Jan. 16, 1962 R. A. GREENE 3,016,951

INDUSTRIAL CURTAIN HARDWARE

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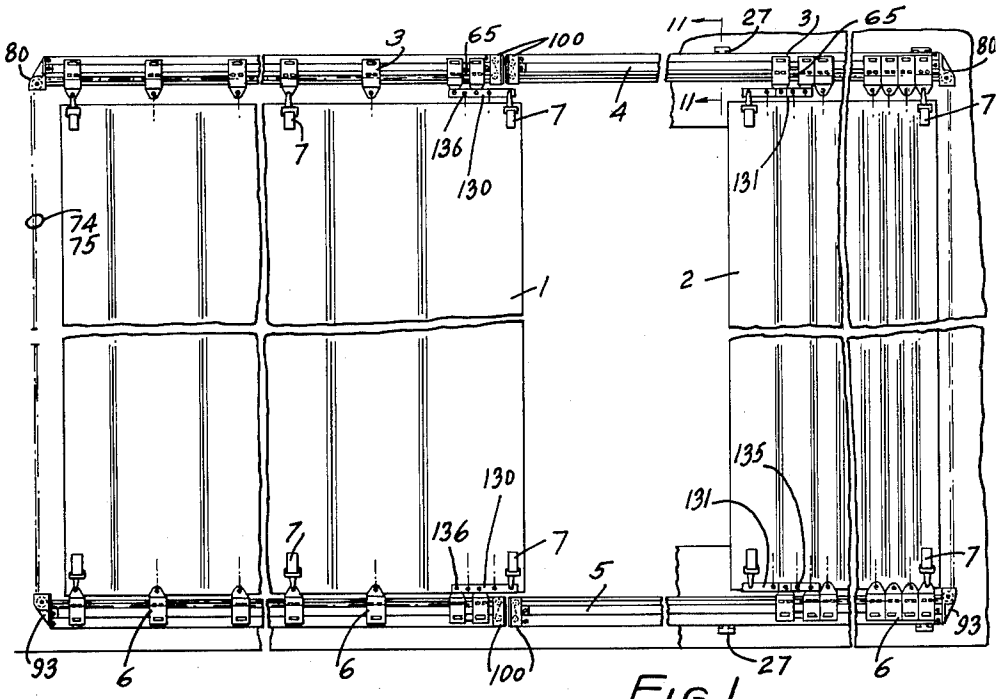


FIG. 1.

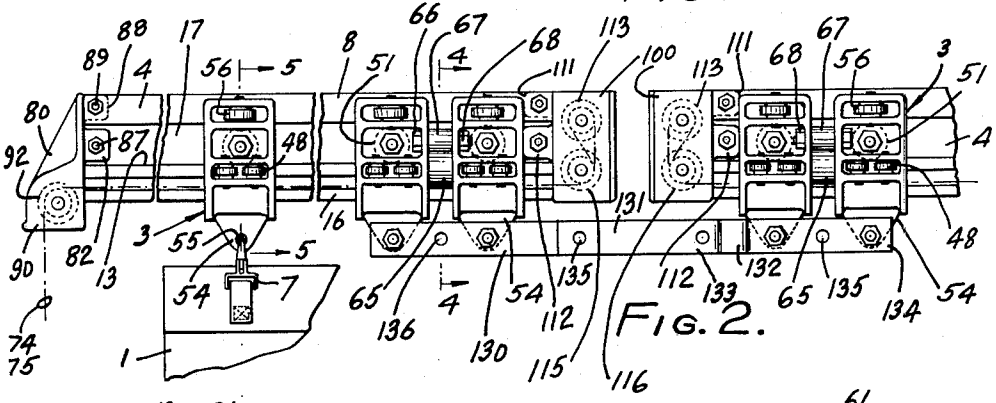


FIG. 2.

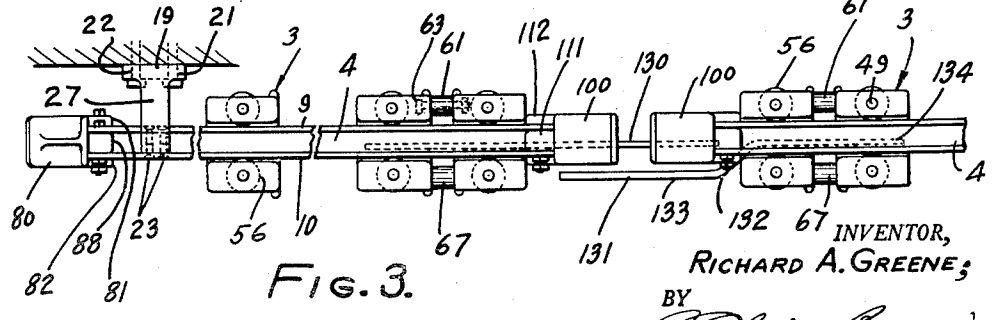


FIG. 3.

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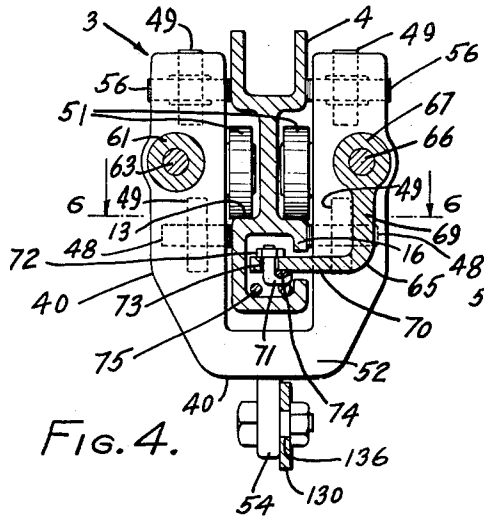


FIG. 4.

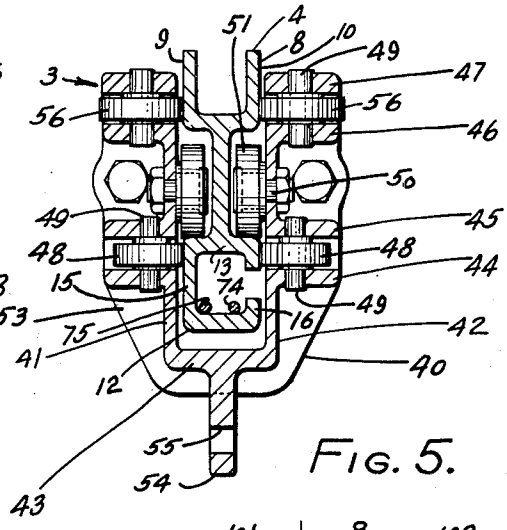


FIG. 5.

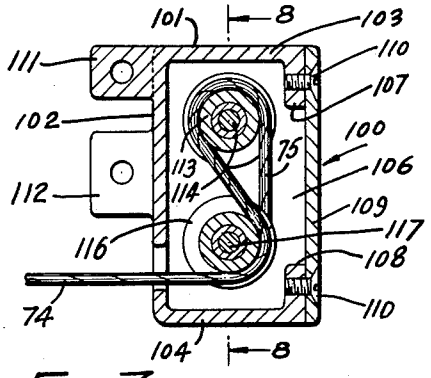


FIG. 7.

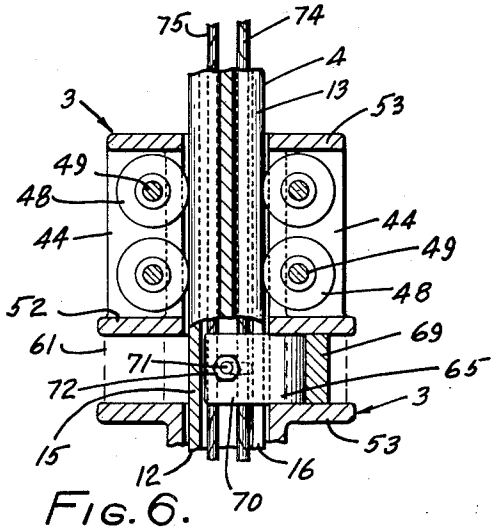


FIG. 6.

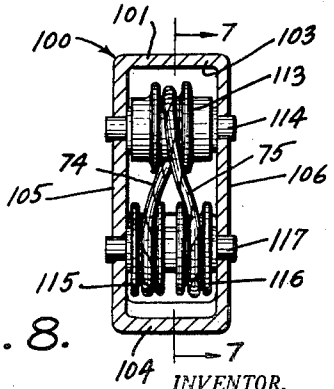


FIG. 8.

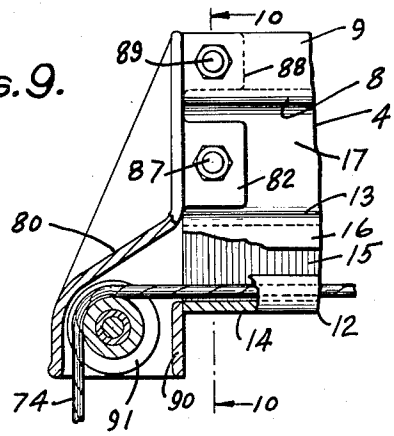
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INDUSTRIAL CURTAIN HARDWARE

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FIG. 9.



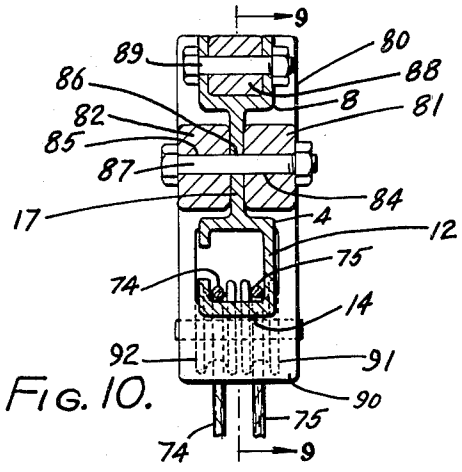


FIG. 10.

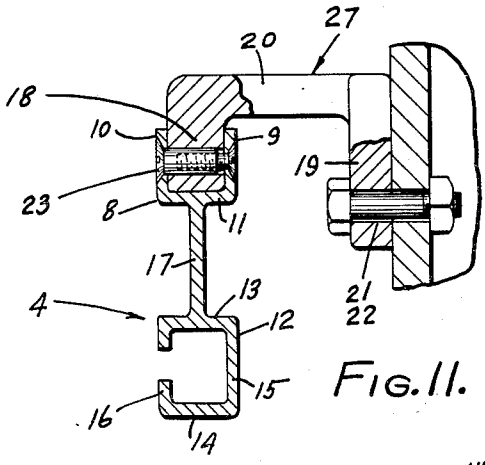


FIG. 11.

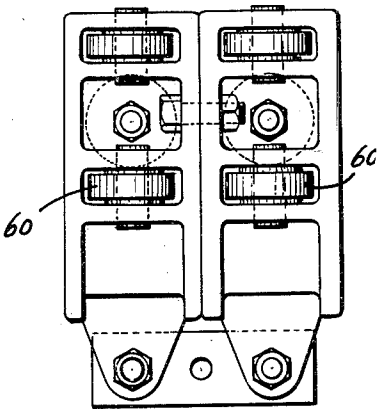


FIG. 13.

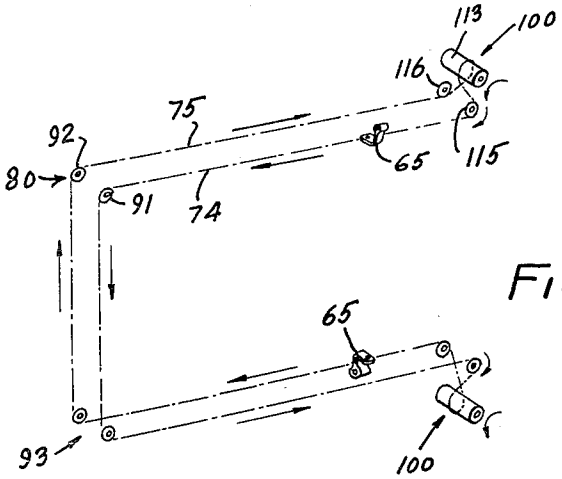


FIG. 12.

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INDUSTRIAL CURTAIN HARDWARE

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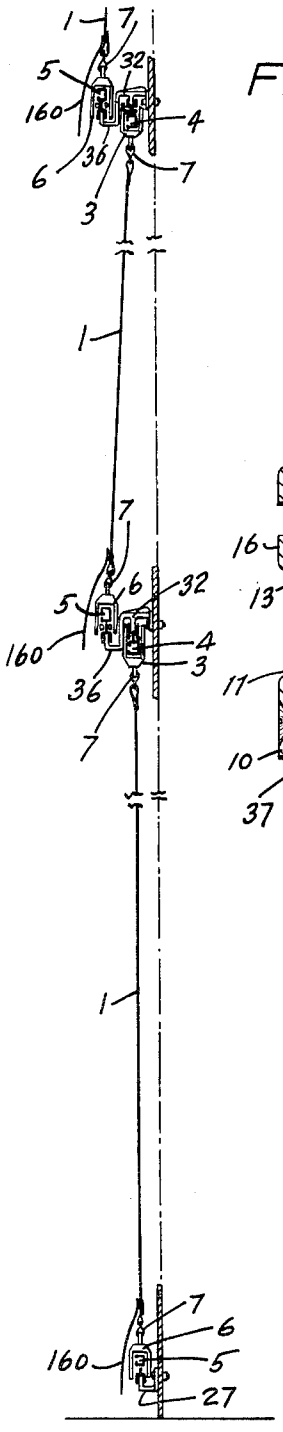


FIG. 14.

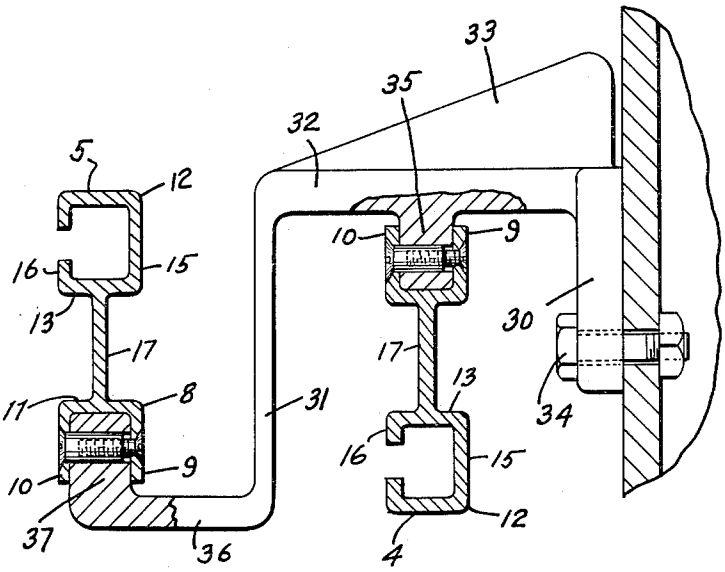


FIG. 15.

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3,016,951

INDUSTRIAL CURTAIN HARDWARE

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Filed Feb. 23, 1960, Ser. No. 10,286
6 Claims. (Cl. 160—126)

This invention relates to rolling trolleys and formed track designed for indoor or outdoor use to support and to suspend heavy curtain or shield at the top and at the bottom in such a manner that the curtain or shield may be opened or closed by pulling on ropes.

The system is particularly directed for use with heavy stage curtains or outdoor weather protection curtains installed on oil derricks and missile towers where provision must be made for opening and closing the curtains or shields by rolling the supporting trolleys along a track.

An object of the invention is to provide for easy operation of the curtains during opening and closing operations.

Another object of the invention is to provide for side loading in the case of outdoor installations, where due to winds against the exposed curtain, side loading becomes of considerable consequence and must be transferred to the formed track.

Another object of the invention is to provide for easy operation of curtains or shields around corners where a curved track is required.

Another object of the invention is to provide for vertical loading caused by heavy curtain materials and/or the catenary effect caused by horizontal wind pressure against the protecting curtain or shield.

Another object of the invention is to provide suitable trolleys to meet load carrying requirements to extend and retract the curtains as required.

Another object of the invention is to provide a suitable method for supplying motivating means to the trolleys to enable them to extend and/or retract the curtains as required.

Another object of the invention is to provide suitable means for causing the meeting curtain edges to overlap thus providing an effective continuous protective covering as required.

Another object of the invention is to provide a track arranged in such a manner as to be easily installed on suitable hangers and also designed to provide proper rolling surfaces for the horizontal and vertical load carrying wheels on the trolleys.

Another feature of the invention is the provision of suitable end fittings installed on the track ends to act as guides for the motivating rope and also to provide bumper stops for the curtain trolleys.

A further object of this invention is to provide a strong, rugged and durable weather resistant, economical system of hardware which can be used to support protective curtains or shields in such a manner that the curtains or shields may be easily transported out of the way when not in use, or not required and as easily transported to a protective position when their use is required or necessary.

With the above mentioned and other objects in view, the invention consists of the novel and useful provision, formation, construction, association and relative arrangement of parts, members and features, all as shown in certain embodiments in the accompanying drawings, described generally and more particularly pointed out in the claims.

In the drawings:

FIGURE 1 is a fragmentary elevation showing upper and lower tracks with trolleys thereon and supporting curtains, one of which is in extended position and the other of which has been collapsed or folded;

FIGURE 2 is a fragmentary side elevation on an enlarged scale, showing a pair of tracks in end-to-end relationship, with trolleys carried on each track for supporting a curtain or curtains, with means interconnecting certain of the trolleys on each track to provide for curtain overlap;

FIGURE 3 is a fragmentary view, partly in section and a top plan of FIGURE 2;

FIGURE 4 is a sectional view on the line 4—4 of FIGURE 2, and on an enlarged scale;

FIGURE 5 is a sectional view on the line 5—5 of FIGURE 2, and on an enlarged scale;

FIGURE 6 is a fragmentary, sectional view taken on the line 6—6 of FIGURE 4;

FIGURE 7 is a sectional view on the line 7—7 of FIGURE 8;

FIGURE 8 is a cross-sectional view on the line 8—8 of FIGURE 7;

FIGURE 9 is a fragmentary sectional view on the line 9—9 of FIGURE 10;

FIGURE 10 is a fragmentary sectional view on the line 10—10 of FIGURE 9;

FIGURE 11 is a fragmentary, cross-sectional view taken on the line 11—11 of FIGURE 1, and on an enlarged scale;

FIGURE 12 is a diagrammatic view of a rope system used for opening and closing the curtains or shields;

FIGURE 13 is an elevation of a pair of the trolleys shown secured together;

FIGURE 14 is a fragmentary, partially sectional elevation showing trackway of the present invention supported by brackets or hangers in such a manner as to allow curtains or shields to overlap; and,

FIGURE 15 is a fragmentary, sectional view of a support bracket or hanger for two tracks and on an enlarged scale.

Referring now to the drawings, I have shown in FIGURE 1 a certain adaptation of my invention utilizing hardware for the carrying of and manipulation of curtains or shields. As previously pointed out, oil derricks, as well as towers for rockets, are usually enclosed not only for the purpose of protecting mechanism within the tower or derrick, but for security reasons as well. It is a prime essential, particularly in missile or rocket towers, which extend to considerable height, that the covering or enclosing curtains be easily closed or opened and by a means which is fool proof in its operation and may be depended upon during inclement weather, as well as during other adverse conditions. In a tower of any height extending perhaps to one hundred fifty feet above the earth surface, it is necessary to provide a series of curtains or shields, and the curtains or shields must be held both at the tops and bottoms thereof to prevent flapping and to resist winds. Under these conditions, it is essential that the means for supporting the curtains or shields be of a strength sufficient to resist side loads due to winds and still permit the curtains to be moved to a closed position or to an open position within a minimum of time.

In FIGURE 1 I have illustrated in elevation and in fragment a pair of curtains 1 and 2, the curtain 1 being in closed position, which is to say, closing a portion of the derrick or tower while the curtain 2 has been folded and is in what is termed open position so far as the tower or derrick is concerned. These curtains are suspended from trolleys designated generally as 3 and which trolleys are carried on an upper track 4, there also being a lower track 5 for roller trolleys 6 identical in construction to the trolleys 3 whereby the curtain or shield, for instance the curtain 1, is held against a tendency to bellow outwardly due to wind, there being suitable means for attaching the trolleys to the upper and lower horizontal edges of the curtain or shield, as shown for instance in FIGURE 1 at 7, together with a cable or rope system,

and means for attachment to certain of the trolleys for opening and closing individual curtains.

The number of curtains used will depend upon conditions under which the curtains must act such as weather and other factors, and hence no particular size of curtain is contemplated although the weight of the curtain is a consideration, as the curtain is suspended from the trolleys 3 on tracks. The track used in the practice of the present invention assumes the form shown in FIGURES 4, 5, 10, 11 and 15 whether it be the upper or lower tracks, the track in each instance including a channel member 8, the legs or sides 9 and 10 thereof being parallel with an interconnecting base 11, and a substantially C-shaped member 12, the upper and lower walls 13 and 14 of which are parallel, a side wall 15 and an interrupted side wall 16 providing a slot, the side walls being parallel, and in the present instance having the same spacing as the spacing between the side walls or legs 9 and 10, with an interconnecting intermediate web 17 joining the walls 11 and 13. This is the general form of the track in cross section and the track may be of any length desired. The track is supported by one or more hangers or brackets, one form of which is shown in FIGURE 11 at 27, and a second form in FIGURE 15. The hanger or bracket includes two legs 18 and 19 which are parallel and an interconnecting piece 20. The leg 19 has greater width than the leg 18, as best shown in FIGURE 3, and leg 19 is transversely bored at 21 and 22 to receive bolts which are secured to the foundation member such as a derrick or tower. Leg 18 is received between the two legs 9 and 10 of the channel member 8, the parts being provided with aligned transverse bores for reception of one or more bolts 23 for maintaining the hanger or hangers and the track in working relationship.

The hanger shown in FIGURE 15 is used where there are a plurality of horizontal tracks in vertically spaced relationship as shown in FIGURE 14, and the hanger is quite similar to the hanger shown in FIGURE 11 in that it includes two spaced apart legs 30 and 31, the leg 30 having the greater width, the legs being interconnected by top piece 32 which may be strengthened by a web 33. The leg 30 and the foundation member are transversely bored for the reception of a securing bolt or bolts 34 for anchoring the hanger to the foundation member. The member 32 is provided with a depending lug 35 of a width sufficient to fit within the channel of the rail and between the sides or legs 9 and 10 thereof, the lug being secured to the legs by transverse bolts passed through aligned openings in the legs and in the lug. The leg 31 carries member 36 in substantially right angular relationship and a leg 37 parallels the leg 31 and is enlarged in width for reception, in the present instance, between the legs 9 and 10 of the channel member 8 of the track. The parts are secured together in the same manner as shown in FIGURE 11. In this instance it will be observed that one C-shaped member 12 is depending from member 32 while in the second track the C-shaped member is elevated above the channel member of the track.

The trolley members 3 are detailed as to construction in FIGURES 4, 5, and 6, and include a framing 40 of substantial U-form providing a pair of substantially parallel side members 41 and 42 and interconnecting member 43. The sides 41 and 42 straddle the track and particularly the sides of the channel member and the C-shaped member as illustrated. Each frame side 41 and 42 is externally provided with spaced apart external flanges 44, 45, 46 and 47. Interposed between each pair of flanges 44 and 45, in one instance, 46 and 47 in the second instance, and for each side 41 and 42, are rollers designated generally as 48, which rollers are held between the pairs of flanges by means of axles designated generally as 49. The axles are passed through suitable openings in each pair of flanges, and afterwards the ends of the axles are expanded so as to hold them in position. The periphery or tread of each roller 48 extends beyond the inner surfaces of the sides 41 and 42 in position to contact sides 15 and 16 of the C-shaped member engaging one of the sides 16 of the interrupted side while the roller 48 interposed between the shaped apart flanges 46 and 47 engages one of the sides of the U-shaped or channel member 8. Each frame side 41 and 42 intermediate the flanges 45 and 46 is transversely bored to receive an axle 50 carrying a roller 51, which roller is in vertical position or at right angles to the rollers 48, the roller 51 riding upon the member 13 of the C-shaped portion 12 of the track. As previously stated, the roller arrangement for the trolley is the same for the opposite side 41. The framing is provided with end webbing members 52 and 53 which interconnect the pairs of flanges and strengthen the framing. The member 43 is intermediately provided with a depending lug 54 which is transversely bored at 55. The lug is for suspending the curtains, as shown in FIGURE 1, when a hook 7 is fastened to a curtain 1 and passed through the transverse bore 55, see also FIGURE 2. The lug 54 is used for other purposes, as shown in FIGURE 2 and which will be described later. Whereas in the present instance I utilize two aligned rollers 48 between the flanges 44 and 45, as shown in FIGURE 2, I use a single roller 56 between the parallel flanges 46 and 47. Roller 56 is secured to an axle in the same manner as for the rollers 48, and as previously set forth, the rollers 56 engage the sides or the legs 9 and 10. Thus any horizontal stress is taken by the rollers 56 and 48 for each side of the frame and the engagement of the rollers with the sides of the members 8 and 12. Vertical stress or stress due to the weight of the curtain is carried by the rollers 51 riding on the top 13 of the member 12 of the track.

The trolley shown in FIGURE 13 differs from the trolleys shown in FIGURES 4 and 5 in that a single roller 60 is used in place of the two rollers 48. This, of course, reduces the width of the frame. Other than for this difference, the two trolleys are the same in construction. The reduced frame width permits use of the trolley type shown in FIGURE 13 on curved track, particularly on tracks having curves of twenty-four inches or less with a minimum curve of eighteen inches radius. Under certain circumstances I may secure two of the trolleys together, as shown in FIGURE 13, particularly when heavy loads are to be carried. The two trolleys may be connected together in any suitable manner but usually I prefer to provide spacers between the two trolley frames in the manner shown for the trolleys of the type shown in FIGURE 2. For the purpose of joining two of the frames, I provide a pair of separators interposed between contiguous ends of the frames of a pair of trolleys as shown in FIGURE 3 at 61. These separators may be tubular members of equal length and through which bolts are passed between the frames, as indicated by the dotted lines at 63 for one separator.

The trolleys of the type depicted in FIGURES 4 and 5 and particularly pairs of the trolleys which have been secured together in tandem by the bolts and separators at 61, have secured therebetween a tow bar 65. The tow bar is held between contiguous frame ends of a pair of trolleys by means of an elongated bolt 66 passed through the boss 67 of the tow bar and through transverse openings in the two frames, both being secured in the usual manner by a nut 68. The tow bar is used in conjunction with a rope or cable as illustrated in FIGURE 4, the tow bar being of angular form, having two arms 69 and 70 in substantially right angular relationship, with the arm 70 passed through the slot on the interrupted side 16 of the track and within the confines of member 12. The arm 70 carries a hook type clamp 71, the shank of the hook being screw threaded for reception of a nut 72, the hook shank being passed through a transverse bore 73 in the arm. The hook is adapted to compress between

the arm and the hook, a portion of a cable or rope, and particularly one length 74 thereof. The cable or rope has two lengths or stretches, one of which has just been referred to as 74 and the other length by 75. These cable stretches or lengths, are confined within the member 12 of the track in the manner shown in FIGURES 4, 5, and 6. The cable is adapted to be moved as hereinafter described, either manually or by motor to cause an opening or a closing of curtains as shown in FIGURE 1.

For the purpose of carrying or controlling easy movement of the cable lengths or stretches, one end of each rail, both top and bottom, is provided with a fixture of the type shown in FIGURES 9 and 10. This fixture functions as a rope or cable guide, and includes a framing 80 for attachment to an end of the track. The frame is provided with spaced apart extending lugs 81 and 82, both lugs provided with aligned transverse bores 84 and 85, the lugs adapted to bridge or lie on opposite sides of the web 17 of the rail or track with the web transversely bored at 86 whereby a bolt 87 may be passed through the aligned bores for securing the rope or cable guide to the track. In addition, a further lug 88 extends from the frame 80 and is received within the channel portion 8 of the track, the lug and the channel portion being transversely bored to receive a bolt 89. The frame 80 has a portion 90 adapted to house a pair of sheaves 91 and 92 the grooves of which are in alignment with the interior surface of the part 14 of rail or track part 12, as shown in FIGURE 10. Each length or stretch of rope or cable is passed over a sheave and downwardly. The cable lengths are passed over sheaves in a rope guide of the construction just described, attached to an end of a lower track or rail 5 as shown in FIGURE 1 at 93. Thus the lengths of cable extend between cable guides for ends of the top track 4 and the lower track 5. The cable lengths in turn are passed around sheaves for a cable guide of the type shown in FIGURES 7 and 8. This type of cable guide is indicated as 100 and is secured to ends of the track opposite those portions of the upper and lower tracks 4 and 5 which carry the cable guides of the type shown in FIGURES 9 and 10. The cable guides 100 are adapted to reverse the direction of rope travel in the manner indicated diagrammatically in FIGURE 12. The cable guide 100 includes framing 101 of the casing type having an end wall 102, top and bottom walls 103 and 104 and side walls which join the walls 102 to 104 inclusive, as shown at 105 and 106, the casing provided with a pair of walls 107 and 108 which are separated and parallel the wall 102. A plate 109, which functions as an inspection plate, is secured to the walls 107 and 108 by screws designated generally as 110. The end wall 102 is provided with a pair of separated lug members, there being a single lug at 111 adapted to be received within the channel portion of the track, the pair of lugs both designated as 112, straddling the web 17 of the track, all of the lugs 111 and 112 being transversely bored whereby bolts may be passed therethrough and through bores in the track for securing the framing to the track.

As previously stated, there are two of the rope guides 100 for ends of the upper and lower tracks 4 and 5. The cable or rope is of continuous form rove about the sheaves positioned within the framing. Thus I have mounted within the boxlike framing a single sheave 113 mounted upon an axle 114 extending between walls 105 and 106 and a pair of sheaves 115 and 116 mounted upon a single axle 117 extending between the sides 105 and 106. In this manner, a cable length may be pulled by the operator either mechanically or by power means so as to open or close a curtain.

I desire that the curtains 1 and 2, when drawn together, should overlap and to accomplish this, the upper and lower trolleys carried by the tracks 4 and 5 and particularly the trolleys which are in tandem relationship, are provided with curtain carrying bars designated generally as 130 and 131. The bar 131 is intermediately bent at 132 to provide two lengths 133 and 134 in offset parallel relationship, and the length 133 is adapted to spacedly overlap the cable rope guides 100, as shown in FIGURE 3. These bars are provided with a plurality of transverse bores 135 and through certain of the bores bolts are passed, which bolts likewise are passed through the bores 55 of the depending lugs 54 of the trolleys, see FIGURES 2, 4 and 5. The curtains 1 and 2, in the present instance curtain 2, is secured by a fastener 7 to the length 133 of the bar. This portion extends beyond the trolleys. The bar 130 is straight and provided with transverse bores 136. The bars 130 for both the upper and lower tracks are attached to a tandem pair of connected trolleys for securing a length of the curtain 1 and in this instance by means of fastener 7. The vertical edge of the curtain extends beyond the trolleys and likewise beyond the rope guides of the type shown in FIGURES 5 and 8. The straight bar maintains a length of curtain 1 in one plane while the offset bar end 133 of the opposite curtain length holds the curtain 2 in an overlapped position relative to curtain 1.

The extended lugs 81, 82 and 88 which are secured to the upper and lower tracks at one end thereof, and the extended lugs 111 and 112 at the opposite ends of the tracks, function as stops or bumpers for the trolleys, see FIGURE 2.

Where great height is a factor in a derrick or tower, a series of parallel curtains are used one above the other and preferably in overlapped relationship. In other words, the curtains will have a shingle effect which is efficient in acting as an enclosure for the derrick or tower. This is illustrated in FIGURE 14 wherein I use track hangers of the type shown in FIGURE 15. Having selected the width of curtain or shield to be used and the number thereof in ascending relationship, the hangers are mounted to the derrick or tower at spaced vertical distances apart as shown in FIGURE 14. The lowermost hanger shown in FIGURE 14 may be of the form shown in FIGURE 15 or of the form shown in FIGURE 11, while the remaining supports or hangers are preferably of the form shown in FIGURE 15. The lower end of each ascending curtain is provided with a skirting 160 which overlaps the lower trolleys and the rail. The upper end of the curtain is fastened to the rail secured by lug 35. The upper end of the curtain is fastened to trolleys which are mounted upon the intermediate track of the bracket or hanger, as shown in FIGURE 15. The next ascending curtain is held at an angle between the trolleys mounted upon the intermediate track secured to the hanger and the outside track of a lower hanger. As before, there is a skirting which overlies the trolleys carried on the lower track whereby the curtain is held at an angle to vertical. This arrangement is followed to the top of the tower for remaining curtains or shields and gives, as stated, a shingle effect.

The operation, uses and advantages of the invention are as follows:

I have provided by the construction described, a very stable, efficient system for enclosing derricks and towers by means of curtains which are held at the top and bottom edges thereof in such a manner as to handle both vertical and horizontal stresses imposed on the curtains due to wind and other conditions, and which stresses may vary from point to point on the several curtains or shields. The number of curtains and the number of top and bottom rails may vary and the system and means described allows for such variation. In fact I may provide curved rails at different points having a certain radius and the trolleys may carry the particular curtains and shields by the system shown and described around said curves without undue friction and with assurance of efficient operation. Each curtain panel is individually movable regardless of its position upon the derrick or tower and such movement may be controlled by power means connected with the cables or ropes for moving the curtains.

Thus, by providing a control panel, any curtain at any location may be opened or closed with contiguous ends of curtains overlapped to form an enclosure. The position of the cables or ropes within the tracks acts to protect the ropes against the elements and against undue abrasion. The cables are at all times guided as to movement. The upper and lower rollers, both horizontal and vertical, provided in the trolleys assure proper support for the curtains and a stable trolley which transfers stresses imposed upon the curtains directly to the tracks and through the tracks to the brackets or hangers secured to a foundation member such as a derrick or tower. I have used the term derrick or tower in a generic sense as meaning any foundation member to which the tracks are secured.

It is obvious that many changes, variations and modifications may be made in the practice of the invention without, however, departing from the spirit thereof as defined by the appended claims.

I claim:

1. In combination: a pair of vertically spaced apart hangers secured to a foundation member, inner and outer tracks secured to each hanger, trolleys mounted for movement on each track, a curtain secured along its top edge to the trolleys supported by the inner track of the uppermost hanger and secured to the trolleys on the outermost track of the lower hanger, means for moving said trolleys, and each trolley including a U-shaped frame adapted to straddle a track and provided with spaced apart horizontal and vertical rollers engaging the track to handle both vertical and horizontal stresses imposed on the curtain.

2. The combination as set forth in claim 1, and each trolley provided with a tow bar for reception within that portion of the track enclosing said means.

3. The device as set forth in claim 1, there being a series of vertically related curtains, each mounted to trolleys between vertically spaced apart brackets and each curtain being mounted at an angle to the trolleys and with the lower edge of one curtain overlapping the top edge of a lower curtain.

4. In combination: a pair of vertically spaced apart hangers secured to a foundation member, inner and outer tracks secured to each hanger, trolleys mounted for movement on each track, a curtain secured along its top edge to the trolleys supported by the inner track of the uppermost hanger and secured to the trolleys on the outermost track of the lower hanger, means for moving said trolleys; said track including a channel portion and a C-shaped portion and a web interconnecting the channel and C-shaped portions, the sides of the C-shaped portion and the channel portion being in substantial alignment and parallel.

5. The combination of claim 4: a rope guide for attachment to an end of a length of track, the rope guide including: a frame housing a pair of sheaves mounted thereto for rotation and an outstanding lug for reception in the channel portion of the track and with a pair of spaced apart lugs adapted to embrace opposite sides of the track web, and means for securing the lugs, web and channel portion in working relationship.

6. The device as set forth in claim 4, and a casing for one end of a track, the casing provided with a lug for reception in the channel portion of the track and a pair of spaced apart lugs for embracing the web, means for securing the lugs to the track, a single sheave and a double sheave within said casing and mounted thereto for rotation, the rope being reaved over said sheaves for reversing the direction of movement of rope.

References Cited in the file of this patent

UNITED STATES PATENTS

2,500,074	Hill	Mar. 7, 1950
2,583,529	Halpern	Jan. 29, 1952
2,722,980	Wills	Nov. 8, 1955
2,736,373	Truesdale	Feb. 28, 1956