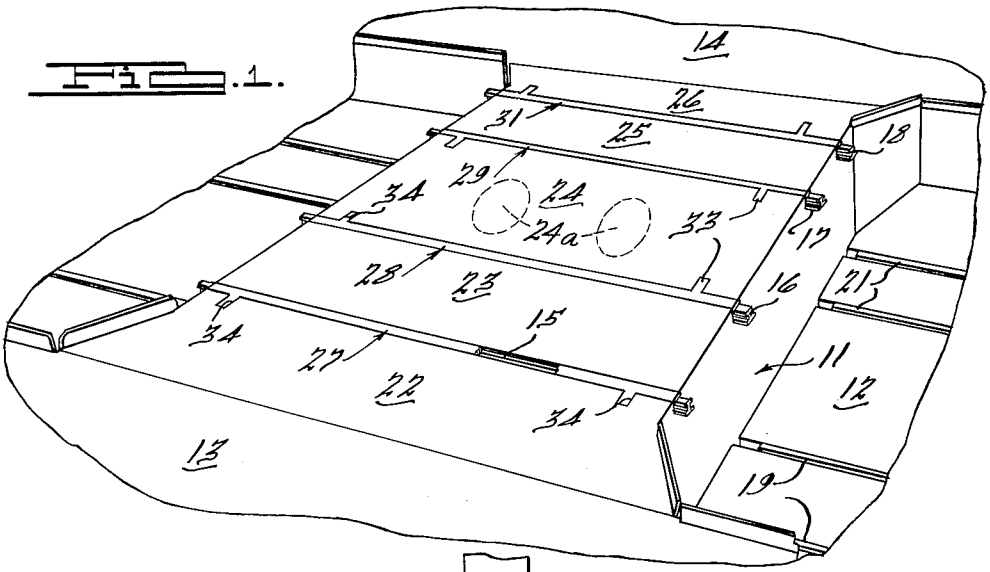
April 18, 1961 R. V. HARTY 2,980,034

OPERATING MECHANISM FOR COVER DEVICE

Filed Sept. 27, 1956 3 Sheets-Sheet 1

FIG. 1.



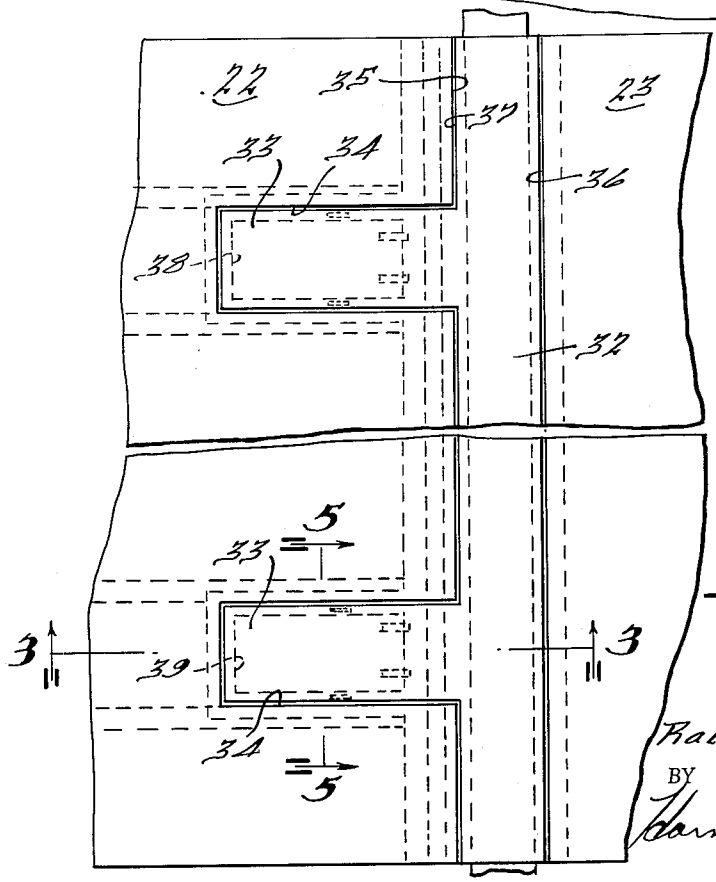


FIG. 2.

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OPERATING MECHANISM FOR COVER DEVICE

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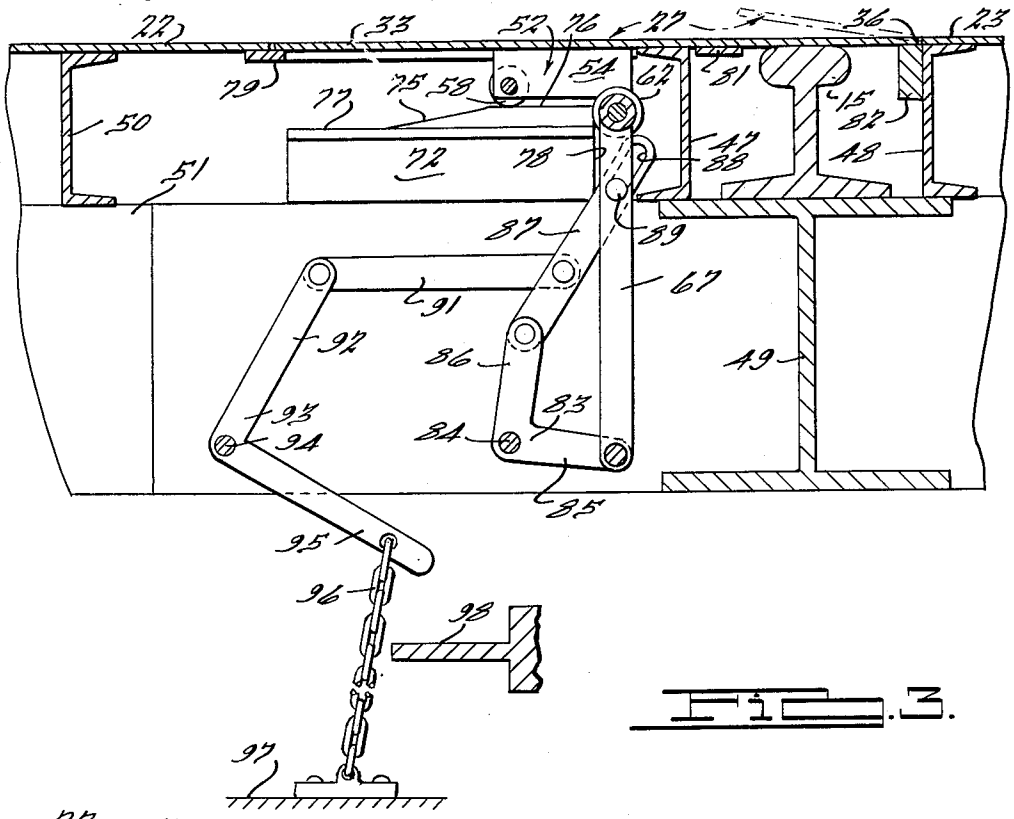


FIG. 3.

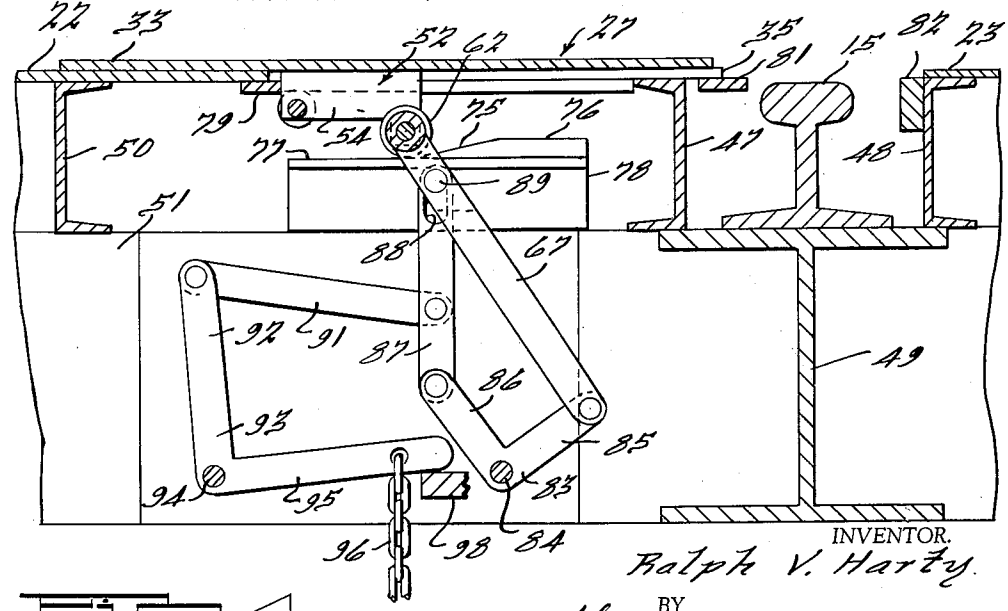


FIG. 4.

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OPERATING MECHANISM FOR COVER DEVICE

Filed Sept. 27, 1956 3 Sheets-Sheet 3

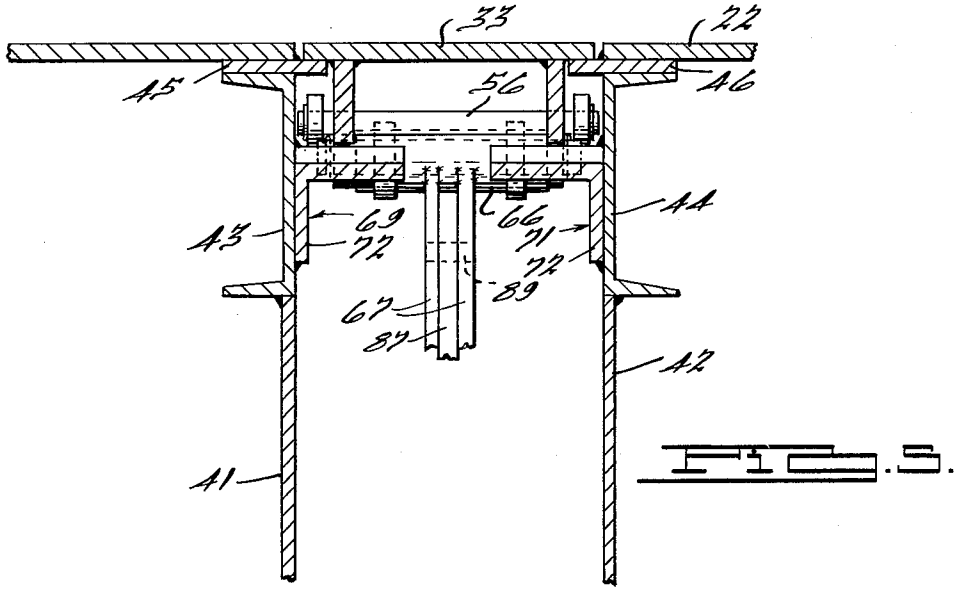


FIG. 5.

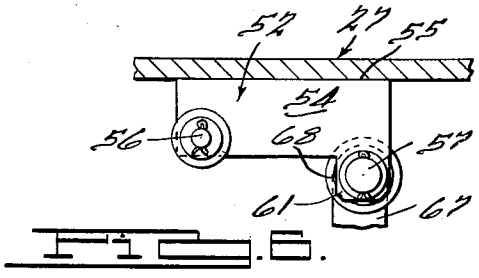


FIG. 6.

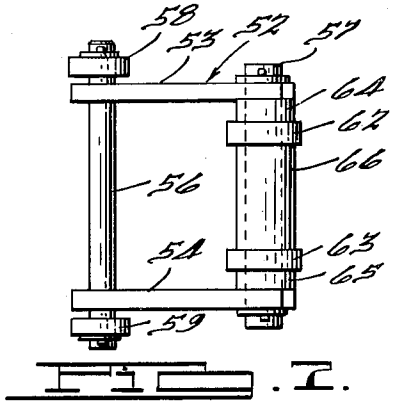


FIG. 7.

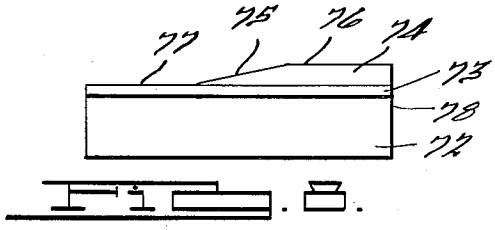


FIG. 8.

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United States Patent Office 2,980,034 Patented Apr. 18, 1961

2,980,034

OPERATING MECHANISM FOR COVER DEVICE

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Filed Sept. 27, 1956, Ser. No. 612,403

15 Claims. (Cl. 104—31)

This invention relates to operating mechanisms for cover devices, and more particularly to a mechanism adapted for use in conjunction with a bridge for depressed railroad sidings.

Applicant's copending application, Serial No. 505,907, filed May 4, 1955, now Patent No. 2,889,565, dated June 9, 1956, entitled "Lift Bridge," describes a bridge for use in such places as factory buildings which have a depressed railroad siding or spur line cutting through the factory floor. This bridge carries a plurality of short track sections which are contiguous with the siding tracks when the bridge is in its lowered position, and a deck structure which is at the same level as the platforms on both sides of the siding when the bridge is in its raised position. The bridge is thus capable of carrying factory floor traffic across the railroad siding when the latter is not in use, and permits use of the railroad tracks when lowered.

It is an object of the present invention to provide a novel and improved cover device and operating mechanism therefor, which will conceal and cover the rail sections of such a bridge when the bridge is in its raised position, thereby creating a continuously smooth deck surface across the entire bridge, facilitating the transportation of trucks and the general flow of traffc and eliminating the hazards to such traffic which would otherwise be presented by gaps between the rail sections and the adjacent edges of the bridge decking.

It is another object to provide an improved cover operating mechanism of the above nature which will automatically retract the rail cover when the bridge is lowered so that the rail section may be utilized, and will move the cover into its operative position in response to raising of the bridge, without the necessity for a separate driving mechanism or for any manipulations by the bridge operator other than those involved in raising and lowering the bridge.

It is a further object to provide an improved rail cover operating mechanism having the above characteristics, which may be entirely concealed within the bridge structure itself, and which is of relatively simple construction requiring little or no maintenance expense.

Other objects, features and advantages of the present invention will become apparent from the subsequent description, taken in conjunction with the accompanying drawings.

In the drawings:

Figure 1 is a perspective view of a bridge of the type to which the cover operating mechanism of this invention is to be applied, showing the bridge in its raised position with the rail covers concealing the rails and flush with the bridge decking;

Figure 2 is a fragmentary plan view of a portion of the bridge showing the configuration of a single rail cover;

Figure 3 is a partially schematic elevational view taken in cross section along the line 3—3 of Figure 2 and showing the cover mechanism with the cover in operative position;

Figure 4 is a view similar to Figure 3 showing the mechanism when the bridge is in its lower position and the cover retracted;

Figure 5 is an end elevational view taken in cross section along the line 5—5 of Figure 2 and showing the two guide tracks and a portion of the supporting structure for the mechanism;

Figure 6 is a detailed elevational view of the roller assembly;

Figure 7 is a plan view of the roller assembly; and

Figure 8 is a detailed view in elevation of one of the guide tracks.

In general terms, the invention comprises a mechanism for use with an elongated flat cover which, when in operative position, overlies a rail section on a bridge of the type described above. As many covers will be mounted on the bridge as there are rail sections, each cover having its own operating mechanism. Each mechanism is disposed within a compartment inside the bridge and below the level of the bridge decking, this compartment being laterally adjacent the rail section. In view of the length of the rail cover which will normally be required, two or more identical operating mechanisms may be provided at spaced points along the cover, thus facilitating movement of the cover between its operative and retracted positions, and the compartments containing these separate mechanisms will thus be spaced from each other in the direction of extent of the rail.

Each operating mechanism comprises a linkage arrangement disposed within one of said compartments, said linkage arrangement being connected with a flat plate which is attached to and flush with the cover plate and extends laterally therefrom. The bridge decking adjacent the rail is cut out to accommodate this extension plate, so that the cover plate with its extensions may move as a unit between a retracted position and an operative position flush with the bridge decking. The linkage arrangement is such that upon lowering of the bridge, the cover plate assembly will first be lifted out of the plane of the bridge decking and will then be retracted in a direction transverse to the rail until the latter is uncovered, the cover assembly resting on the adjacent bridge decking when in retracted position. The rail section will thus be exposed for use as long as the bridge is in its lower position. When the bridge is raised, the operating mechanism will automatically move the cover assembly in the opposite direction until it is directly over its corresponding gap in the bridge decking, and will then cause the cover assembly to be lowered into flush relationship with the decking. A smooth and substantially unbroken decking will thus be provided over the entire bridge, facilitating factory floor traffic across the railroad siding.

Referring now in detail to the drawings, Figure 1 shows a bridge generally indicated at **11** which is disposed within a depressed railroad siding or spur line **12**, the platforms alongside the spur line being designated **13** and **14** respectively. The bridge is provided with four rail sections **15, 16, 17** and **18** which are adapted to be aligned with two pairs of rails **19** and **21** respectively when the bridge is in its lower position, permitting the use of siding **12** for railroad cars. The upper surface of the bridge is provided with a plurality of deck plates **22, 23, 24, 25** and **26** between which rails **15–18** are disposed. These deck plates are in a plane immediately above the tops of rails **15–18**, and when bridge **11** is in its raised position are flush with platforms **13** and **14** alongside railroad siding **12**, thus facilitating factory floor traffic across the siding.

In order to provide flush connecting surfaces between deck plates **22–26**, four cover assemblies generally designated **27, 28, 29** and **31** are provided for rails **15–18** respectively. When bridge **11** is in its raised position, these cover assemblies will be in overlying relation with their corresponding rails and in flush relation with the deck

plates of the bridge, thus providing a smooth surface unbroken by gaps between the deck plates. When the bridge is lowered, cover assemblies 27–31 will be retracted laterally with respect to their rails, exposing the latter for use and resting on the adjacent portions of the bridge decking.

Each of cover assemblies 27–31 comprises an elongated flat cover plate 32 for the rail, and a plurality of extension plates 33 secured to and extending laterally from cover plate 32. As seen best in Figure 2, two such extension plates 33 are provided for each cover plate in the illustrated embodiment, although a different number could be provided in accordance with requirements. As described below in detail, the operating mechanism associated with each extension plate 33 is disposed below such plate and within bridge 11. In the embodiment of the lift bridge described in the aforementioned copending application, the lifting mechanism for the bridge, such as a pair of pistons and cylinders, is disposed below the central portion thereof, that is below deck plate 24 shown in Figure 1. Such means is indicated by dotted lines at 24*a* in Figure 1. The operating mechanisms for the rail cover assemblies are therefore suitably disposed below deck plates 22, 23, 25 and 26 respectively. For this reason, extension plates 33 of the cover assemblies are shown in Figure 1 as extending into rectangular cutouts 34 provided in plates 22, 23, 25 and 26 so that the operating mechanisms may be conveniently connected to the extension plates. It should be understood however that other locations for the cover operating mechanisms could be provided within the principles of the invention, depending upon the construction of the particular bridge and its associated parts.

As seen best in Figure 2, cover plate 32 of a typical cover assembly 27 is adapted to fit between the opposing edges 35 and 36 of deck plates 22 and 23 respectively, with extension plates 33 secured to plate 32 at spaced portions of the edge 37 thereof adjacent deck edge 35. Compartments 38 and 39 respectively are provided below extension plates 33 to enclose the cover operating mechanisms.

A single cover operating mechanism is shown in Figures 3, 4 and 5 and is disposed between a pair of upright side plates 41 and 42 and channel-shaped beams 43 and 44 supported by plates 41 and 42 respectively. As seen in Figure 5, these beams support a pair of bed plates 45 and 46 respectively on which rest the adjacent edges of deck plate 22. Bed plates 45 and 46 extend inwardly from channels 43 and 44 respectively and serve to support the outer portions of extension plate 33, as seen in Figure 5, when cover assembly 27 is in its operative position. A pair of deck supporting beams 47 and 48 extend alongside rail 15, being supported by the outer portions of an I beam 49 which also supports rail 15. Beams 47 and 48 serve to support edges 35 and 36 of deck plates 22 and 23 respectively. A shorter beam 50 may also be provided for supporting that portion of deck plate 22 adjacent the outer end of extension plate 33. Beam 50 may be supported by some appropriate portion 51 of the understructure of bridge 11.

Secured to the underside of each extension plate 33 is a roller assembly generally indicated at 52, the details of this assembly being best seen in Figures 6 and 7. Assembly 52 comprises a pair of plates 53 and 54 in spaced parallel relation, the upper edges 55 of these plates being welded or otherwise secured to the undersurface of extension plate 33 in such a manner that plates 53 and 54 extend at right angles to cover plate 32. A pair of shafts 56 and 57 are supported between plates 53 and 54. Shaft 56 extends outwardly from said plates and carries a pair of rollers 58 and 59 at the outer ends thereof. Shaft 57 is supported by a pair of downwardly extending arms 61 on plates 53 and 54 at the end of said plates remote from shaft 56. Shaft 57 carries a pair of rollers 62 and 63 spaced inwardly from plates 53 and 54 by a pair of spacers 64 and 65 respectively. Rotatably mounted on shaft 57 between rollers 62 and 63 is a sleeve 66 to which are secured the upper ends of a pair of identical levers 67, these levers operating in unison as described below.

It will be noted from an examination of Figure 6 that the axis of rollers 62 and 63 is somewhat below that of rollers 58 and 59, and that rollers 62 and 63 are of somewhat larger diameter than the other pair of rollers. It should also be observed that both pairs of rollers are so disposed that their lower portions extend below the lower edges of plates 53 and 54, and that rollers 62 and 63 also extend beyond vertical side edges 68 of arms 61. It should be noted that because of the configuration of the cover assembly as seen in Figure 2, the center of gravity of the cover assembly will be a substantial distance to the right of rollers 62 and 63, as seen in Figures 3 and 4.

Rollers 58 and 59 as well as rollers 62 and 63 are adapted to cooperate with a pair of tracks generally indicated at 69 and 71 respectively, these tracks being secured to beams 43 and 44 respectively within the bridge compartment. The construction of each track is shown best in Figures 5 and 8, and comprises an angular member one leg 72 of which is secured to beam 43 or 44, with the other leg 73 extending horizontally therefrom. A block 74 is secured to the upper surface of leg 73, this block having an inclined surface 75 and a horizontal surface 76 and extending partway along leg 73, so that these two surfaces combine with a lower horizontal surface 77 on leg 73 to form a ramp having an upper horizontal surface 76 relatively close to rail 15, a downwardly inclined surface 75 extending away from surface 76 and a lower horizontal surface 77 relatively remote from rail 15. Leg 73 and block 74 combine to present a forward surface 78 which is so located that, when cover assembly 27 is in its operative position as shown in Figure 3, surface 78 will be immediately adjacent that portion of roller 62 or 63 extending beyond edge 68 of arm 61. This relationship between vertical surfaces 78 of the two guide tracks and rollers 62 and 63 is best seen in Figure 3, and it will be noted from this figure that leftward movement of cover assembly 27 will be prevented until rollers 62 and 63 are lifted above surfaces 78. It should also be observed that when rollers 62 and 63 are in the position shown in Figure 3, rollers 58 and 59 will engage surface 76 of the tracks, this engagement serving partially to support cover assembly 27 in its operative position. Additional supporting strips 79 and 81 secured to the undersides of the edges of deck plate 22 may also be provided for supporting cover assembly 27, and a supporting strip 82 secured to beam 48 adjacent rail 15 may also serve this purpose. Surfaces 76 of tracks 69 and 71 are at such a height that when rollers 62 and 63 are lifted so as to rest thereon, that portion of cover assembly 27 which is also lifted will be above the level of deck plate 22. More specifically, since the center of gravity of cover assembly 27 is to the right of rollers 62 and 63, lifting of these rollers will cause the left hand ends of extension plates 33, as seen in Figures 3 and 4, to be lifted until they are clear of deck plate 22, cover assembly 27 temporarily assuming an angular position as partially indicated by dot-dash lines in Figure 3. The height of horizontal surfaces 77 of tracks 69 and 71 are such that when rollers 62 and 63 approach these surfaces the lower surface of cover assembly 27 will come to rest upon the upper surface of deck plate 22, as seen in Figure 4, the cover assembly thus returning to a horizontal position.

The means for moving cover assembly 27 between its positions includes a bell crank 83 mounted on a pivot 84 fixed to the bridge structure and having one arm 85 to which the lower ends of levers 67 are pivotally secured. Pivoted to the other arm 86 of bell crank 83 is a yoke 87, the other end of the yoke carrying a slot 88

within which is disposed a pin 89 fixed to levers 67 at an intermediate portion thereof but closer to the upper ends of the levers. A link 91 is pivoted at one end to an intermediate portion of yoke 87 and at its other end to one arm 92 of a bell crank 93 which is on a pivot 94 fixed to the bridge structure. The other arm 95 of bell crank 93 is secured to one end of a chain 96 or similar flexible connection, the lower end of the chain being fixed to a stationary portion 97 of the structure which does not move with the bridge. A stationary projection 98, which likewise is not attached to bridge 11, is disposed between arm 95 of bell crank 93 and the lower end of chain 96. The disposition of stationary projection 98 is such that when bridge 11 is lowered with bell crank 93 in the position shown in Figure 3, arm 95 of bell crank 93 will engage projection 98, causing rotation of the bell crank into its counterclockwise position as shown in Figure 4.

In describing the operation of the device, it will be assumed that bridge 11 is initially in its raised position connecting platforms 13 and 14, that it is lowered to position rails 15–18 in alignment with rail pairs 19 and 21 for passage of railroad cars, and that it is thereafter again raised to its original position. Throughout this cycle of operations, cover assemblies 27–31 will perform similar movements with respect to their corresponding rail sections 15–18, and the operating mechanisms beneath all cover extension plates 33 will likewise perform identical functions. Therefore, the operation of cover assembly 27 and of one of the two operating mechanisms associated therewith need only be described. When bridge 11 is in its raised position, cover assembly 27 will be in the position shown in Figure 3, flush with deck plates 22 and 23 and concealing rail 15. Rollers 58 and 59 will rest upon surfaces 76 of tracks 69 and 71, and the edges of cover assembly 27 will be supported by strips 79, 81 and 82. Rollers 62 and 63 will be in engagement with vertical surfaces 78 of tracks 69 and 71, with levers 67 in a substantially vertical position, pin 89 in the bottom portion of yoke slot 88, and chain 96 relatively taut with arm 95 of bell crank 93 some distance above stationary projection 98. When bridge 11 is lowered, pivots 84 and 94 attached to the bridge will likewise be lowered. Arm 95 of bell crank 93 will engage stationary projection 98, and further downward movement of pivot 94 will cause bell crank 93 to rotate counterclockwise as seen in Figure 3. This will cause link 91 to be pulled to the left, creating a leftward force on both ends of yoke 87. The upper slotted end of yoke 87 will tend to urge pin 89 to the left, but since vertical track surfaces 78 are in obstructing relation with rollers 62 and 63, this movement will not be permitted. The lower end of yoke 87 will rotate bell crank 83 counterclockwise as seen in Figure 3, thus creating a substantially vertical force on levers 67. This force will be transmitted through roller assembly 52 to cover assembly 27. Since the center of gravity of the cover assembly is to the right of rollers 62 and 63, the left hand portions of cover assembly 27 will be lifted, resulting in the outer ends of extension plates 23 clearing of deck plate 22.

This lifting movement will continue until rollers 62 and 63 clear vertical surfaces 78 of tracks 69 and 71. When this occurs, horizontal force components transmitted from yoke 87 to pin 89 (the latter having meanwhile moved to the upper portion of slot 88) will cause cover assembly 27 to be moved to the left into the position shown in Figure 4. During this movement, rollers 62 and 63 will roll along track surfaces 76 and down track surfaces 75, arriving at surfaces 77 in which position cover assembly 27 will rest on deck plate 22, leaving rail 15 exposed. Because of the inclined nature of track surfaces 75, there will be no tendency for cover assembly 27 to move toward rail 15 while the bridge is in its lower position, and there will thus be no danger of interference with railroad cars running along the rails.

When bridge 11 is lifted, the parts will remain in the position shown in Figure 4 until chain 96 becomes taut. When this occurs, bell crank 93 will be swung clockwise, and link 91 will transmit a rightward force component to yoke 87. The lower end of the yoke will tend to rotate bell crank 83 clockwise as shown in Figure 4, but this movement will be resisted by the engagement of rollers 62 and 63 with tracks 69 and 71. The upper end of yoke 87 will urge the upper portions of levers 67 to the right, and cover assembly 27 will be moved righwardly as rollers 62 and 63 roll up inclined surfaces 75 of tracks 69 and 71. This movement will continue until rollers 62 and 63 reach the ends of track surfaces 76, whereupon the rollers will drop into the position shown in Figure 3 in front of vertical surfaces 78. This will cause cover assembly 27 to be lowered into its operative position flush with deck plates 22 and 23. It should be noted that the movement of cover assembly 27 into its flush or operative position is positive, since bell crank 83 will be urged clockwise by yoke 87 and will therefore pull levers 67 downwardly. All movements of the cover assemblies between their operative and retracted positions will thus be accomplished automatically and simultaneously without the necessity of the operator attending to any controls other than those used for raising and lowering the bridge.

While it will be apparent that the preferred embodiment of the invention disclosed is well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What is claimed is:

1. In a vertically movable bridge for use in conjunction with a depressed railroad siding having platforms therealong, a plurality of deck plates on said bridge positioned for use as part of a deck, said deck plates being substantially flush with the platforms alongside said siding when the bridge is in its raised position, said deck plates being spaced apart horizontally to provide gaps therebetween, said gap being aligned with the tracks of said railroad siding, rails disposed within said gaps and adapted to be aligned with the rails of said siding when said bridge is in its lower position, covers for said gaps movable between an operative position covering said gaps and a retracted position exposing said rails, and means mounted on said bridge responsive to movement of said bridge to its raised position for moving said covers to their operative position and responsive to movement of said bridge to its lower position for moving said covers to their retracted position.

2. In combination, a bridge movable between a lower position and an upper position, a pair of deck plates on said bridge in substantially the same plane and positioned for use as part of a deck when said bridge is in one of said positions, said deck plates being spaced apart with a gap therebetween, said gap being transverse to the extent of the bridge, a cover plate for said gap, said cover plate being movable between an operative position covering said gap and in the same plane as said deck plates to form a continuous deck, and a retracted position to one side of said gap and out of said plane, means mounted on said bridge responsive to movement of said bridge from said one position to the other position for first moving said cover plate out of said plane and then moving the cover plate to one side of said gap, and means mounted on said bridge responsive to movement of said bridge to said one position for first moving said cover plate into alignment with said gap and then into the plane of said deck plates.

3. In a vertically movable bridge for use in conjunction with a depressed railroad siding having platforms along the sides thereof, a plurality of deck plates on said bridge in substantially the same plane and positioned

to connect the platforms alongside said siding when the bridge is in its raised position, said deck plates being spaced apart to provide gaps therebetween extending in the direction of and aligned with the siding rails, a plurality of rail sections mounted on said bridge below the level of said deck plates, said rails being aligned with said gaps and adapted to be aligned with the siding rails when said bridge is in its lower position, a plurality of elongated cover plates movable between an operative position covering said gaps and in the plane of said deck plates, and a retracted position exposing said rails and alongside said gaps above said deck plates, a transverse extension on each of said cover plates, cutouts in said deck plates adjacent said gaps for accommodating said extensions when said cover plates are in their operative position, and operating means for said cover plates disposed below the level of said deck plates and connected to said extensions, said operating means being responsive to movement of said bridge to its lower position for first lifting said cover plates and extensions above the plane of said deck plates and then moving said cover plates and extensions to their retracted position, said operating means being further responsive to movement of said bridge to its upper position for first moving said cover plates and extension into alignment with said gaps and cutouts and then moving said cover plates and extensions to their operative position.

4. In a bridge, means for moving said bridge between an upper position and a lower position, a pair of spaced plates on said bridge positioned for use as part of a deck and having a gap therebetween, said gap being transverse to the extent of the bridge, a cover for said gap movable between an operative position covering said gap and contiguous with said plates when said bridge is in one of its positions, and a retracted position to one side of said gap and above one of said plates when said bridge is in its other position, an operating mechanism for said cover including a lever connected to the underside of said cover and extending therebelow, the point of connection of said lever to said cover being spaced from the center of gravity of said cover in a direction toward said one side of the gap, means for simultaneously applying upward and lateral forces to the upper end of said lever when said cover is in its operative position, and means for restraining said cover against lateral movement only until the side of said cover toward said one side of the gap has been lifted to a height above said one plate, whereby said lateral force will be effective after said height has been reached to move said cover to its retracted position.

5. The combination according to claim 4, said restraining means comprising a substantially vertical obstructing surface, an element connected to said cover and engageable with said vertical surface, a substantially horizontal surface engageable by said element after lateral retracting movement of said cover has been initiated, and means for applying a lateral force to said cover opposite to said first lateral force, whereby said cover element will be moved along said horizontal surface to the end thereof and will then drop in front of said vertical surface, the cover thereby being moved to its operative position.

6. In a bridge, means for moving said bridge between an upper position and a lower position, a pair of spaced plates on said bridge having a gap therebetween and positioned for use as part of a deck, said gap being transverse to the extent of the bridge, a cover for said gap movable between an operative position covering said gap and contiguous with said plate when said bridge is in one of its positions, and a retracted position to one side of said gap and above one of said plates when said bridge is in its other position, a lateral extension plate on and extending from said cover, a cutout in said one plate for accommodating said extension plate when said cover is in its operative position, a pair of rollers mounted on a horizontal axis below and secured to said extension plate, a pair of stationary tracks for cooperation with said rollers, said tracks having substantially vertical surfaces facing said gap and horizontal surfaces extending laterally from the upper ends of said vertical surfaces at a height such that, when said rollers rest on said horizontal surfaces, the outer end of said extension plate will be above the level of said one plate, a lever connected to the underside of said extension plate adjacent said rollers and extending therebelow, and means for simultaneously applying upward and lateral forces to the upper end of said lever when said cover is in its operative position, the disposition of said vertical track surfaces being such that said rollers will be restrained against lateral movement until said rollers reach said horizontal track surfaces, whereby the outer end of said extension plate will first be lifted above said one plate and said cover will then be moved to its retracted position.

7. The combination according to claim 6, said means for simultaneously applying upward and lateral forces comprising a yoke, a slotted connection between one end of said yoke and the upper end of said lever, a bell crank connection between the opposite end of said yoke and the lower end of said lever, and means for applying a lateral force to an intermediate portion of said yoke.

8. The combination according to claim 6, further provided with downwardly inclined track portions at the ends of said horizontal track surfaces remote from said vertical surfaces, and a second pair of horizontal track surfaces extending from the lower ends of said inclined surfaces, the height of said second pair of horizontal track surfaces being such that engagement of said rollers therewith will bring the underside of said cover into engagement with the upper surface of said one plate.

9. The combination according to claim 6, further provided with a second pair of rollers supported beneath said extension plate on an axis parallel to said first roller axis, said second pair of rollers being engageable with said pair of horizontal track surfaces when said cover is in its operative position.

10. In a cover operating device for installation on a vertically movable bridge, a cover means on said bridge responsive to movement of said bridge in one direction for moving said cover from a first position to a second position out of the plane of and to one side of said first position, and means on said bridge responsive to movement of said bridge in the opposite direction for moving said cover from its second position to its first position.

11. In a cover operating device for installation on a vertically movable bridge, a cover, a lever having an upper end adapted for operative connection to said cover, said upper end being movable between a first position and a second position vertically and horizontally displaced from said first position, an actuating link movable in opposite directions, operating means connecting one end of said link to said lever in such manner that movement of said link in one direction will cause the upper end of said lever to move from its first to its second position and movement of said link in the opposite direction will cause the upper end of said lever to move from its second to its first position, a bell crank pivoted on said vertically movable bridge, a pivotal connection between one arm of said bell crank and the other end of said link, a stationary element engageable by the other arm of said bell crank when said bridge moves in one direction, whereby force will be applied to said link in one direction, and a chain having one end stationarily fastened and the other end connected to said other bell crank arm, whereby movement of said bridge in the opposite direction will cause a force to be exerted on said link in the opposite direction.

12. In a bridge, means for moving said bridge between an upper position and a lower position, a pair of deck plates on said bridge positioned for use as part of a deck, said deck plates being spaced apart leaving a gap therebetween, said gap being transverse to the extent of the bridge, a cover plate movable between an operative position covering said gap to form a continuous deck and a retracted position exposing said gap, means mounted on said bridge responsive to movement of said bridge from one of said positions to the other position for moving said cover plate to its retracted position, and means mounted on said bridge responsive to movement of said bridge from said other position to said one position for moving said cover plate to its operative position.

13. In a bridge, means for moving said bridge between an upper position and a lower position, a pair of horizontally spaced plates on said bridge having a gap therebetween and positioned for use as part of a deck, said gap being transverse to the extent of the bridge, a cover for said gap movable between an operative position covering said gap and contiguous with said plates when said bridge is in one of said positions, and a retracted position to one side of said gap and above one of said plates when said bridge is in its other position, an operating mechanism for said cover mounted on said bridge including means for simultaneously applying upward and lateral forces to said cover when said cover is in its operative position, and means for restraining said cover against lateral movement only until said cover has been lifted to a height above said one plate, whereby said lateral force will be effective after said height has been reached to move said cover to its retracted position.

14. In a bridge, means for moving said bridge between an upper position and a lower position, a pair of spaced plates on said bridge having a gap therebetween and positioned for use as part of a deck, said gap being transverse to the extent of the bridge, a cover for said gap movable between an operative position covering said gap and contiguous with said plates when said bridge is in one of said positions, and a retracted position to one side of said gap and above one of said plates when said bridge is in its other position, a lever pivotally connected to the underside of said cover and extending therebelow, means for simultaneously applying an upward force to the lower end of said lever and a lateral force to the upper end of said lever when said cover is in its operative position, a vertical obstructing surface below said cover, and an element connected to said cover and adapted to be obstructed by said surface only until said cover has been raised a predetermined distance, whereby continued application of said lateral force to said lever will cause movement of said cover to its retracted position.

15. In a bridge, means for moving said bridge between an upper position and a lower position, a pair of spaced plates on said bridge having a gap therebetween and positioned for use as part of a deck, said gap being transverse to the extent of the bridge, a cover for said gap movable between an operative position covering said gap and contiguous with said plates when said bridge is in one of its positions, and a retracted position to one side of said gap and above one of said plates when said bridge is in its other position, a roller secured to the underside of said cover on a horizontal axis transverse to the direction of cover movement, a stationary track having a vertical surface parallel to said roller axis and a horizontal surface extending from the upper end of said vertical surface toward said one side, said vertical track surface being in obstructing relation with said roller when said cover is in its first position, a lever pivoted to the underside of said roller and extending therebelow, a bell crank on a stationary pivot, a pivotal connection between one arm of said bell crank and the lower end of said lever, a yoke, a pivotal connection between the other arm of said bell crank and one end of said yoke, a pin-and-slot connection between the other end of said yoke and an intermediate portion of said lever, and means connected to said yoke for exerting a transverse force on an intermediate portion of said yoke in opposite directions, whereby a transverse force applied in one direction will cause upward and then lateral movement of said cover into its second position, and application of the opposite transverse force to said yoke will cause lateral and then downward movement of said cover into its first position.

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