Aug. 31, 1937. C. F. HIRSHFELD 2,091,478

SWING LINK

Filed Feb. 21, 1935

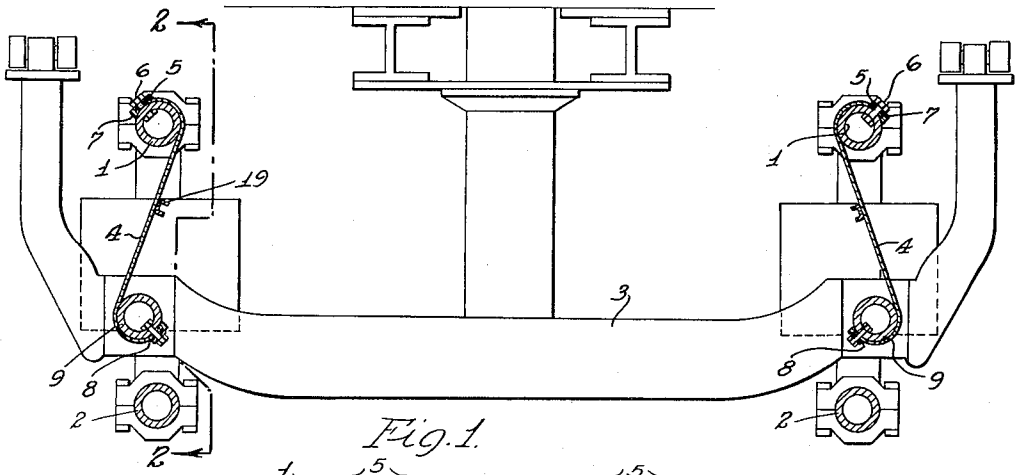


Fig. 1.

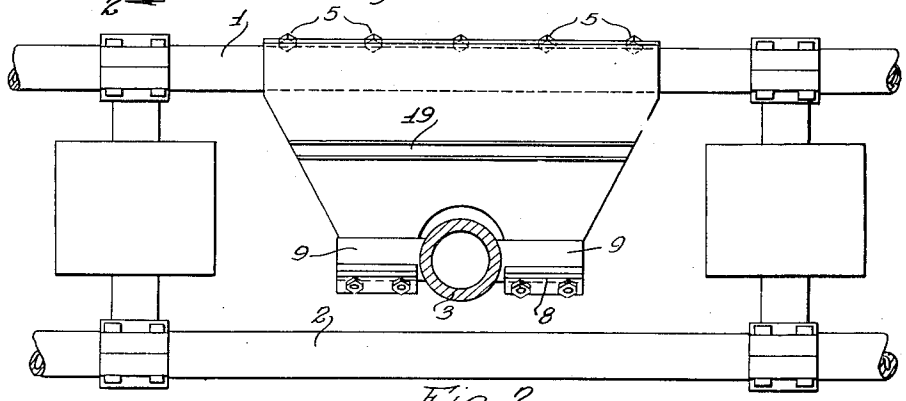


Fig. 2.

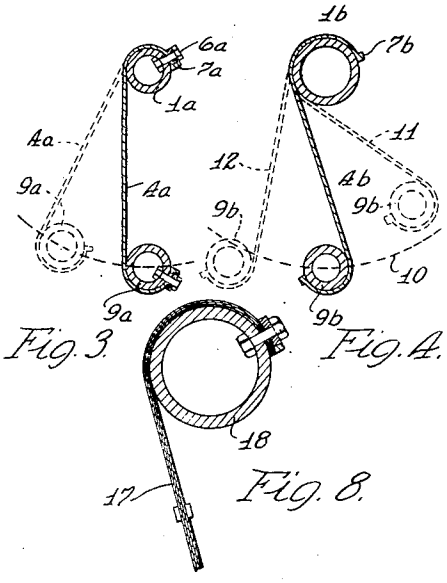


Fig. 3.

Fig. 4.

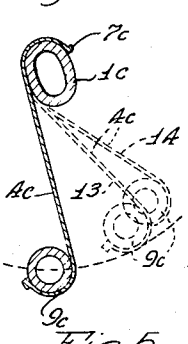


Fig. 5.

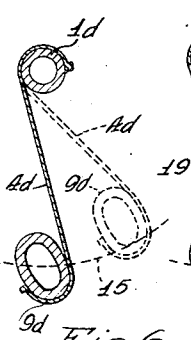


Fig. 6.

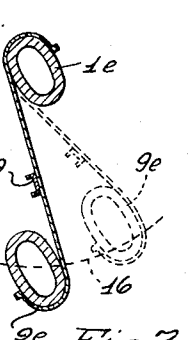


Fig. 7.

Fig. 8.

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SWING LINK

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Application February 21, 1935, Serial No. 7,585

16 Claims. (Cl. 105—190)

This invention relates to swing links for rail truck bolsters through which the loading of a car body is transmitted to the truck frame.

Heretofore it has been customary to connect a swing link to the frame and to the truck bolster by means of bearings at each end thereof. These bearings, in practice, wear rapidly and necessitate constant care and early replacements. It is a principal object to provide a swing link construction which will give a new freedom of movement at its pivotal points, which will not be subjected to sliding friction, and which will have ample fore and aft rigidity.

Because of the fact that a swing link in normal pivoting movement swings upwardly through the arc of a circle, gravity acts to damp lateral swinging and rolling movements of the car body. However, the damping or restoring force is insufficient and various additional restoring means of spring or friction type have been suggested, some of which have been put into use. It is another object of this invention to provide a swing link construction by which the restoring force may be altered throughout a wide range from a negative quantity to a very sizable amount such that additional resilient devices, as aforementioned, may be entirely eliminated, or which may be combined with such devices, and which will give many novel and improved damping effects.

In carrying my invention into effect I preferably employ one or a plurality of thin sheets of some suitable material, such as steel, in fixed engagement with cooperating members at each end thereof as will become more fully apparent with reference to the accompanying drawing in which the recommended forms are illustrated by way of example and in which

Figure 1 is a transverse vertical view through the truck frame of a rail vehicle equipped with my improved swing link,

Figure 2 is a vertical section along the line 2—2 of Figure 1,

Figures 3, 4, 5, 6, and 7 show various modifications in the shape of frame and bolster members to which my improved link is attached, and

Figure 8 shows a modified form of the link itself.

More particularly, 1 and 2 indicate the side girders of a rail truck and 3 a swing bolster. These parts may be of any conventional or special design since my invention is applicable to any truck incorporating a swing bolster.

Supporting the bolster 3 from the frame members 1 are the swing links 4. These links are flexible at each end and hence may be made entirely of a flexible material, such as sheet steel. Instead of the usual bearings, the upper end of each link 4 is bent to follow the form of the members 1 for a substantial portion of their circumference and anchored thereto. In order to obtain a firm and lasting attachment, it is recommended that the ends of the links be perforated at intervals, a plate 5 placed thereover and a multiplicity of bolts 6 inserted through the plate and perforations. The ends 7 of the links may be turned to form a shoulder for abutment against the plate 5. The lower end of each link 4 is similarly anchored at 8 to an end 9 of the bolster 3.

As shown in the left side of Figure 1 the link 4 finds contact with the member 1 interiorly of the truck frame and with the bolster 3 exteriorly of the frame. When the bolster swings to the left, as viewed, the surface of contact between the link and the member 1 increases, and similarly, the area of contact between the link and the bolster member 9 increases. This action causes the link to foreshorten and consequently raises the left end of the bolster by an amount proportionate to the amount of shortening. The contact surface of the member 1 and also of the member 9 thus give a cam effect.

While the left link is shortening, the right link is becoming longer because the link is really "unwinding" from the right members 1 and 9,—that is, it is decreasing its area of contact with these members.

In Figure 1, the direction of winding of the left link 4 on the number 1 is clockwise, and on the member 9 it is counter-clockwise while the reverse is true for the right link. A reverse action can be obtained by reversing the manner of attachment, and the action can be altered through a wide range by altering the shape of the members 1 and 9 as illustrated, by way of example in Figures 3 to 7.

In Figure 3, the link 4*a* increases its area of contact with the lower member 9*a* and decreases the area of contact with the upper member 1*a* when swinging to the left with the net result that the length of the link 4*a* remains constant when the diameters of the members 9*a* and 1*a* are the same.

In Figure 4, the diameter of the upper member 1*b* is larger than that of the lower member 9*b*, otherwise the arrangement is the same as for the right side of Figure 1. The arc 10 shows the travel which would be obtained by a link with ordinary pivotal swinging. The dotted position 11 shows how the bolster and 9 is elevated when

swung to the right and depressed when swung to the left.

In Figure 5, the member 1c is oval or cam shape with the result that there is greater lift of the member 9c per degree of swing in travelling from the position 13 to the position 14 than in travelling from the original normal position to the position 13.

In Figure 6, the member 9d has an oval shape and the upper member 1d is round, whereas in Figure 7 both members 9c and 1c are of oval shape. The positions of swinging to the right are indicated in dotted lines and the arcs which would be traversed by a link of constant radius are indicated at 15 and 16 respectively.

In Figure 8 the link 17 is made of flexible laminations of suitable material such as steel. These laminations are secured to the member 18 as previously described in connection with the link 4. The member 18 may be a frame member or a bolster end and may be of any desired shape such as is illustrated in Figures 3 to 8.

The links 4 and 8 are of considerable and substantial width as indicated in elevation in Figure 2, so that there is a large area of contact with the members 1 and 9. The possible area of contact with the member 1 is, in some constructions, larger than with the member 9 and in such cases it will be found advisable to give the link the general shape of a trapezoid, as illustrated. However, the essential point is to give the link sufficient width so that it has ample strength to resist bending in the direction of truck travel. A rigidifying member 19 as shown in end elevation in Figure 7 and in side elevation in Figure 2, may be added to prevent buckling where necessary.

What I claim is:

1. In combination, a truck frame, a swing bolster, a swing link for supporting each end of said bolster from said frame, each of said swing links being made of laminated sheet metal and being fixedly secured at its ends to said frame and bolster, said swing links constituting the means through which driving and retarding forces are transmitted from said frame to said bolster.

2. In combination, a truck frame, a swing bolster, a swing link for supporting each end of said bolster from said frame, each of said swing links being made of laminated sheet metal and fixedly secured at its ends to said frame and bolster, said swing links being of trapezoidal shape with the larger base in engagement with said frame and constituting the means through which driving and retarding forces are transmitted between said frame and said bolster.

3. In combination in a rail truck including a truck frame and a truck bolster, a swing link flexible in the direction of swinging movements for supporting said bolster from said frame, and a cam surface at the connection between said frame and said swing link with which said link increases and decreases its area of contact dependent upon the direction of swinging for controlling the amount of restoring force of said link in consequence of a swinging movement of said bolster.

4. In combination in a rail truck including a truck frame and a truck bolster, a swing link flexible in the direction of swinging movements for supporting said bolster from said frame, and a cam surface at the connection between swing link and said bolster with which said link increases and decreases its area of contact dependent upon the direction of swinging for controlling the amount of restoring force of said link in consequence of a swinging movement of said bolster.

5. In combination in a rail truck including a truck frame and a truck bolster, a swing link flexible in the direction of swinging movements for supporting said bolster from said frame, a cam surface adjacent the connection between said frame and said swing link, said link being adapted to increase and decrease its area of contact with each of said surfaces according to the direction of swinging, and a cam surface adjacent the connection between said bolster and said swing link for controlling the amount of restoring force of said link in consequence of a swinging movement of said bolster.

6. The combination of swing links and a swing bolster to which said links are connected, said links each being flexible at one end and fixedly attached at said end to said bolster whereby said links increase their surface of contact with said bolster upon swinging movement in one direction and decrease their surface of contact with said bolster upon swinging movement in the other direction, said swing links constituting the means through which driving and retarding forces are transmitted.

7. The combination of a rail truck frame, a swing bolster, and a swing link supporting said bolster from said frame, said link being flexible at one end and fixedly attached at that end to said frame in such manner that the link increases its surface of contact with said frame upon swinging in one direction and decreases its surface of contact with said frame upon swinging movement in opposite direction.

8. The combination of a rail truck frame, a swing bolster, and a swing link supporting said bolster from said frame, said link being flexible at each end and fixedly attached at its ends to said bolster and said frame respectively, said link altering its area of contact with said bolster and with said frame during swinging movements thereby altering the radius of swing of its end of said bolster.

9. In combination, a truck frame including side rails, a swing bolster, and sheet metal swing links supporting the ends of said bolster from said rails, said swing links each having a substantial area of contact with said rails and being rigidly secured thereto whereby all driving and retarding forces between said frame and said bolster are transmitted therethrough.

10. In combination, a truck frame including side rails, a swing bolster, and flexible swing links connecting the ends of said bolster to said side rails, said links each being fixedly attached to one of said rails and each being similarly located with respect to the space enclosed by said rails whereby upon swinging of said bolster in one direction one of said links increases its area of contact with its side rail and the other decreases its area of contact with its rail.

11. In combination, a truck frame including side rails, a swing bolster, and flexible swing links connecting the ends of said bolster to said side rails, said links each being fixedly attached to one of said rails and each being similarly located with respect to the space enclosed by said rails whereby upon swinging of said bolster in one direction one of said links increases its area of contact with its side rail and the other decreases its area of contact with its rail, said links each being fixedly connected to said bolster and also each being

similarly located with respect to the space enclosed by said rails.

12. In combination, a truck frame including side rails, a swing bolster, and sheet metal swing links supporting the ends of said bolster from said rails, said swing links each having a substantial area of contact with said side rails and being fixedly secured thereto, said swing links also having substantial area and a rigidifying means in their direction of length thereby constituting sturdy means for transmitting all driving and retarding forces from said rails to said bolster without buckling.

13. In combination, a truck frame including side rails, a swing bolster having arms extending laterally from each end thereof, swing links for supporting said bolster from said rails, said links each being of thin metal of substantial width for elongated contact with its side rail, said links each having its lower edge cut away intermediate the ends thereof to straddle said bolster with said ends fixedly secured to said laterally extending arms.

14. In combination, a truck frame including side rails, a swing bolster having arms extending fore and aft in the direction of truck travel at each end thereof, flexible swing links for supporting said bolster from said rails, said links each being of substantial width and fixedly attached at its ends to one of said rails and to both arms at one end of said bolster whereby swinging of said bolster increases and decreases the area of contact of said link with its rail and its arms, each of said links being cut away between said arms by a sufficient amount to permit increase and decrease of area of contact of said link with the bolster arms without contacting the bolster proper.

15. In combination, a truck frame including side rails, a swing bolster having arms extending from each of its ends fore and aft thereof, swing links for supporting said bolster at its ends from said side rails, said links being of thin metal and cut away at the mid-portion of their bottom edges for straddling said bolster, the lower edges of said links being fixedly secured to each of said arms whereby upon swinging movement of said bolster one of said links increases its area of contact with its arms and upon swinging movement in the opposite direction decreases its area of contact with said arms, said links each being of trapezoidal form whereby the surface of contact with said rails is substantially greater than with said arms and whereby the links have great stiffness in the direction of truck travel, said links each being fixedly secured to their respective side rails whereby swinging of said links in one direction increases the area of contact of one of said links with its rail and in the other direction decreases said area of contact.

16. The combination as set forth in claim 15 together with means parallel to said side rails and between said rails and said arms for rigidifying said links against buckling during transmission of driving and retarding forces between said rails and said bolster.

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