports are provided at its free end to engage connecting pins on a bridge plate at an elevation below or approximately level with the upper surface of the door track. Each bridge plate preferably includes a foot that engages the deck when the bridge plate is in extended position to augment the support provided by the door track.

[0009] In accordance with another aspect of the invention, there is provided an upper level bridge plate support comprising a fixed member and a movable member. The movable member can be adjusted between an extended position and a retracted position. In its extended position it is capable of supporting and interconnecting with one side of an end of a bridge plate. In its retracted position, it avoids interference with door clearance requirements and is capable of supporting one side of an end of a bridge plate connected to an adjacent car, with the fixed member supporting the opposite side.

[0010] In accordance with a third aspect of the invention, there is provided an improved locking arrangement for railway car end doors of the type employing a spring loaded locking pin for securing the door in open or closed position. The improvement includes provision of lubrication conduits in top and bottom walls of a bracket which supports the locking pin. The lubrication conduits enable lubricant to be received at an external location and distributed circumferentially about the lock pins through communication between the lubrication conduits and annular channels in lock pin apertures which constrain and guide the lock pins.

[0011] In accordance with a fourth aspect of the invention, there is provided a flexible deflector extending inward from each of the side walls of an automotive vehicle carrying railway car near the outer edges of the end doors to inhibit air flow around the outer edges of the end doors without contacting the doors when in closed position. The flexible deflectors preferably engage the doors only as they approach fully opened position, and are deformed thereby so as not to prevent the end doors from moving to fully opened position. The deflectors are capable of withstanding repeated deformations by the end doors during extended periods of use in rail service throughout a wide range of temperatures. Preferably, the deflectors have the same configurations as end door nose seals, and are made of the same materials, so that the same extrusion can be used for both.

Brief Description of the Drawings

[0012]

FIG. 1 is a side elevational view of a lower deck bridge plate support in a retracted position.

FIG. 2 is a plan view of the bridge plate support of FIG. 1, shown in an extended position.

FIG. 3 is a side elevational view of the bridge plate support of FIG. 1 in an extended position.

FIG. 4 is a plan view of an upper deck bridge plate support member in an extended position.

FIG. 5 is a side elevational view whereof.

FIG. 6 is a top plan view of an upper deck bridge plate support including the member of FIGS. 4 and 5.

FIG. 7 is a sectional plan view illustrating a radial end door and an associated deflector. The door is shown in solid lines in open position, and is shown in closed position in phantom.

FIG. 8 is a side elevational view of a door lock assembly.

FIG. 9 is a plan view thereof.

FIG. 10 is a top plan view of a support bracket for the door lock assembly.

FIG. 11 is a side elevation thereof.

Detailed Description of Preferred Embodiments

[0013] The invention is preferably embodied in improvements relating to the end doors and bridge plate supports of railway cars for carrying automotive vehicles.

[0014] The preferred railway car has a pair of radial doors 20 at each end. Each of the end doors has one or more rollers at its bottom end. Examples of suitable end doors are shown and described in U.S. Patent No. 5,765,486, the disclosure of which is incorporated herein by reference. The rollers of each door travel along an arcuate door track 22 that protrudes upward from the floor or lower deck 24 to provide a slightly elevated, curved path for the rollers.

[0015] The invention is described herein with reference to a bi-level car having upper and lower decks 26 and 24, each of which is capable of supporting automotive vehicles in railway service between a pair of side walls 27. Each deck is equipped with suitable chocks and other equipment for securing automotive vehicles in place during rail transport. In other embodiments, the invention may be employed in tri-level rail cars which include a third deck for supporting automotive vehicles.

Bridge Plate Supports

[0016] The preferred railway car has a pair of movable bridge plate supports 28 at each end of its lower deck. The movable bridge plate supports have sufficient strength, stiffness and durability to withstand loads associated with bi-directional travel of automotive vehicles over the bridge plate supports and associated bridge plates 30 during repeated loading and unloading of automotive vehicles 32 over extended periods of railway service. Each of the bridge plate supports 28 is movable between a retracted position (FIG. 1) and an extended position (FIGS. 2 and 3). In its retracted position, the bridge plate support 28 is disposed inward of the door track so as to avoid interference with opening and closing of the doors. In retracted position, each of the lower deck bridge plates 28 is capable of supporting an end of a bridge plate 30 connected to an adjacent car, positioned to support wheels 34 of automotive vehicles traveling between the cars. In its extended position, the bridge plate support 28 spans the door track 22 and is capable of being connected with and supporting an end of a bridge plate 30 positioned to support wheels 34 of automotive vehicles traveling between cars while spanning the door track.

[0017] In the illustrated embodiment, each of the lower deck bridge plate supports 28 comprises a main plate 36 and a pair of sleeves or pipes 38 which receive pins or rods 40 connecting the bridge plate supports to the bridge plate. Each of the bridge plate supports further includes hinge members 42 for receiving a hinge pin 44 to pivotally connect the bridge plate support to a hinge member 43 mounted on the lower deck 24 of the rail car. The bridge plate support is moved between retracted position and extended position by pivoting it about the hinge pin.

[0018] When in retracted position, as shown in FIG.1, a first portion 46 of the main plate rests directly on the deck surface, and a second portion 48 is elevated slightly thereabove. The first and second portions are connected by a generally "S" shaped bend 50.

[0019] When the bridge plate support 28 is in its retracted position with a bridge plate 30 resting thereon, the tip 52 or free end of the bridge plate extends beyond the hinge, but does not reach the elevated second portion of the main plate. To limit downward deflection of the portion of the bridge plate extending beyond the hinge in response to automotive vehicle tire loads, a support member 54 extends upward to engage an end portion of the bridge plate. The illustrated support member 54 comprises a short length of steel channel welded to the main plate so that the web 56 of the channel is spaced therefrom to provide a stable support surface disposed beneath the free end 52 of the hinge plate generally centrally of the width of the bridge plate support.

[0020] The bridge plate is generally rectangular in shape, having a width about equal to that of the bridge plate support 28, but having angled corners at its free end to reduce its width at the free end. The bridge plate also tapers somewhat in thickness, decreasing in thickness near its free end.

[0021] When the bridge plate support 28 is used to support the free end of the bridge plate 30 as shown in FIG. 1, the opposite end of the bridge plate typically is connected to an adjacent car. In the absence of the support member 54, where the adjacent car is equipped with pivotal bridge plate supports, downward force on the free end 52 of the bridge plate will result in rapid upward displacement of the opposite end of the bridge plate due to a lever action, with the hinge members 42 and 43 acting as fulcrum. As the vehicle tire subsequently rolls off of the free end of the bridge plate, the opposite end then drops back down, resulting in impact loads and attendant noise, wear, and other undesirable effects. The support member 54 addresses these problems by preventing or limiting downward displacement of the free end of the bridge plate.

[0022] The distance between the hinge pin 44 and the bend 50 is slightly greater than the maximum distance between the hinge pin and the outer edge of the door track, so that when the bridge plate support is pivoted from retracted position to extended position, the first portion 46 rests on the upper surface of the door track, while the second portion 48 is disposed at a slightly lower elevation. This enables the bridge plate pins 40 to engage the bridge plate support at an elevation below that of the upper surface of the door track.

[0023] As shown in FIG.2, the door track 22 engages the bottom of the main plate 36 along a curved path at varying distances from the free end 52 of the bridge plate support 28 in extended position. To enable the bridge plate support 28 to withstand the loads associated with repeated transport of automotive vehicles between car units when the bridge plate support is in its extended position, a deck-engaging foot 58 is preferably affixed to the main plate and positioned so as to extend downward therefrom adjacent its outer edge 60, between the door track and the bend 50, thereby supporting the outer edge portion of the bridge plate support on the deck surface, and preventing the outer edge portion from being bent downward.

[0024] As shown in FIG. 6, bridge plate supports 66 are provided at each end of the upper deck. Each bridge plate support 66 comprises a fixed inner member 62 and a movable outer member 64. Like those on the lower deck, the upper deck bridge plate supports 62 and 64 must have sufficient strength, stiffness and durability to withstand loads associated with bi-directional travel of automotive vehicles over the bridge plate supports 66 and an associated bridge plate during repeated loading and unloading of automotive vehicles over extended periods of railway service.

[0025] The movable outer member 64 is pivotable between an extended position, shown in FIGS. 4-6, and a retracted position in which it is retracted into a pocket

or recess 68. In its extended position, the movable member is capable of supporting and connecting with one side of an end of a bridge plate while extending outward beyond the edge of the deck, and beyond the clearance requirements for the inner surface of the door (shown in phantom at 70 in FIG. 4). In this position, it is capable of interconnecting with and supporting one side of a bridge plate end. The fixed member 62 is disposed inward of the inner surface of the end door 20 in closed position, and is capable of supporting and interconnecting with an opposite side of the same end of the bridge plate.

[0026] In its retracted position, the movable outer member 64 avoids interference with door clearance requirements, and is disposed entirely inside of the edge of the deck. In this position, its upper surface is substantially flat and flush with the surrounding deck surface, and it is capable of supporting a portion of a bridge plate connected to an adjacent car.

[0027] The movable member 64 pivots about a hinge pin 72 which is fixed to the upper deck by a hinge support 74. A pair of opposite side walls 76 of the movable member are rotatably mounted on the hinge pin. A sleeve 78 for receiving a pin for interconnection with a bridge plate is mounted on a bottom wall 80 which is affixed to the side walls. A top wall 82 and end wall 84 which extend between the side walls provide additional strength and rigidity.

[0028] The fixed member 62 comprises a plate 86 that is welded to the underside of the deck, and a sleeve 88 affixed thereon for receiving a bridge plate pin. The fixed member may also include an angle 90 extending vertically along the end of the deck, and horizontally over an end portion of the upper surface of the deck, and an additional reinforcement plate 92 welded to the bottom of plate 86.

[0029] By employing a fixed bridge plate support member in combination with a movable bridge plate support member for the upper deck as described above, the deck structure is significantly simplified, as compared to the deck structure that would be required if two pivotal members where employed, or a full width pivotal member employed, for each bridge plate. The movable member described herein above, when in its retracted position, presents a substantially flat upper surface for the deck, which is desirable not only for support of a bridge plate connected to an adjacent car, but also to avoid presenting an obstruction to foot traffic at this location.

Locking Pin Bracket

[0030] To lock the doors in open or closed position, each end door includes upper and lower locks. Each lock has a spring-loaded locking pin which may be received in a bore 98 or opening in the deck. A lever arm 100 is positioned to facilitate raising the lock pin. The locks 94 are positioned in a manner generally similar to the arrangement shown in U.S. Patent No. 4,936,227, and function in a similar manner, but have an improved construction to increase their durability and wear resistance, as described below.

[0031] The locking pin 96 is supported in a door-mounted bracket comprising top and bottom walls 102 and 104 having aligned locking pin apertures 106 and 108 therethrough constraining the locking pin for linear motion between a locked position and an unlocked position, and a generally channel-shaped wall member 105 having a vertically-extending web and pair of flanges connecting the top and bottom walls. The top and bottom walls 102 and 104 have lubrication conduits 110 formed therein extending from exterior surfaces 112 to the lock pin apertures 106. Each of the lubrication conduits has an exterior grease fitting 114 for receiving lubricant and permitting lubricant to pass inward therethrough while inhibiting reverse flow of lubricant. Each of the lock pin apertures 106 preferably has a circumferential channel 116 disposed between annular pin-engaging surfaces 117 of the apertures, communicating with a respective one of the lubrication conduits 110 to receive and distribute lubricant circumferentially about the lock pin from the lubrication conduit. To increase the internal pin-engaging surface area of the apertures 106, each of the top and bottom walls preferably has a thickness greater than 1/4 in., e.g., about 1/2 in. The circumferential channel may have a vertical dimension of about 1/8 in. and a diameter about 1/2 in. larger than that of the lock pin aperture, although other dimensions may provide viable alternatives.

Deflector

[0032] To reduce airflow around the outer edges 120 of the end doors 20 in closed position, between the outer edges 120 and the ends of the side walls 27, and to inhibit entry of particulate matter associated with such air flow, a flexible deflector 118 extends inward from each of the side walls 27 near the outer edge of each end door. The deflector 118 can be flexed between an extended position and a deformed position. The end doors are shown in closed position, and the deflector 118 shown in its extended position, in FIG. 7. In the illustrated embodied, the deflectors are mounted on ladder panels 122 to extend inward therefrom.

[0033] The deflector 118 preferably does not contact the end door 20 in closed position, but rather extends toward the end door to reduce the width of the gap through which particle-laden air may pass. As the end doors are moved into fully open positions, however, they engage the deflectors and deform them. The deflectors are folded back into deformed positions, as shown in solid lines in FIG.7, when the end doors are in fully opened position. The deflectors preferably are capable of withstanding repeated deformations by end doors in this manner during extended periods of use in rail service without failure.

[0034] Each of the end doors preferably has a nose seal 124 extending along its inner edge for engaging an identical nose seal on the opposite door. In the preferred embodiment, each of the deflectors 118 has a configuration similar or identical to that of the nose seal, so that the deflectors and nose seals can be formed of the same extrusions.

[0035] One material believed to be suitable for the deflectors and nose seals is a formulated PVC compound, extruded as a continuous strip of about 15 ft. in length, extending upward along the ladder panel. The extrusion preferably includes a semi-rigid PVC base member 126 which is bolted to the railway car structure, and a flexible PVC extension 128.

[0036] The material should be operable and flexible in temperature extremes from -45 degrees F. to 130 degrees F., and should provide high resistance to ultraviolet attack and to ozone attack, and resistance to attack from solvents, oils, lubricants, and chemicals which may be encountered in railway service. The extrusion should be sufficiently flexible to avoid unduly interfering with shifting of the door to its fully opened position. The thickness of the extrusion in one embodiment is .13 in. In other embodiments, other thicknesses may be employed.

Alternative Embodiments

[0037] It should be appreciated that the invention is not limited to the preferred embodiment described above, or to any other particular embodiments. As noted above, while the preferred embodiment includes improved door lock arrangements in conjunction with movable bridge plate supports and deflectors as described above, other embodiments may employ less than all of the described features. Furthermore, while the invention has been described in connection with a bi-level rail car, it should be appreciated that the features described above might alternatively be used in connection with tri-level cars. The invention is further described in the following claims.

Claims

1. In an automotive vehicle carrying railway car having a lower deck and at least one upper deck, each of said decks being capable of supporting automotive vehicles in railway service, said railway car also having radial end doors that are movable between open and closed positions along door tracks on the lower deck, the improvement comprising:

a pair of movable bridge plate supports each having sufficient strength, stiffness and durability to withstand loads associated with bi-directional travel of automotive vehicles over the bridge plate support and an associated bridge plate during repeated loading and unloading of automotive vehicles over extended periods of railway service, said bridge plate supports being disposed at least at one end of the car on the lower deck thereof, each bridge plate support being movable between a retracted position in which it is disposed inward of and adjacent one of said door tracks and is capable of supporting an end of a bridge plate connected to an adjacent car positioned to support wheels of automotive vehicles traveling between cars, and an extended position in which it is capable of supporting and interconnecting with an end of a bridge plate positioned to support wheels of automotive vehicles traveling between cars while spanning said one of said door tracks.

2. The improvement of claim 1 wherein said bridge plate support comprises, in extended position, a main plate and a pair of support members welded to the lower surface thereof.

3. The improvement of claim 1 wherein, when said bridge plate support is in its retracted position, one of said support members is positioned on the upper surface thereof to support the tip of a bridge plate.

4. The improvement of claim 1 wherein, when said bridge plate support is in its extended position, it is partially supported by said door track, and partially supported by one of said support members.

5. In an automotive vehicle carrying railway car having a lower deck and at least one upper deck, each of said decks being capable of supporting automotive vehicles in railway service, said railway car also having end doors that are movable between open and closed positions and for which clearance must be provided during opening and closing of said doors to avoid interference therewith, the improvement comprising:

a bridge plate support having sufficient strength, stiffness and durability to withstand loads associated with bi-directional travel of automotive vehicles over the bridge plate support and an associated bridge plate during repeated loading and unloading of automotive vehicles over extended periods of railway service;

said bridge plate support being disposed at one end of the car, said bridge plate support comprising a fixed member and a movable member;

said movable member being movable between an extended position in which it is capable of

supporting and interconnecting with one side of an end of a bridge plate positioned to support wheels of automotive vehicles traveling between cars while extending beyond said edge of one of said decks, and a retracted position in which it avoids interference with door clearance requirements and in which it is capable of supporting one side of an end of a bridge plate connected to an adjacent car positioned to support wheels of automotive vehicles traveling between cars;

said fixed member being capable of supporting and interconnecting with an opposite side of the same end of the bridge plate.

6. In an automotive vehicle carrying railway car having a pair of end doors, each of said end doors having a spring-loaded locking pin, a bore that receives said locking pin in locked position, and a bracket supporting said locking pin including top and bottom walls having aligned locking pin apertures therethrough constraining said locking pin for rectilinear motion between a locked position and an unlocked position,

the improvement wherein said top and bottom walls have lubrication conduits formed therein extending from exterior surfaces thereof to said lock pin apertures, each of said lubrication conduits having an exterior fitting for receiving lubricant and permitting lubricant to pass inward therethrough while inhibiting reverse flow of lubricant, each of said lock pin apertures having a channel communicating with a respective one of said lubrication conduits to receive and distribute lubricant from said respective one of said lubrication conduits about said locking pin.

7. The improvement of claim 6 wherein each of said channels is annular.

8. The improvement of claim 6 wherein each of said walls has a thickness of about 1/2 in.

9. In an automotive vehicle carrying railway car having a pair of side walls and a pair of end doors having inner and outer edges, said end doors being movable between open and closed positions;

the improvement comprising a flexible deflector extending inward from each of said side walls near the outer edges of said end doors to inhibit entry of particle-laden air into the railway car around the outer edges of the end doors;
said flexible deflectors being capable of engaging said end doors as they are moved from closed to open position and being deformed thereby so as not to unduly impede said end doors from moving to open position, said deflectors being capable of withstanding repeated deformations by said end doors during extended periods of use in rail service without failure.

10. The improvement of claim 9 wherein each of said side walls includes a ladder panel, and wherein said deflectors are attached to said ladder panels.

11. The improvement of claim 9 wherein each of said end doors has a seal along its inner edge formed of an extrusion, and said deflectors are formed of identical extrusions.

12. The improvement of claim 9 wherein said flexible deflectors do not contact the end doors in fully closed position.

13. In an automotive vehicle carrying railway car having a lower deck and at least one upper deck, each of said decks being capable of supporting automotive vehicles in railway service, said railway car also having a pair of side walls and having radial end doors that are movable between open and closed positions along door tracks on the lower deck, each of said end doors having a spring-loaded locking pin, a bore that receives said locking pin in locked position, and a bracket supporting said locking pin including top and bottom walls having aligned locking pin apertures therethrough constraining said locking pin for rectilinear motion between a locked position and an unlocked position, the improvement comprising:

a pair of lower deck bridge plate supports, each having sufficient strength, stiffness and durability to withstand loads associated with bi-directional travel of automotive vehicles over the bridge plate support and an associated bridge plate during repeated loading and unloading of automotive vehicles over extended periods of railway service, said lower deck bridge plate supports being disposed at least at one end of the car on the lower deck thereof, each lower deck bridge plate support being movable between a retracted position in which it is disposed inward of and adjacent one of said door tracks and is capable of supporting an end of a bridge plate connected to an adjacent car positioned to support wheels of automotive vehicles traveling between cars, and an extended position in which it is capable of supporting and interconnecting with an end of a bridge plate positioned to support wheels of automotive vehicles traveling between cars while spanning

said one of said door tracks;

said lower deck bridge plate support comprising, in extended position, a main plate and a pair of support members welded to the lower surface thereof;

one of said support members being positioned to support the tip of a bridge plate when said lower deck bridge plate support is in its retracted position;

said lower deck bridge plate support being partially supported by said door track, and partially supported by one of said support members, when said bridge plate support is in its extended position;

an upper deck bridge plate support having sufficient strength, stiffness and durability to withstand loads associated with bi-directional travel of automotive vehicles over the upper deck bridge plate support and an associated bridge plate during repeated loading and unloading of automotive vehicles over extended periods of railway service;

said upper deck bridge plate support being disposed at one end of the car, said upper deck bridge plate support comprising a fixed member and a movable member;

said movable member being movable between an extended position in which it is capable of supporting and interconnecting with one side of an end of a bridge plate positioned to support wheels of automotive vehicles traveling between cars while extending beyond said edge of one of said decks, and a retracted position in which it avoids interference with door clearance requirements and in which it is capable of supporting one side of an end of a bridge plate connected to an adjacent car positioned to support wheels of automotive vehicles traveling between cars;

said fixed member being capable of supporting and interconnecting with an opposite side of the same end of the bridge plate;

said top and bottom walls of said bracket having a thickness of about 1/2 in. and having lubrication conduits formed therein extending from exterior surfaces thereof to said lock pin apertures, each of said lubrication conduits having an exterior fitting for receiving lubricant and permitting lubricant to pass inward therethrough while inhibiting reverse flow of lubricant, each of said lock pin apertures having an annular channel communicating with a respective one of said lubrication conduits to receive and distribute lubricant from said respective one of said lubrication conduits about said locking pin;

a flexible deflector extending inward from each of said side walls near the outer edges of said end doors to inhibit entry of particle-laden air into the railway car around the outer edges of the end doors without contacting said end doors;

said flexible deflectors being capable of engaging said end doors as they are moved from closed to open position and being deformed thereby so as not to unduly impede said end doors from moving to open position, said deflectors being capable of withstanding repeated deformations by said end doors during extended periods of use in rail service without failure;

each of said side walls including a ladder panel, said deflectors being attached to said ladder panels, said end doors further including nose seals of substantially identical cross-section as said deflector.

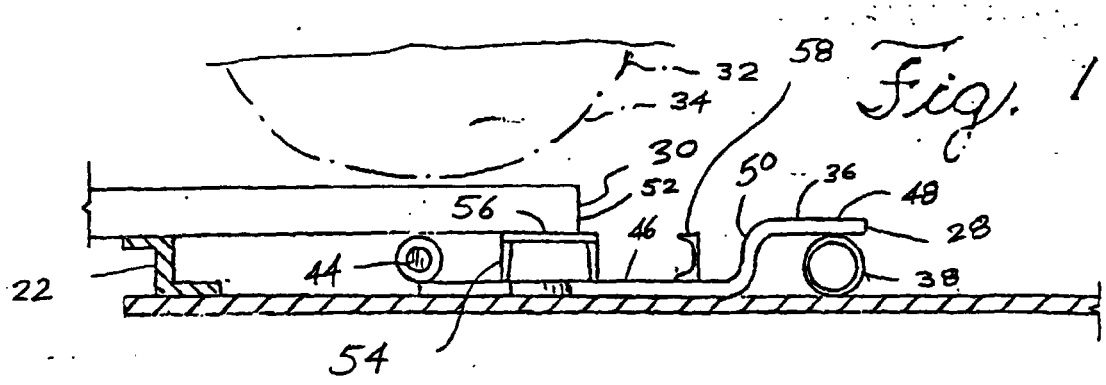
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Fig. 1

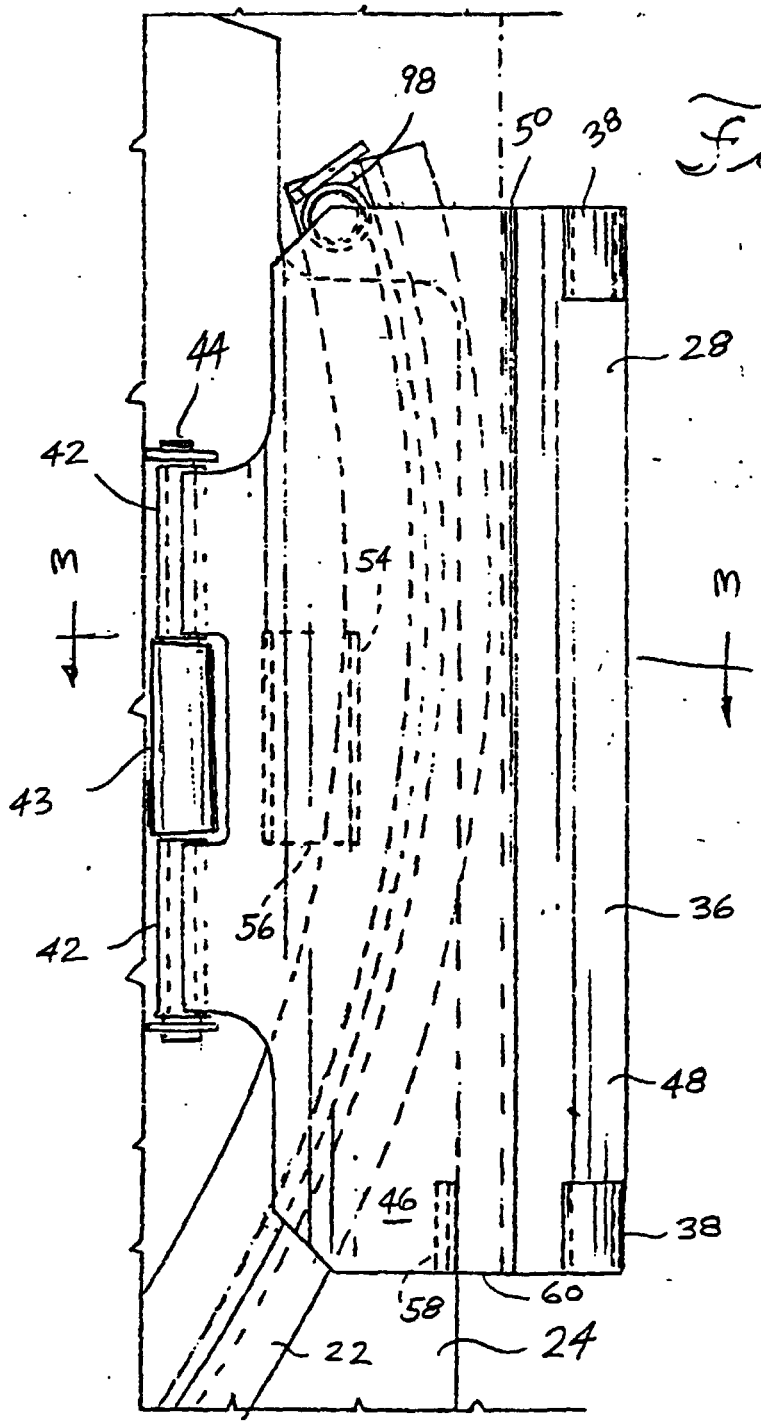
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Fig. 2

Fig. 9

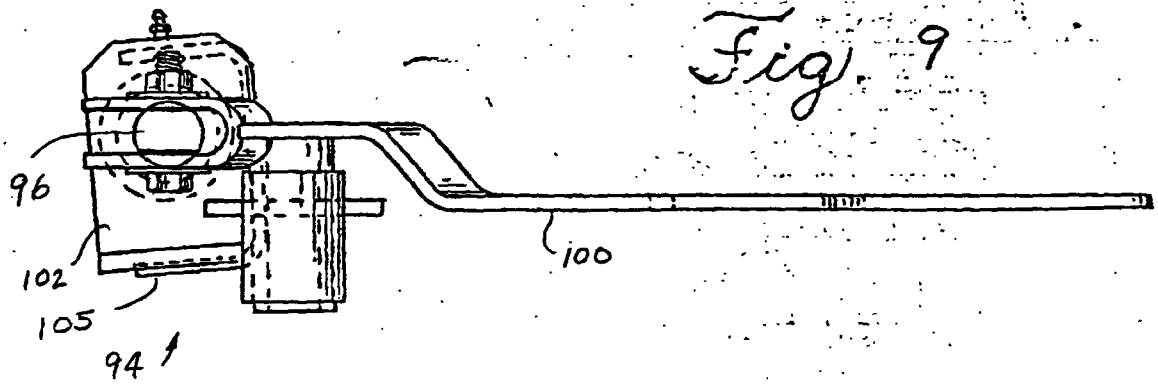


Fig. 8

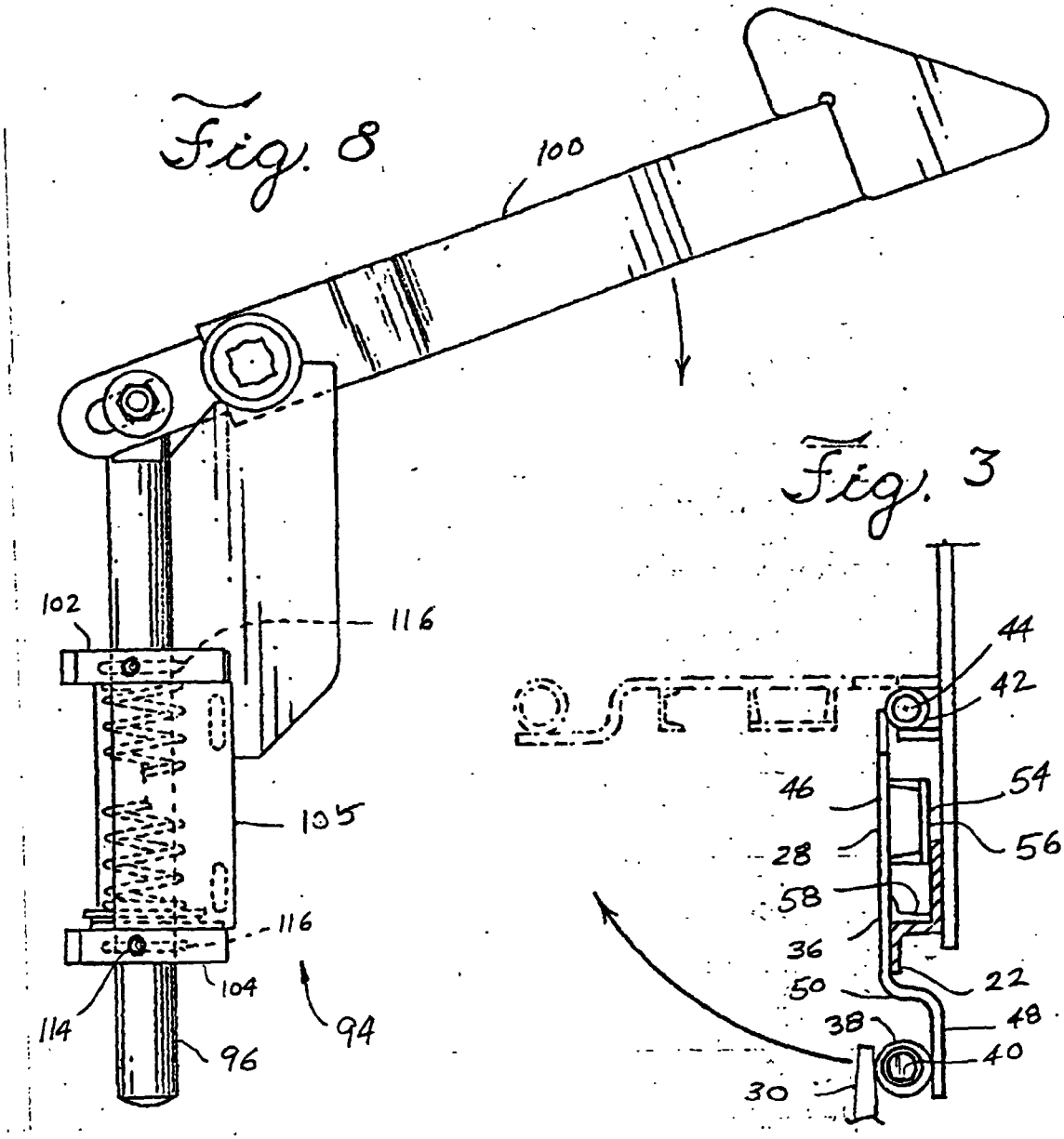


Fig. 3

Fig. 4

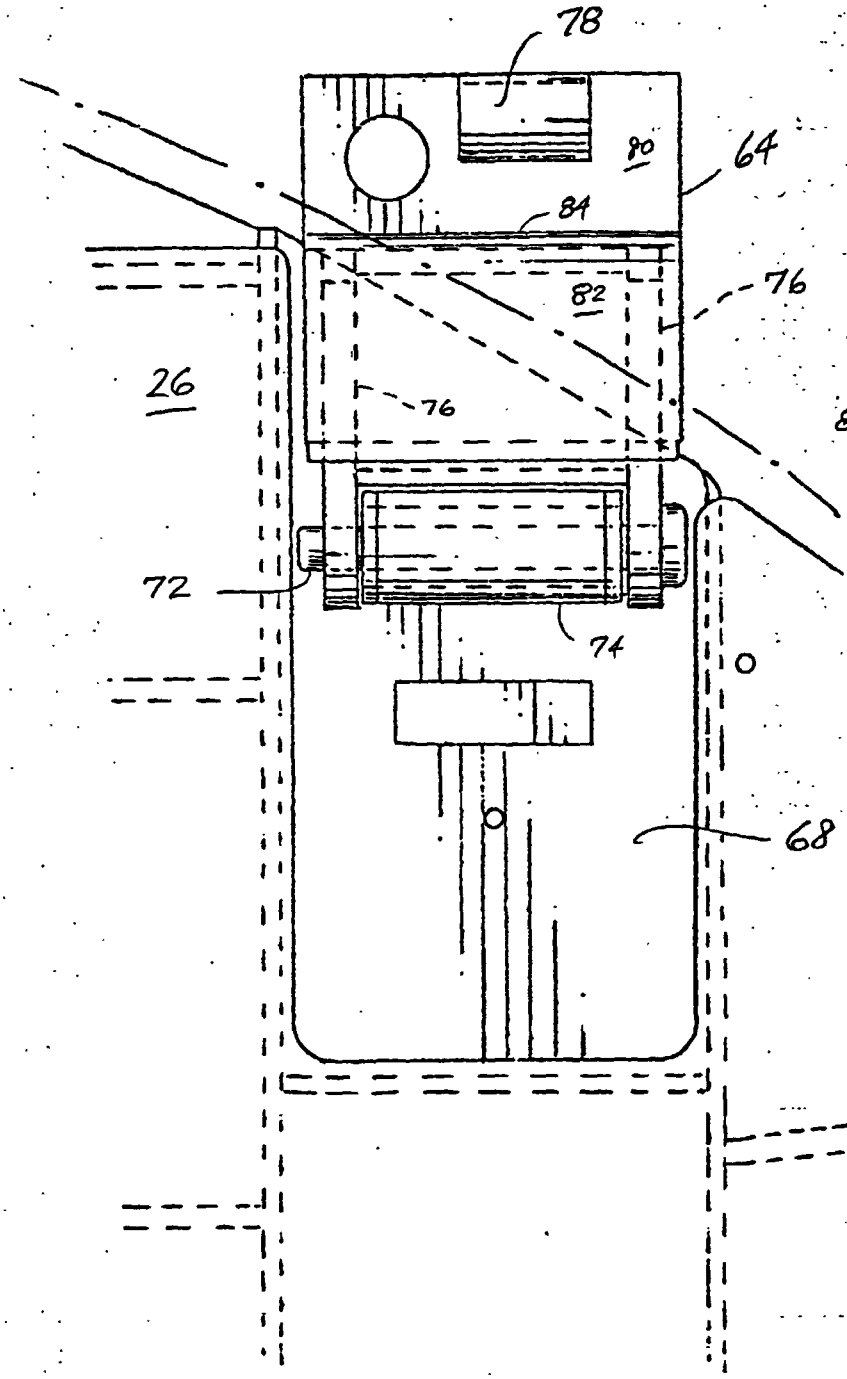
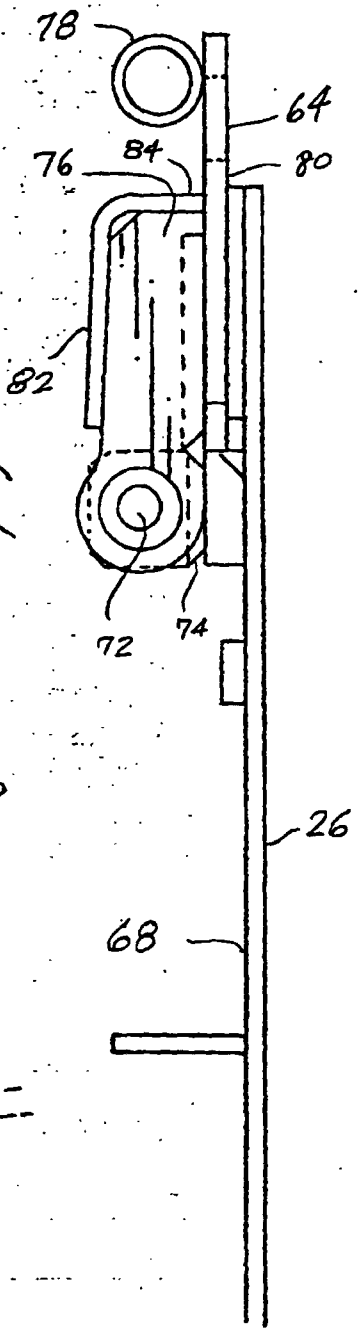


Fig. 5



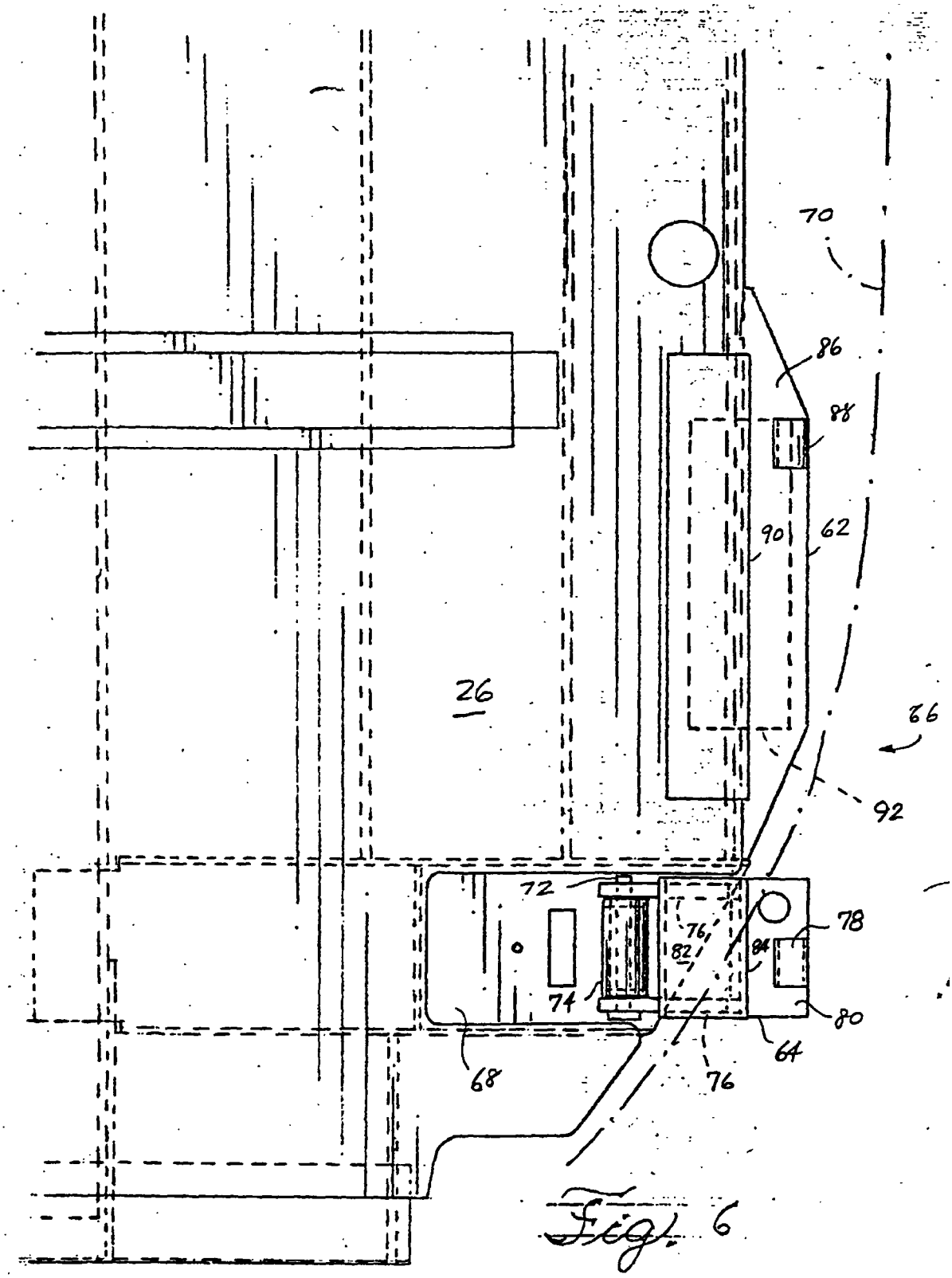


Fig. 6

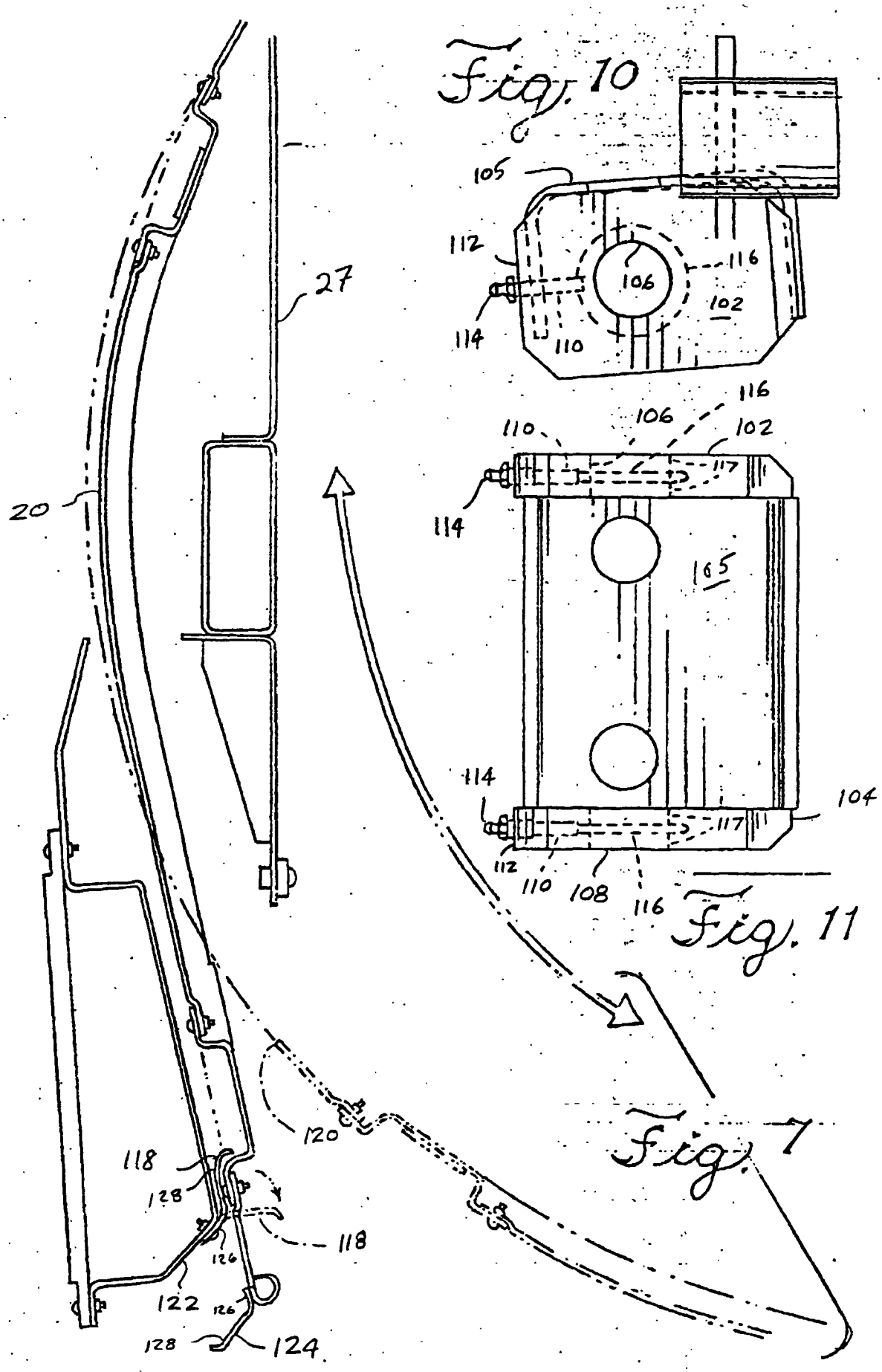


Fig. 7

Fig. 10

Fig. 11

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EUROPEAN SEARCH REPORT

Application Number
EP 99 11 6759

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 4 667 604 A (BAKER WILLIAM R) 26 May 1987 (1987-05-26) * column 3, line 46 - column 4, line 22; figures 1-9 *	1,5,13	B61D3/18 B61D19/00
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A,D	US 4 936 227 A (BAKER WILLIAM R ET AL) 26 June 1990 (1990-06-26) * column 3, line 32 - line 51; figure 9 *	6,13	

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B61D
E05D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 December 1999	Chlosta, P

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