

June 30, 1970

R. E. MEYER

3,517,774

TOWER ELEVATOR

Filed Jan. 17, 1968

3 Sheets-Sheet 1

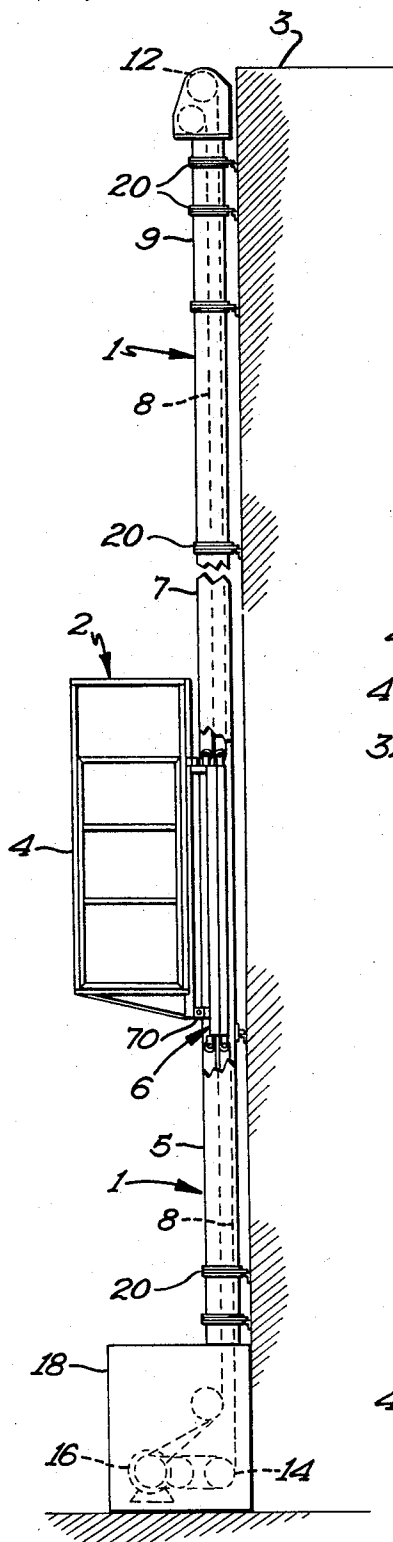


FIG 1

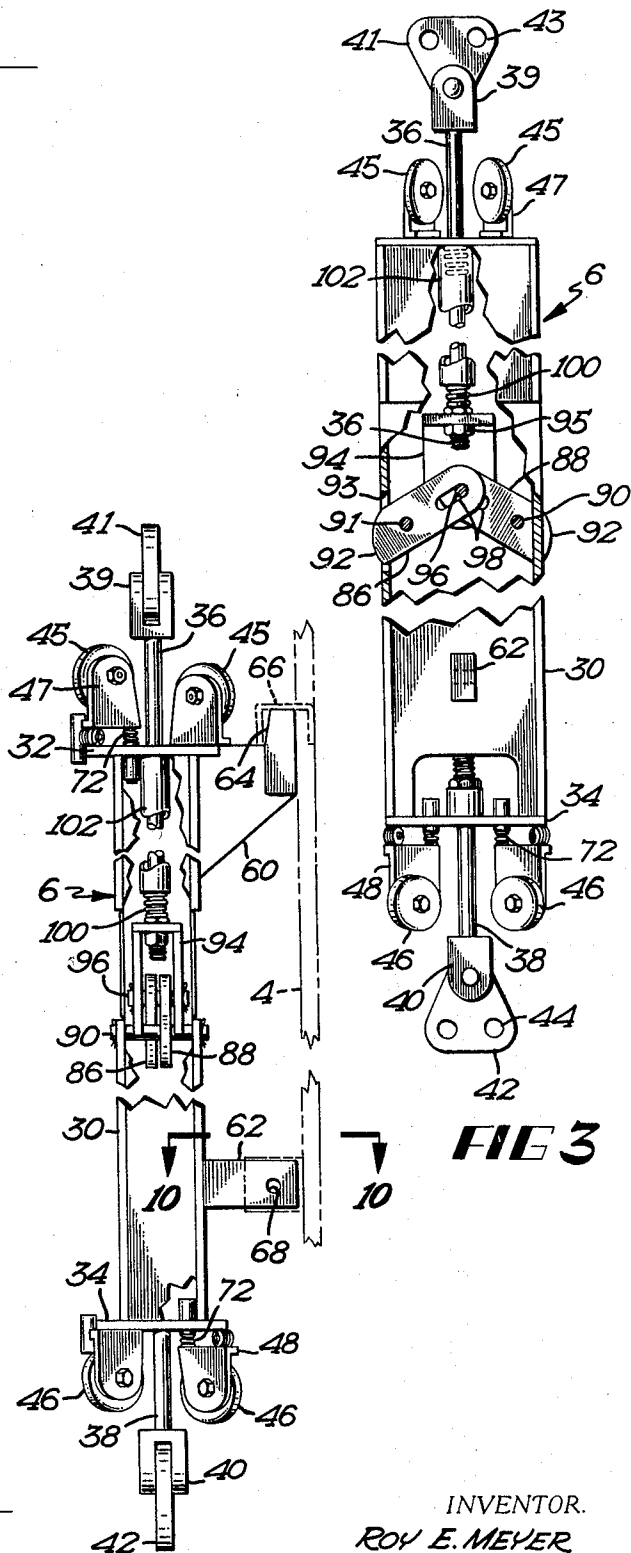


FIG 2

FIG 3

INVENTOR.  
ROY E. MEYER

BY  
*Williamson, Palmatier  
& Bains*  
ATTORNEYS

June 30, 1970

R. E. MEYER  
TOWER ELEVATOR

3,517,774

Filed Jan. 17, 1968

3 Sheets-Sheet 2

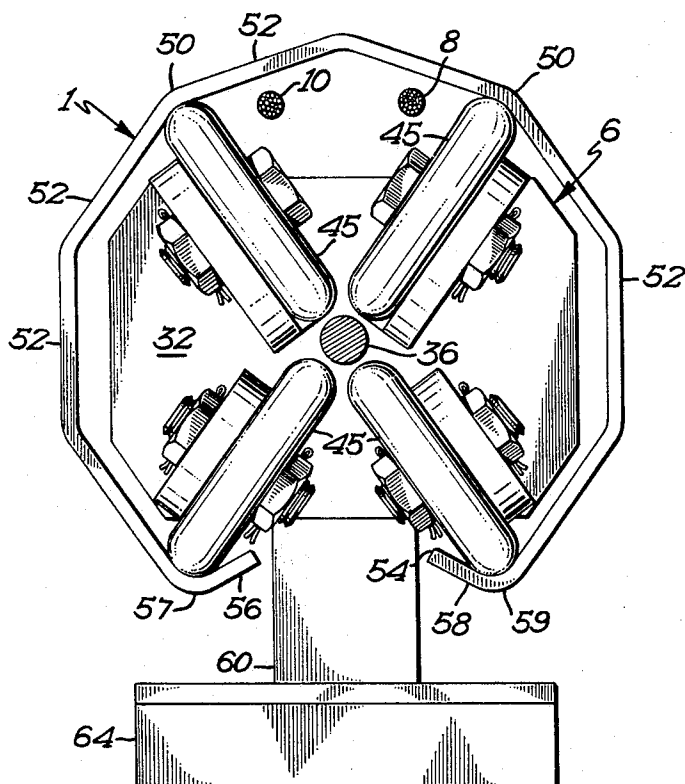


FIG 4

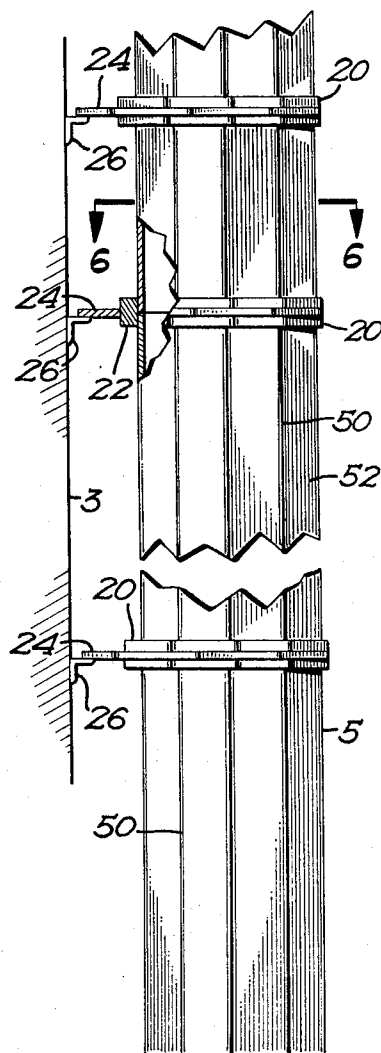


FIG 5

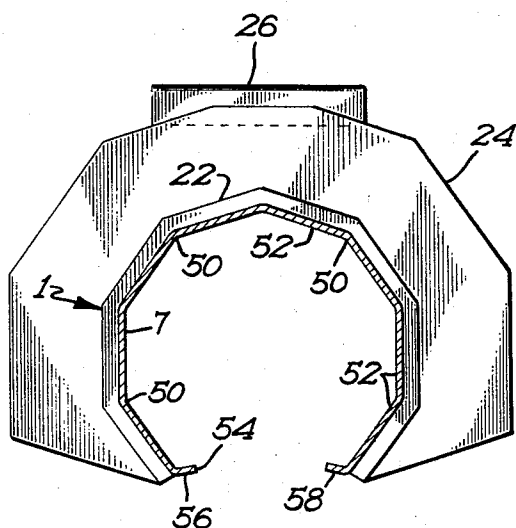


FIG 6

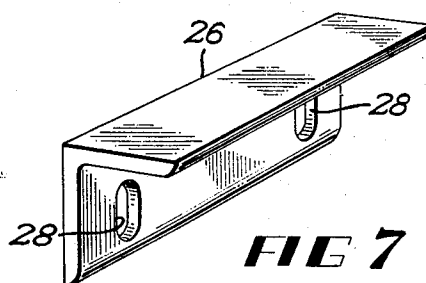


FIG 7

INVENTOR.  
ROY E. MEYER  
BY  
*Williamson, Palmatier  
& Bains* ATTORNEYS

June 30, 1970

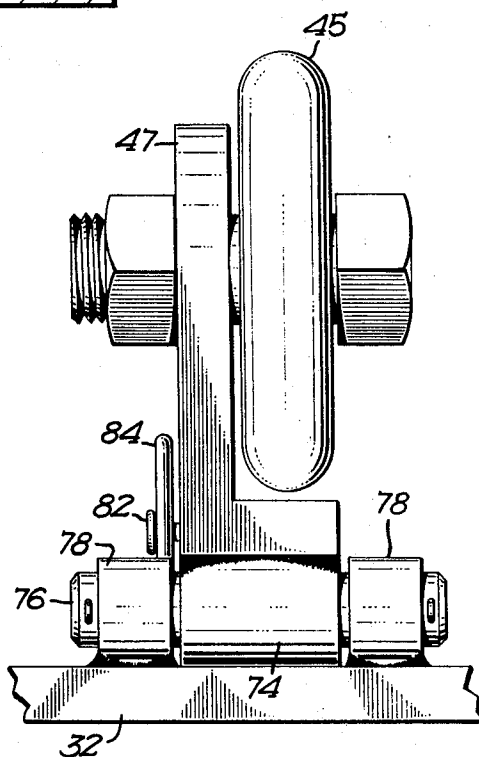
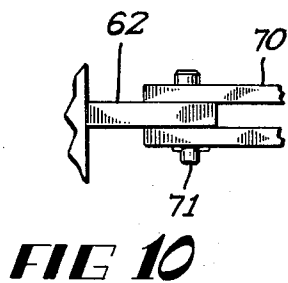
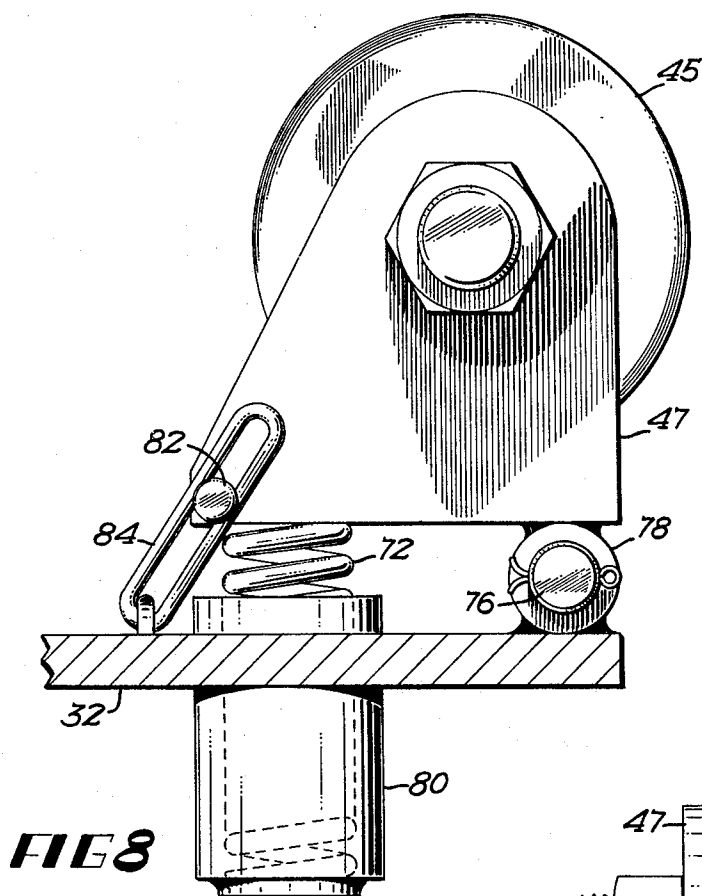
R. E. MEYER

3,517,774

TOWER ELEVATOR

Filed Jan. 17, 1968

3 Sheets-Sheet 3



INVENTOR.  
ROY E. MEYER

BY  
*Williamson, Palmatier  
& Bains* ATTORNEYS

1

3,517,774

## TOWER ELEVATOR

Roy E. Meyer, 1124 Oak St., Red Wing, Minn. 55066

Filed Jan. 17, 1968, Ser. No. 698,548

Int. Cl. B66b 7/04

U.S. Cl. 187—6

4 Claims

### ABSTRACT OF THE DISCLOSURE

Hoist apparatus comprising a tubular track affixed to a vertical wall and made up of a plurality of reinforced, polygonal-shaped sections, the side walls of the tubular track intersecting in vertical corners within which the wheels of a carriage permanently installed inside of the track are rotatably supported. An elevator car is removably attached to the carriage through a slot extending the length of the tubular track, and a safety, brake mechanism is mounted on the carriage. The brake mechanism includes spring-loaded brake shoes which are urged outwardly into frictional engagement with the inside walls of the tubular track in response to the severing of the lift cable for the carriage. The carriage wheels are rotatably supported on pivotal brackets and are biased outwardly against the inside of the tubular track by shock absorbing springs.

### SUMMARY OF THE INVENTION

There are in use today a variety of types of elevator structures designed to be attached to a tower or to the wall of a building for the purpose of carrying out construction, repair or service operations. I have designed an improved elevator assembly which is particularly characterized by its rigidity and structural strength, as well as by its safety of operation and its ability to firmly support the carriage of the elevator car against wobbling movement as it moves up and down the tower track.

As a primary structural feature of my improved elevator apparatus, I utilize a polygonal-shaped tubular track, the vertical corners formed between intersecting side walls of the track advantageously serving to guide and support the wheels of a carriage movably mounted within the track. An elevator car is removably attached to the carriage by means of bracket arms extending outwardly through an elongated slot running longitudinally of one side wall of the track.

An especially significant feature of my invention resides in the utilization of a brake mechanism which is mounted on the permanently-installed carriage, and which incorporates brake shoes which are movable into frictional engagement with the tubular track by an actuating spring which is normally held in a non-braking position by the tension of the lift cable attached to the elevator carriage.

As a further beneficial aspect of my invention, the carriage wheels are pivotally mounted on brackets and are urged into engagement with the track by shock absorbing springs.

These and other objects and advantages of my invention will become readily apparent as the following description is read in conjunction with the accompanying drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side, elevation view showing the hoist apparatus mounted against a vertical wall;

FIG. 2 is a side, elevation view of the carriage for the elevator car;

FIG. 3 is a front, elevation view of the car carriage;

FIG. 4 is a top, plan view of the carriage and track assembly;

2

FIG. 5 is a side, elevation view showing the tubular track in its upright, installed position;

FIG. 6 is a horizontal, section view of the track taken along lines 6—6 of FIG. 5;

FIG. 7 is a perspective view of one of the track mounting brackets;

FIG. 8 is a side, elevation view of the mounting assembly for one of the carriage wheels;

FIG. 9 is a front, elevation view of the wheel assembly of FIG. 8; and

FIG. 10 is a horizontal, section view taken along lines 10—10 of FIG. 2, and showing the connection between the lower end of the elevator car and the movable carriage.

With reference to FIG. 1 of the drawings, the elevator assembly of this invention is comprised of an elongated, tubular track 1 on which an elevator car assembly 2 is movably mounted. Elevator car assembly 2 is comprised of a passenger or equipment-carrying car 4 and a carriage 6 which is permanently mounted within tubular track 1, car 4 being removably attached to carriage 6 in a manner explained below. Carriage 6 is movably supported within track 1 by means of cables 8 and 10, only one of which is shown in FIG. 1. These cables form a closed loop around pulleys 12 and 14 at the top and bottom of track 1, and are secured at their free ends to the top and bottom ends of carriage 6. Power is supplied to the lower pulley assembly 14 by a reversible motor 16 housed within a removable power unit 18. Track 1 is shown secured to a vertical wall 3 which may be an upright portion of a building, tower or industrial chimney. Although the elevator tower of this invention has been particularly designed with a view towards servicing industrial chimneys which may be as high as 600 feet, the hoist apparatus would be equally useful for construction or repair operations on a building or for fire fighting purposes.

As is shown in FIGS. 1, 5, and 6, track 1 is comprised of a plurality of sections 5, 7 and 9 of polygonal cross section. Although three sections are shown, any number of sections could obviously be employed depending upon the height of the tower or building to which the hoist apparatus is to be attached. The individual track sections are provided with reinforcing collar assemblies 20 at spaced points along their lengths in order to rigidify the track assembly and to support tubular track 1 against the outward forces generated by carriage 6 as it moves up and down within track 1. Each collar assembly 20 is comprised of an inner collar 22 which conforms to the polygonal shape of track 1, and an outer reinforcing ring 24. A mounting bracket 26 is secured to each of the reinforcing rings 24 and is provided with vertically extending slots 28 through which fasteners may be attached to wall 3. Slots 28 accommodate a degree of vertical expansion and contraction of the track 1. Bottom and mid-track sections 5 and 7 each have a collar assembly 20 attached to their upper ends, as by welding, with the upper ends of these track sections terminating substantially at the middle of inner collar 22 in the manner indicated in FIG. 5. Collars 22 slidably receive the next higher track section, and thereby serve as coupling members. As is indicated in FIG. 1, a plurality of reinforcing collar assemblies 20 are mounted on each of the separate track sections 5, 7, and 9 at spaced points along their lengths between the coupling joints between sections, and attached to wall 3, in order to provide proper support and strength for the entire track assembly.

Referring now to FIGS. 1 through 4, carriage 6 is comprised of a vertically extending outer shell 30 to which top and bottom walls 32 and 34 are secured. Cable attachment rods 36 and 38 project vertically from top and

3

bottom walls 32 and 34, and are provided with bifurcated end portions 39 and 40 to which cable attachment fittings 41 and 42 are secured. The upper and lower ends of parallel cables 8 and 10 are attached to fittings 41 and 42 respectively through apertures 43 and 44 therein. Cable drive motor 16 may be reversibly operated from elevator car 4 so as to move the car assembly 2 up and down on track 1 by a control cable or by a remote control radio. Four wheels 45 are mounted on carriage top wall 32 by brackets 47, and a similar set of wheels 46 is suspended from carriage bottom wall 44 by brackets 48. Each of the wheels 45 and 46 rotatably engages track 1 along one of the vertical corners 50 formed between the intersecting side walls 52 of polygonal-shaped track 1 in the manner indicated in FIG. 4. Vertically extending corners 50 serve to guide wheels 45 and 46, and the diametrically opposed disposition of each set of wheels 45 and 46, as shown in FIG. 4, supports carriage 6 against vertical, wobbling movement.

Each of the track sections 5, 7 and 9 are provided with a vertically extending, longitudinal slot 54, and these slots are aligned when the several track sections are coupled together, thereby providing a continuous slot which runs lengthwise of tubular track 1. Referring again to FIG. 4, the marginal edges of slot 54 are formed by inwardly turned, oppositely directed flanges 56 and 58 formed in each of the track sections. Flanges 54 and 56 cooperate with the adjacent side wall sections 52 of track 1 to form vertically extending breaks or corners 57 and 59 which supportably engage and guide two upper wheels 45 and two of the lower wheels 46. Oppositely directed flanges 54 and 56 bear against wheels 45 and 46 and restrain carriage 6 against lateral movement in either a clockwise or counter-clockwise direction.

As is best shown in FIGS. 2 and 4, carriage 6 is provided with projecting bracket arms 60 and 62 which extend outwardly through slot 54 and removably support elevator car 4. Upper bracket arm 60 includes horizontally extending, upright flange 64 which supportably engages complementary channel member 66 of car 4, as shown in phantom lines in FIG. 2. Lower bracket arm 62 is apertured at 68, and is removably connected to bifurcated connector arm 70 of car 4 by pin 71 in the manner shown in FIG. 10. Car 4 may thus be very easily moved from carriage 6 and used on a multiplicity of tower installations incorporating a permanent track and carriage assembly identical to track 1 and carriage 6.

In order to insure the proper rolling contact of wheels 45 and 46 with the inside walls of track 1, two of the upper wheels 45, and two, diagonally opposed lower wheels 46 are pivotally mounted and biased by springs 72 into frictional engagement with the inside of tubular track 1, as shown in FIGS. 2 and 3. The spring-biased wheel mounting arrangements are best shown in FIGS. 8 and 9 which depict the mounting assembly for one of the upper, pivotal wheels 45. The two pivotal upper brackets 47 are provided with integral collars 74 which pivot about pins 76 supported in sleeves 78 secured to top carriage wall 32. Springs 72 mounted within guide cylinders 80 bear against the inner end of brackets 47, thereby urging attached wheels 45 outwardly into engagement with the inner surface of tubular track 1. Brackets 47 are further supported by guide pins 82 which slide back and forth within slotted members 84. Springs 72 also serve to absorb the shock forces generated when wheels 45 and 46 pass over uneven portions of track 1, thus causing brackets 47 to pivot inwardly and downwardly against springs 72.

For the purpose of insuring the safety of passengers riding in elevator car 4, I have provided a unique brake mechanism designed to prevent the fall of car 4 in the event that lift cables 8 and 10 should break. With reference to FIGS. 2 and 3, the brake mechanism is mounted entirely on carriage 6, and includes as the braking means a pair of brake shoes 86 and 88. Brake shoes 86 and 88

4

are pivotally mounted on pins 90 and 91, and include an outer braking surface 92 which is contoured so as to cam against the inner surface of track 1 when shoes 86 and 88 are pivoted downwardly. Brake shoes 86 and 88 are supported and actuated by movable, bifurcated bracket 94 which carries a pin 96 at its lower end extending through slots 98 in brake shoes 86 and 88. Upper, cable attachment rod 36 is slidably mounted through top wall 32 of carriage 6 and is secured at its lower end to bracket 94 by lock nut 95. Spring 100 embraces rod 36 between top wall 32 and the top of bracket 94, and is enclosed within guide sleeve 102. Spring 100 is compressed, and the downward force which it normally tends to exert on movable bracket 94 is countered by the tension force of cables 8 and 10 acting through connecting rod 36. If cables 8 and 10 should break for any reason, spring 100 would then act to force bracket 94 downwardly, thereby pivoting brake shoes 86 and 88 in a downward direction and urging cammed braking surfaces 92 outwardly through apertures 93 in carriage shell 30 into frictional contact with the inner wall of tubular track 1. Those skilled in the art will readily appreciate that the basic concept of utilizing spring-biased brake shoes responsive to the severing of the hoist lift cable could be applied equally well to an elevator or hoist structure having the car assembly movably mounted on the outside rather than on the inside of the track.

The permanent mounting of the brake mechanism, as well as the carriage and cable assembly, within tubular track 1 not only protects these elements from the corrosive and wearing effects of wind and weather, but also improves the overall appearance of the elevator structure since the only elements visible are the car 4 and track 1. Also, the mounting of the brake mechanism on permanently installed carriage 6 rather than on removable car 4 greatly simplifies the removal and multiple application of car 4.

It is to be noted that the particular embodiments of my invention which I have shown and described are illustrative only. I contemplate that those skilled in the art will be able to make modifications in the form, details and arrangement of the various parts without departing from the spirit and scope of my invention as defined in the following claims.

I claim:

1. Hoist apparatus comprising:

an elongated tubular track adapted to be secured to a vertically extending wall member, said track being of polygonal cross section and having a plurality of side walls intersecting in vertically extending corners;

an elongated carriage movably disposed within said tubular track, said carriage having a plurality of wheels rotatably supported on horizontal axes, each of said wheels engaging said track within one of said vertically extending corners;

an elevator car attached to said carriage;

cable means connected to said carriage and extending over pulley assemblies located adjacent the top and bottom of said track for raising and lowering said carriage and elevator car;

a single, mounting bracket supporting each of said carriage wheels for rotation about a horizontal axis, a plurality of said mounting brackets being pivotally supported at their outer ends adjacent the inside surface of said tubular track;

spring means bearing against the inner ends of said plurality of mounting brackets tending to pivot said brackets outwardly, whereby a plurality of said wheels are urged outwardly into frictional engagement with said vertically extending corners; and

a slotted guide member for each of said pivotal brackets within which a slide member on each of said brackets is slidably and retainably received, whereby said pivotal brackets are held in the desired vertical plane

5

and said wheels mounted thereon are prevented from wobbling.

2. Hoist apparatus as defined in claim 1, wherein:

said tubular track has an elongated slot extending along the portion thereof facing away from said wall member, and wherein;

said elevator car is removably attached to said carriage by separate, generally horizontally extending bracket members secured to the top and bottom ends of said carriage and extending outwardly through said elongated slot, said top bracket member including an upwardly projecting member over which a complementary channel member on the upper end of said elevator car is removably mounted, and said bottom bracket being adapted to receive a fastener for connecting it to a support member on the lower end of said elevator car.

3. Hoist apparatus comprising:

an elongated tubular track adapted to be secured to a vertically extending wall member, said track being of polygonal cross section and having a plurality of side walls intersecting in vertically extending corners; an elongated carriage movably disposed within said tubular track, said carriage having a plurality of wheels rotatably supported on horizontal axes, each of said wheels engaging said track within one of said vertically extending corners;

an elevator car attached to said carriage;

cable means connected to said carriage and extending over pulley assemblies located adjacent the top and bottom of said track for raising and lowering said carriage and elevator car;

said tubular track has a slot extending longitudinally thereof;

said elevator car is removably mounted on said carriage by bracket means extending outwardly through said slot, and wherein;

the marginal edges of said slot are defined by inwardly turned flanges facing towards each other and cooperating with the next adjacent side walls of said track to form vertically extending corners, each of which supportably engages one of said wheels, thereby restraining said carriage against lateral wobbling movement.

4. Hoist apparatus comprising:

an elongated, tubular track of polygonal cross section having bracket members secured thereto for attaching said track to a wall in a vertical position, said track being comprised of separate sections, each of

6

which has a longitudinally extending slot therein, said slots being in vertical alignment so as to form a continuous opening extending lengthwise of said track;

a carriage positioned within said tubular track for longitudinal movement therein;

mounting means for an elevator car attached to said carriage and extending outwardly through said continuous opening said mounting means comprising first and second, generally horizontally extending bracket members secured to the top and bottom ends of said carriage and extending outwardly through said continuous opening, said first top bracket member including an upwardly projecting member over which a complementary connecting member on the upper end of said elevator car is removably mounted, and said second, bottom bracket member being adapted to receive a fastener for connecting it to a support member on the lower end of said elevator car;

coupling means connecting adjacent ones of said track sections together;

reinforcing collar assemblies embracing said separate track sections at spaced points along their lengths between said coupling means, and wherein:

said coupling means and said reinforcing collar assemblies each comprise an inner collar and an outer reinforcing ring extending around said collar, said ring and said collar terminating adjacent the opposed longitudinal edges of said continuous opening, and said bracket members being secured to said outer reinforcing rings.

References Cited

UNITED STATES PATENTS

|           |        |         |        |
|-----------|--------|---------|--------|
| 1,714,297 | 5/1929 | Crispen | 187—95 |
| 2,122,908 | 7/1938 | Collins | 187—6  |
| 3,136,385 | 6/1964 | Eitel   | 182—2  |

FOREIGN PATENTS

|           |        |         |
|-----------|--------|---------|
| 1,238,140 | 6/1960 | France. |
| 1,265,029 | 5/1961 | France. |
| 163,244   | 5/1958 | Sweden. |

45 HARVEY C. HORNSBY, Primary Examiner

U.S. Cl. X.R.

187—27, 87, 95