Aug. 12, 1941. W. SPIRO 2,251,963

ROLLER GUIDE FOR ELEVATOR CARS

Filed May 27, 1940

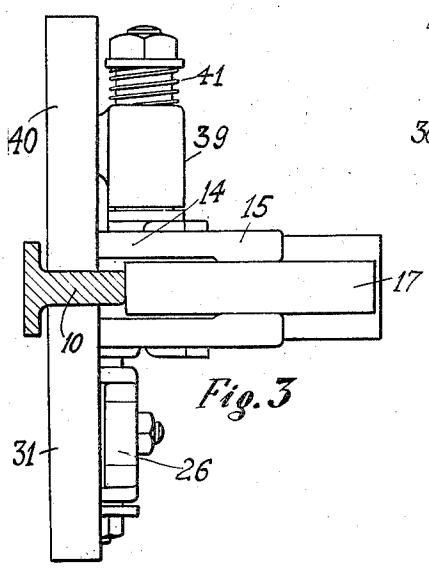


Fig. 3

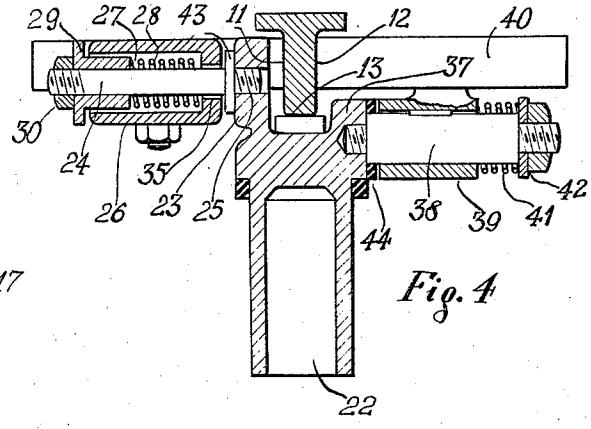


Fig. 4

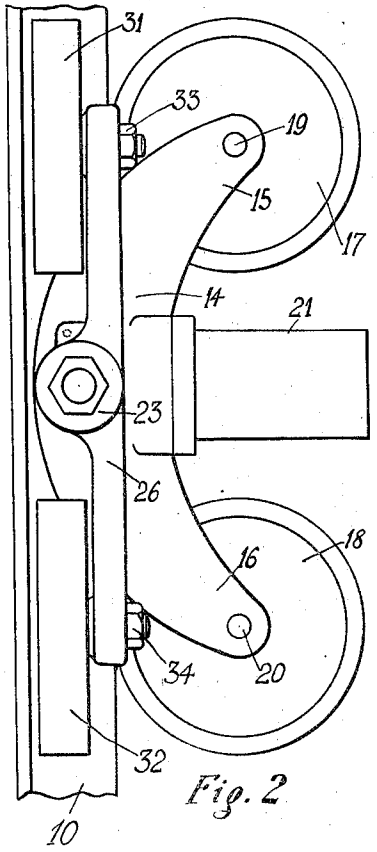


Fig. 2

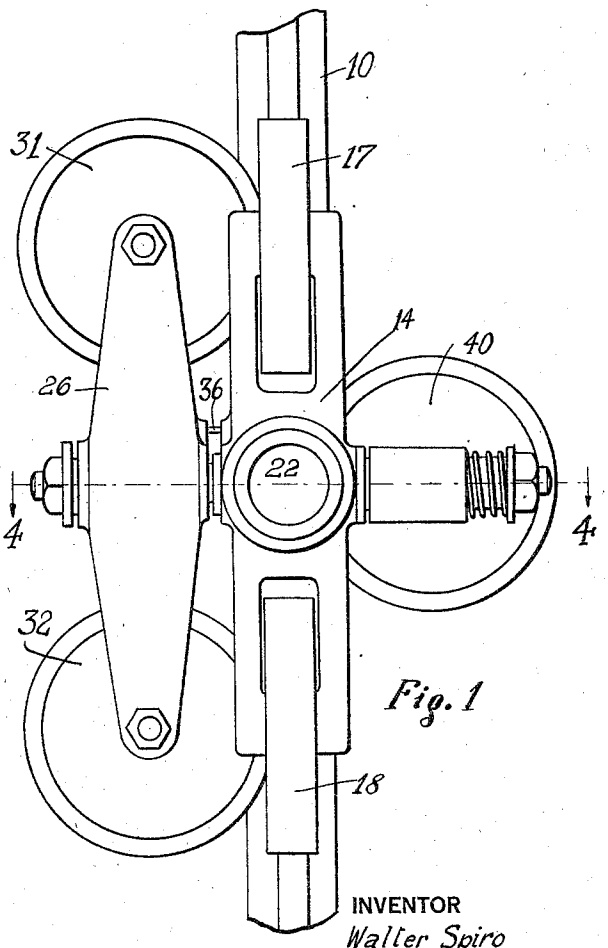


Fig. 1

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Patented Aug. 12, 1941

2,251,963

UNITED STATES PATENT OFFICE

2,251,963

ROLLER GUIDE FOR ELEVATOR CARS

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Application May 27, 1940, Serial No. 337,477

7 Claims. (Cl. 187—95)

This invention relates to elevators, and more particularly refers to improvements in rail guides of the roller type for use on elevator cars.

It is well known that with the advent of the high speed elevator the trend in elevator design has been towards the use of rail guides of the roller type, in place of the sliding shoe type which had been commonly used for a number of years in preference to the old roller guide type which it had originally supplanted.

The original roller guides had been displaced because of their tendency to permit undue vibration and play of the car. The rigid guides served their purpose well, with the assistance of frequent lubrication, until with the constantly increasing length and speed of travel they developed serious shortcomings, especially due to the virtual impossibility of maintaining a guide-rail perfectly straight and true. In order to avoid the ensuing necessity of providing in a rigid guide a certain amount of play, efforts were made towards the development of sliding guides with yielding and self-adjusting contact shoes. However, these also proved unequal to the task when the high-speed express elevator was perfected, intensifying the problems of friction, lubrication and loose fit.

Although a return to the roller type of guide was then indicated, many structures of this type which have since come into being have proved entirely inadequate to meet the normal operating requirements, in that they failed to meet the conditions created by the uneven or unbalanced loading of the elevator car, a common occurrence. This unbalanced weight causes a much greater pressure upon one side of the guide than upon the other, and this results in increased friction with corresponding increased current consumption as well as uneven and noisy operation of the elevator.

In Patent No. 2,083,502, issued June 8, 1937, to A. A. Matthews, is described a roller type of rail guide, providing automatic compensation for such bends or irregularities as may be present in the guide rail, and insuring smooth and noiseless operation through the use of rubber-tired rollers which also cooperate in the compensating function.

I have found that a device possessing advantages favorably comparing with those of the Matthews device may be constructed in a much simpler form, calculated to further reduce the friction in operation, while calling for a much lighter structure, adapted to be produced at considerably less cost.

The primary object of this invention accordingly is to provide an elevator rail guide of a novel and improved design, which is automatically adjustable to unbalanced loading of the elevator and to rails presenting bends and other irregularities, while preventing undue friction and noisy operation of the elevator.

Another object is to provide a simple type of self-compensating roller guide for use on an elevator car, particularly adapted to meet practical operating conditions such as exist in high speed elevator installations.

My invention is illustrated by way of example in the accompanying drawing, in which:

Fig. 1 is a front view in elevation of an elevator rail guide embodying my invention;

Fig. 2 is a side view in elevation thereof;

Fig. 3 is a plan view of the same; and

Fig. 4 is a horizontal section of the guide and rail through line 4—4 of Fig. 1.

Referring to said drawing, 10 designates one of the T-shaped guide rails such as are generally provided for the car in an elevator shaft. Guides, mounted at each end of the top and bottom cross members of the car sling, are arranged to cooperate with the guide rails to guide the car in its movement in the shaft. The guide rail has two side surfaces 11, 12 and an end surface 13, providing runways for the rollers forming part of the guide structure.

The guide structure comprises an elongated frame 14, formed at each end with a bifurcated, outwardly extending support 15, 16, carrying wheels or rollers 17, 18, rotatably mounted at 19, 20, respectively, said wheels or rollers being equipped with tires made of rubber or other resilient material. In operation the frame extends in front of, and parallel with the rail 10, and the wheels or rollers 17, 18, are of equal diameter, and are symmetrically mounted with respect to the center of the frame.

The outer surface of the frame, midway of its length, is provided with the usual hub portion 21, for attachment to the car in the customary manner. The hub portion may be blind bored, as shown at 22 in Fig. 4, to provide a housing for a spring (not shown), to hold the guide firmly against the guide rail.

At one side, preferably midway of its length, the frame is provided with a boss 23, to which is secured yoke shaft stud 24, outwardly extending therefrom. In the drawing the boss is shown threaded, to receive the threaded end 25 of the stud. The yoke 26 is provided with a central bore 27, through which the stud 24 ex-

tends, and a spring 28, held under tension by a bushing 29 and a lock nut 30, urges the yoke inwardly towards the rail.

At each end the yoke carries a rubber or resiliently tired wheel or roller 31, 32, rotatably mounted on studs 33, 34, respectively, said studs extending from the outer face of the yoke, at right angles thereto.

The distance between a longitudinal plane passing through the axes of shaft studs 19, 20 and a plane parallel thereto passing through the center of shaft stud 24 is such that when wheels or rollers 17, 18, are in contact with the end face 13 of the rail, wheels or rollers 31, 32, of the yoke are directly opposite one of the side faces 11 of the guide rail.

The yoke 26 should be capable of a limited rocking movement in a longitudinal plane at right angles to the side surface of the guide rail, but should preferably be restrained against rotatory movement about its shaft stud support in a plane parallel to said side surface. A simple arrangement whereby this result may be achieved is shown in Figs. 1, 2 and 4, where it is seen that the rocking movement of the yoke is made possible by making the opening 35 through the bottom of bore 27, of a diameter slightly larger than the diameter of shaft stud 24 passing therethrough, and the diameter of bushing 29 slightly smaller than the diameter of bore 27. The resulting clearances cause the yoke to be floatingly mounted upon its shaft stud, as will be understood. The rotatory movement of the yoke about its pivotal support may be prevented in any suitable manner, for instance, by providing the inner face of the yoke with a pin 36, projecting within a slightly larger opening (not shown) provided in the side of the frame directly opposite thereto.

At the opposite side, frame 14 is provided with another central boss 37, to which is secured outwardly extending stud 38. On said stud is slidably mounted a sleeve 39, carrying a rubber or resiliently tired wheel or roller 40, located substantially on the same plane as wheels or rollers 17, 18, said wheel or roller 40 being urged against the other side surface 12 of the guide rail by a spring 41, maintained under tension by a washer and check nut assembly 42.

A washer 43, made of rubber or similar material, is interposed between the yoke 14 and boss 23, and another similar washer 44 is interposed between sleeve 39 and boss 37. These rubber washers provide a cushioning action for the yoke and sleeve, thereby insuring quiet operation, and eventually also serve to compensate the wear of the rubber tread on wheels 17, 18 and 40.

The construction described thus provides a three-point rolling contact for the guide, which is possessed of a great amount of flexibility in action, inasmuch as the resilient mounting of both the yoke and sleeve make it possible for all the rolling elements to instantly adjust themselves to such bends, misalignments and inequalities as may occur at certain points in the guide rail.

The treads with which the wheels or rollers are equipped, being to a certain extent compressed when forced against the running surfaces of the guide rail by the action of springs 28, 41, as well as by the spring housed within hub 21, also serve to provide a certain amount of resilient action, insuring continuity of contact between said wheels and said rail even when some particularly sharp irregularity occurs in the guide rail. In addition, the rubber treads insure noiseless operation of the elevator car throughout its entire run. The term "rubber" used in this description and in the claims, is meant to include other materials having mechanical properties comparable to those of rubber.

It is to be understood that in order to decrease friction and improve smoothness of operation, at the same time decreasing current consumption, all rollers are preferably made to rotate on ball or roller bearings packed with grease, sealed against loss, so that the rollers will run for long periods of time without the necessity of periodic oiling.

The constructional details of my invention may vary from those shown without departing from the inventive idea. The drawing should, therefore, be understood as being intended for illustrative purposes only and not in a limiting sense.

I, accordingly, reserve the right to carry my invention into practice in all those ways and manners which may enter, fairly, into the scope of the appended claims.

I claim:

1. In an elevator guide for use in connection with a guide rail having an end riding surface and two side riding surfaces the combination, with a frame, of two longitudinally spaced rubber tired rollers mounted on said frame, adapted to ride along one of said two side riding surfaces, another rubber tired roller mounted on said frame at a point intermediate said two rollers, adapted to ride along the other side riding surface of said rail, and a rubber tired roller mounted at each end of said frame, adapted to ride along the end riding surface.

2. In an elevator guide for use in connection with a guide rail having an end riding surface and two side riding surfaces the combination, with a frame, of two longitudinally spaced rollers mounted on said frame, adapted to ride along one of said side riding surfaces, another roller mounted on said frame at a point intermediate said two rollers, adapted to ride along the other side riding surface of said rail, resilient means urging said longitudinally spaced rollers against said first mentioned side riding surface, and additional resilient means, urging said other roller against the other side riding surface.

3. In an elevator guide for use in connection with a guide rail having an end riding surface and two side riding surfaces the combination, with a frame, of two longitudinally spaced rollers mounted on said frame, adapted to ride along one of said side riding surfaces, another roller mounted on said frame at a point intermediate said two rollers, adapted to ride along the other side riding surface of said rail, resilient means urging said rollers against their respective riding surfaces, and a roller mounted at each end of said frame, adapted to ride along the end riding surface.

4. In an elevator guide for use in connection with a guide rail having an end riding surface and two side riding surfaces the combination, with a frame, of a yoke oscillatable in a plane substantially parallel to said end riding surface, mounted at one side of said frame, a rubber tired roller at each end of said yoke adapted to ride along one of said side riding surfaces, and a rubber tired roller mounted on said frame at a point intermediate said two rollers, adapted to ride along the other side riding surface of said rail.

5. In an elevator guide for use in connection with a guide rail having an end riding surface

and two side riding surfaces the combination, with a frame, of a yoke oscillatable in a plane substantially parallel to said end riding surface, mounted at one side of said frame, a rubber tired roller at each end of said yoke adapted to ride along one of said side riding surfaces, a rubber tired roller mounted on said frame at a point intermediate said two rollers, adapted to ride along the other side riding surface of said rail, and a rubber tired roller mounted at each end of said frame, adapted to ride along the end riding surface.

6. In an elevator guide for use in connection with a guide rail having an end riding surface and two side riding sufaces the combination, with a frame, of a yoke oscillatable in a plane substantially parallel to said end riding surface, mounted at one side of said frame, a roller at each end of said yoke adapted to ride along one of said side riding surfaces, resilient means urging said yoke and rollers against said side surface, a roller carried by the other side of said frame at a point intermediate said two rollers, adapted to ride along the other side riding surface of said rail, and resilient means urging said roller against said second mentioned side riding surface.

7. In an elevator guide for use in connection with a guide rail having an end riding surface and two side riding surfaces the combination, with a frame, of a yoke oscillatable in a plane substantially parallel to said end riding surface, mounted at one side of said frame, a roller at each end of said yoke adapted to ride along one of said side riding surfaces, resilient means urging said yoke and rollers against said side surface, a roller carried by the other side of said frame at a point intermediate said two rollers, adapted to ride along the other side riding surface of said rail, resilient means urging said roller against said second mentioned side riding surface, and a roller mounted at each end of said frame, adapted to ride along the end riding surface.

WALTER SPIRO.