Feb. 23, 1965 T R. SOWDER 3,170,412

CHAIR SWING DAMPER

Filed May 6, 1963

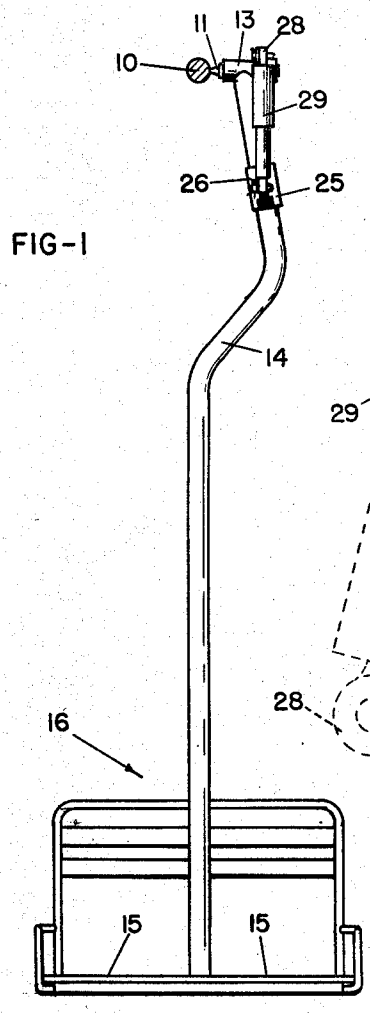


FIG-1

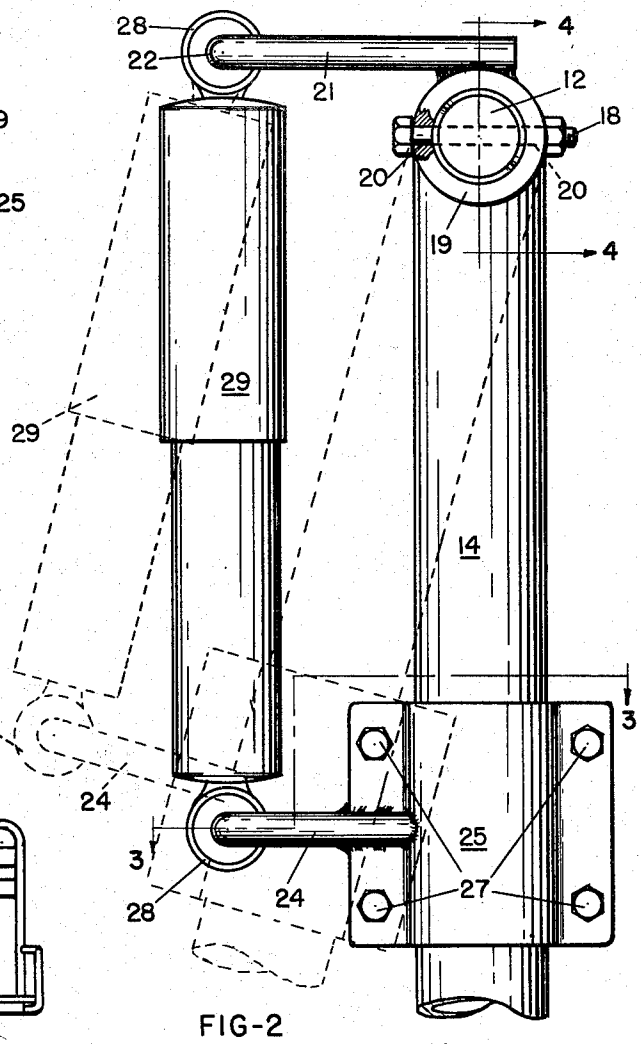


FIG-2

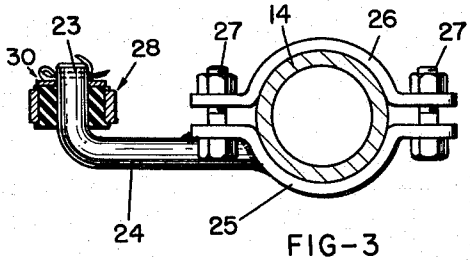


FIG-3

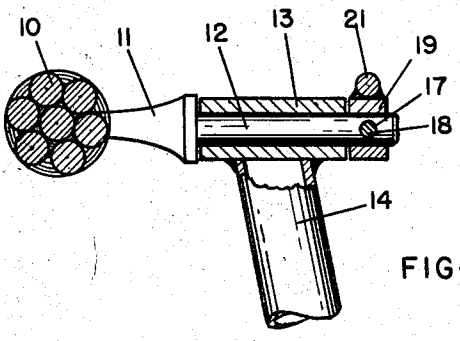


FIG-4

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CHAIR SWING DAMPER

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5 Claims. (Cl. 104—173)

This invention relates in general to a mono-cable tramway and in particular to a damper for frames hung on spindles carried by the tramway cable.

The invention, while not limited to chairs adapted to be occupied by homo-sapiens, is admirably adapted for use with mono-cable aerial ski-lift chairs, wherein it is a common and well known practice to fasten a series of substantially horizontally extending non-rotatable spindles to an endless tramway cable and pivotally support the ski-lift chairs from the spindles by means of depending hangers.

Conventionally, these tramway cables move at an average speed of 500 feet per minute and it is required for the skiers to mount and dismount the chairs while they are moving at this speed. It therefore becomes requisite that each skier be accelerated from zero velocity to at least a velocity of 500 feet per minute within a relatively short period of time. Were the ski chairs rigidly attached to the spindles so that there could be no swinging movement in a vertical plane coincident to the tramway cable, the initial acceleration shock would be so great as to render the device incapable of use.

By journaling the chair support hanger on the spindle, the chair may swing rearwardly after initial contact with the skier and thus accelerate the skier over a greater period of time to the speed of say, 600 feet per minute, occasioned by the sum of the kinetic energy present, by virtue of the motion of the chair, and the potential energy created by virtue of the angularity assumed by the chair hanger during the acceleration of the skier (occasioned by the resistance of the skier to acceleration). The sum of these energies then, increases the speed of movement of the mounted skier above the average speed of movement of the cable by the pendulum effect of gravity and thus for a comparatively long period of time the chair swings back and fourth.

In addition to the undesirable swinging movement of the chair in a vertical plane coincident to the tramway cable, it has been observed that this movement is translated into a secondary swinging movement laterally of the first plane of movement which, of course, is highly undesirable because of the danger of swinging a skier laterally of the cable toward one of the many cable supporting towers along the tramway system.

It is therefore an object of the present invention to provide in a mono-cable tramway a chair swing damper including means for converting mechanical energy to heat.

It is another object of the present invention to provide a chair swinging movement damper attachment which may be easily and conveniently applied to existing mono-cable passenger chairs without modification of the existing structures.

It is yet a further object of the present invention to provide a chair swinging movement damper for mono-cable tramway passenger chairs which includes a conventional hydraulic shock absorber means for converting mechanical energy to heat and thus that is very simple and inexpensive to manufacture, is well proven in efficiency and reliability and one which is inexpensive to procure, may be easily installed and is comparatively trouble-free.

These and other objects and advantages of the present invention will become apparent during the course of the following description when considered in conjunction with the accompanying drawings wherein a preferred form of the present invention is disclosed.

It is to be understood that the drawings are exemplifying only and are not intended to be restrictive of the scope of the invention beyond that scope expressly stated in the appended claims.

In the drawings, wherein like numerals are employed to designate like parts;

FIGURE 1 is a vertical elevation of a passenger chair supported upon a spindle carried by the cable of a mono-cable tramway and including the damper constituting the subject matter of the present invention;

FIGURE 2 is a fragmentary side elevation upon an enlarged scale showing the chair swinging movement damper attached to a passenger chair hanger and spindle;

FIGURE 3 is a horizontal sectional view taken substantially on the planes indicated by lines 3—3 of FIGURE 2; and

FIGURE 4 is a vertical view partially in section taken substantially upon the plane indicated by line 4—4 of FIGURE 2 and upon a reduced scale.

A mono-cable tramway conventionally has an endless cable 10 which is supported (by means not shown) for movement about a predetermined path and is provided with a plurality of cable supported clips 11 which include spindles 12. The bearing sleeve 13 is telescoped over the spindle 12 and is thereby journaled for pivotal movements about the axis of spindle 12. A hanger 14 is welded or otherwise supported on the sleeve 13 and supports at its lower end the seats 15—15 which, together with the hanger and sleeve 13 constitute a passenger chair 16. The spindle 12 is provided with a diametrically disposed aperture 17 through which a pin 18 extends to confine the sleeve 13 on the spindle 12 for rotational movements.

The present invention is an attachment for this conventional structure which may be applied to the existing members without modification of said members and comprises an annular collar 19 which is adapted to encircle the end portion of the spindle 12 outwardly of the sleeve 13. The pin 18 passes through diametrically disposed bores 20 which align with the aperture 17 thus fixing the collar 19 to the spindle 12 and confining the sleeve 13 against accidental removal.

A laterally extending arm 21 is welded or otherwise fixed relative to the collar 19 and has a right angle terminal end portion 22 at its free end which is identical to the right angle terminal end portion 23 of the arm 24 fixed relative to the clamp section 25 of a clamp 25–26. The clamp is rigidly fixed on the hanger 14 by means of a series of nut and bolt fasteners 27. The terminal end portions 22 and 23 of the arms 21 and 24 are adapted to receive the rubber bushed connecting rings 28—28 of a conventional automotive double-acting hydraulic shock absorber 29 and are confined against removal by a washer and cotter key assembly 30.

The shock absorber 29 is one of the many means for converting mechanical energy to heat which may be employed for the purpose of damping the swinging movements of the mono-cable tramway passenger chair 16. Obviously, other well known means for converting mechanical energy to heat may be substituted if desired, as for example, pneumatic shock absorbers and friction devices, but each of these is well known and falls within the engineering principles conventionally termed "Joule's equivalent" wherein the ratio of mechanical energy transformed into heat to the resultant quantity of heat generated is calculated as 4.19×10^7 ergs per calorie.

Having thus described my invention, I desire to secure by Letters Patent of the United States the following:

1. In a mono-cable tramway passenger chair including a hanger pivotally supported for swinging movements about the substantially horizontal axis of a single cable-supported non-rotatable spindle, a chair swinging movement damper, comprising:

means for converting mechanical energy to heat; and

means connecting said first named means to said spindle and said chair, for effecting the conversion of swinging-movement-induced mechanical energy to heat.

2. The invention defined in claim 1 wherein the first named means is a double-acting shock absorber.

3. In a mono-cable tramway;

a cable supported non-rotatable axially substantially horizontal spindle carried by the cable;

a hanger journaled on said spindle for rotation about its axis;

a support arm fixed with respect to said spindle and extending laterally therefrom in a substantially horizontal plane;

means for converting mechanical energy to heat connected to said arm at a point spaced from the axis of said spindle; and

said means for converting mechanical energy to heat also being connected relative to said hanger for actuation upon occurrence of rotational movements of said hanger about said spindle axis.

4. In a mono-cable tramway passenger chair including a hanger pivotally supported for swinging movements about the substantially horizontal axis of a cable-supported non-rotatable spindle, said spindle having a diametrically disposed aperture adjacent its free end;

a chair swinging-movement damper attachment, comprising:

a collar, having diametrically disposed bores adapted to encircle said spindle with said bores aligned with said aperture;

a pin extending through and removably fixed in said bores, and adapted to extend through said aperture to fix said sleeve to said spindle;

an arm rigid with said collar and having a terminal portion spaced from the axis of said collar;

a clamp for releasably attaching to said hanger for movements therewith; and

means for converting mechanical energy to heat connected to said clamp and the terminal portion of said arm for actuation upon occurrence of relative movements between said collar and said clamp.

5. The invention defined in claim 4 wherein the last named means is a double-acting hydraulic shock absorber.

References Cited in the file of this patent

UNITED STATES PATENTS

2,152,235	Bannerman et al.	Mar. 28, 1939
2,938,472	Tiegel	May 31, 1960
3,001,610	Takagi	Sept. 26, 1961

FOREIGN PATENTS

177,103	Switzerland	Aug. 1, 1935
240,358	Germany	Nov. 3, 1911
536,655	Germany	Oct. 24, 1931