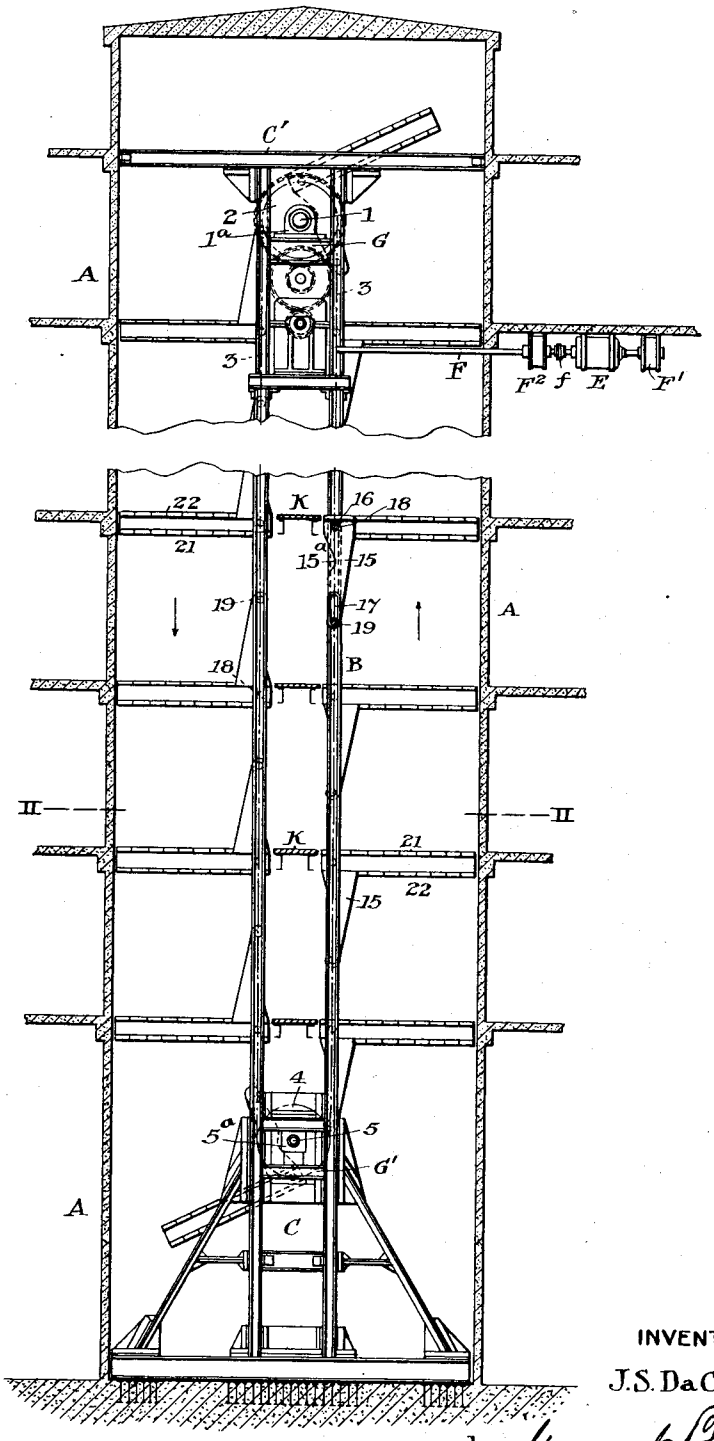
Nov. 18, 1930. J. S. DA COSTA 1,781,806

ELEVATOR MECHANISM

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Fig.1.



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Nov. 18, 1930. J. S. DA COSTA 1,781,806

ELEVATOR MECHANISM

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Fig. 2.

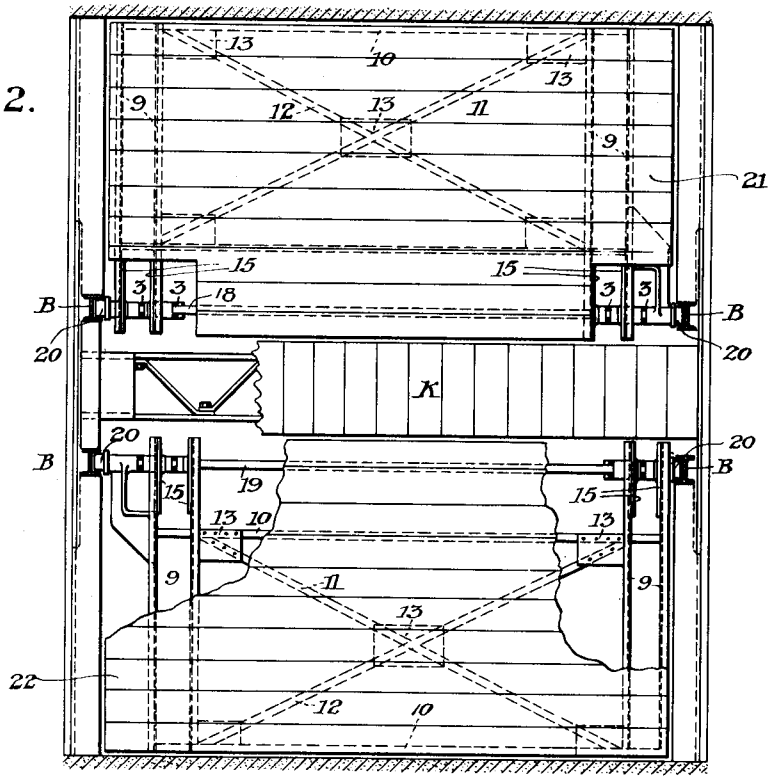
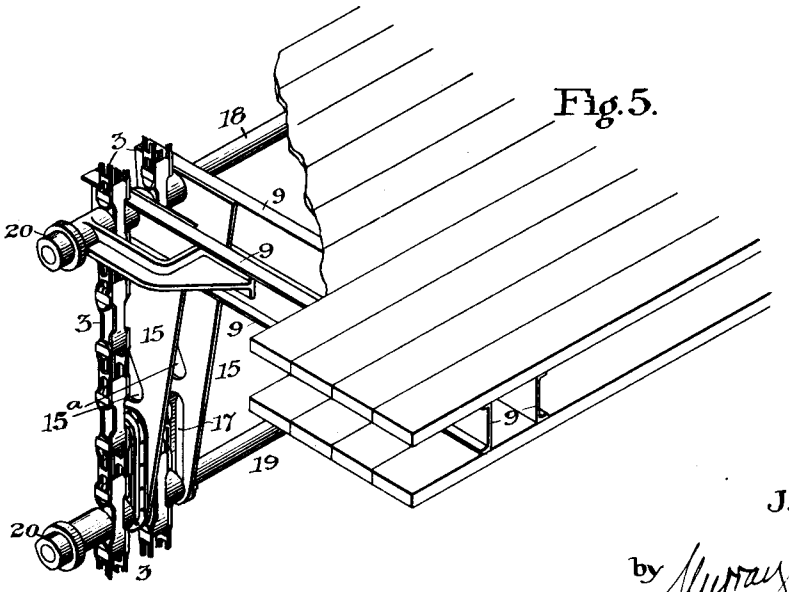


Fig. 5.



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ELEVATOR MECHANISM

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Fig. 3.

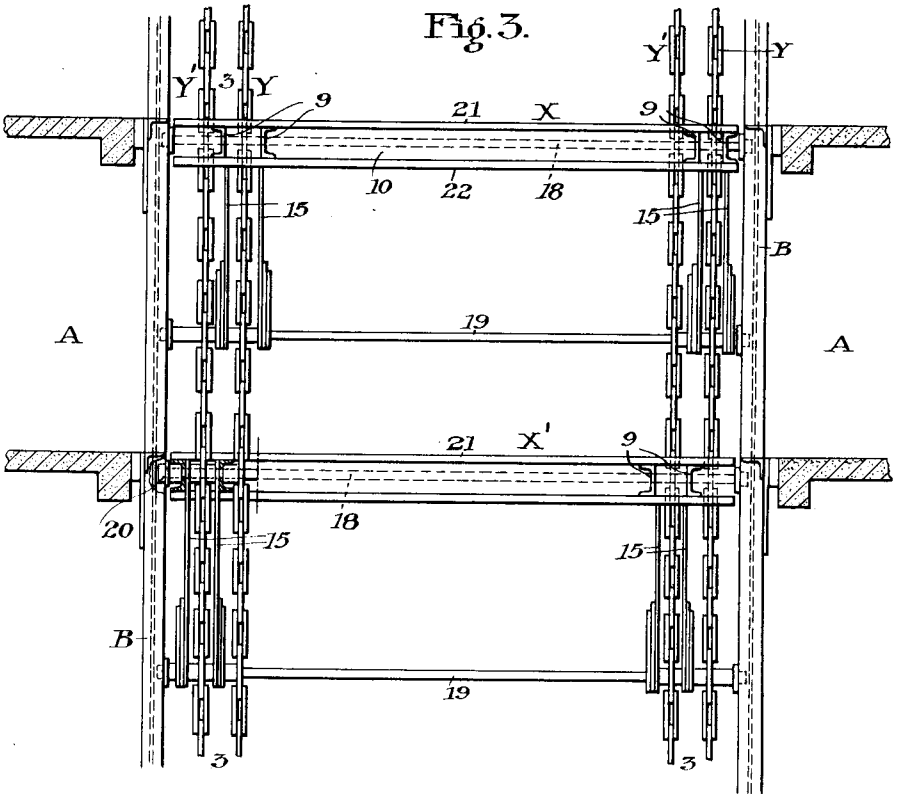


Fig. 6.

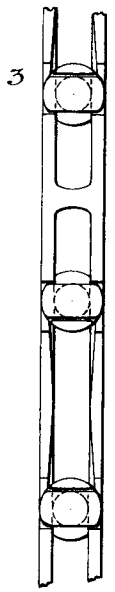


Fig. 8.

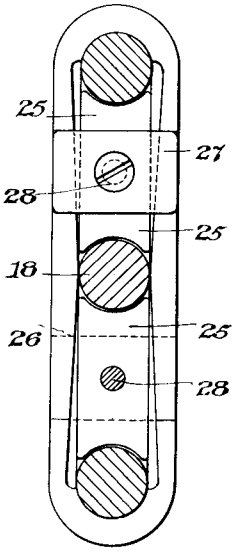
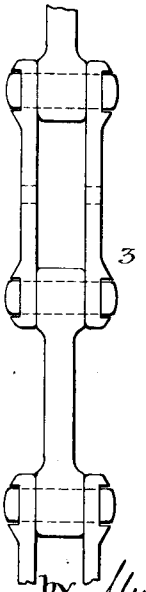


Fig. 7.



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ELEVATOR MECHANISM

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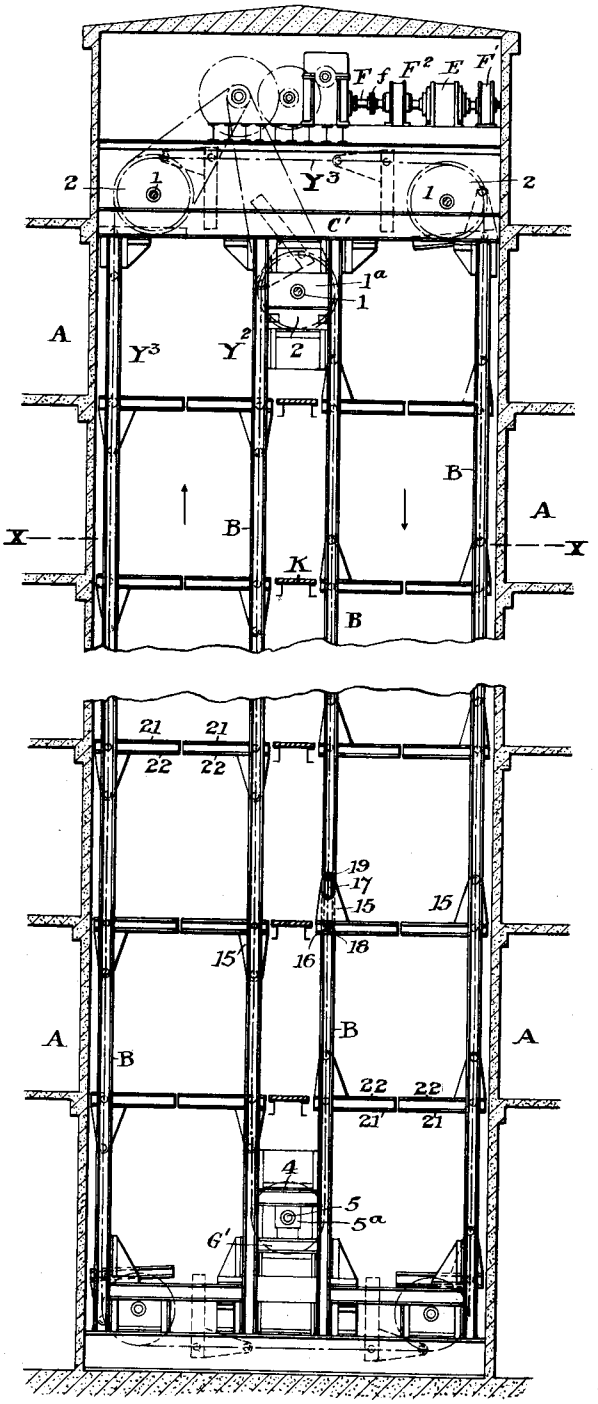


Fig. 9.

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ELEVATOR MECHANISM

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Fig.10.

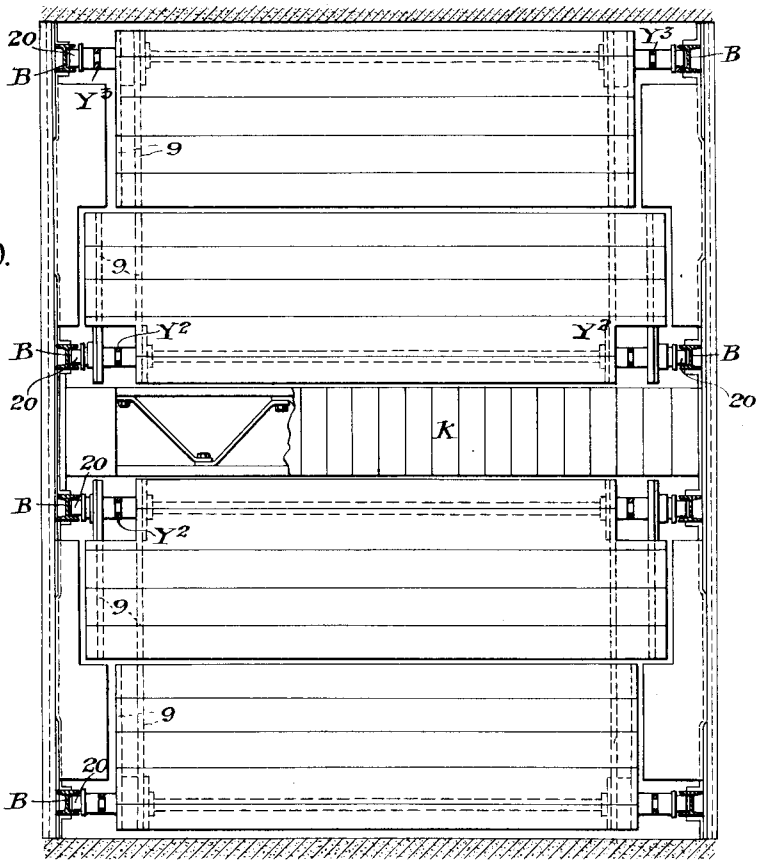


Fig.4

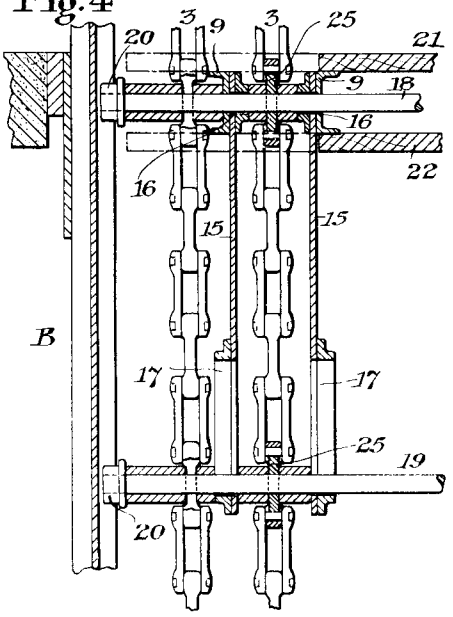
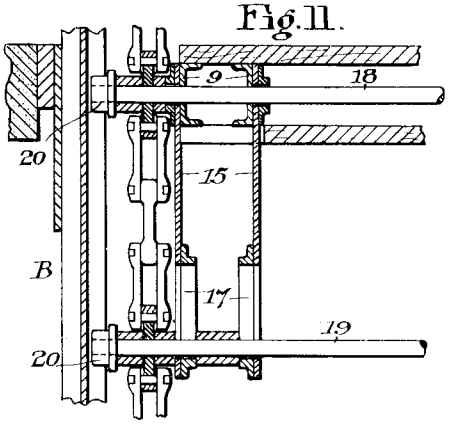


Fig.11.



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UNITED STATES PATENT OFFICE

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ELEVATOR MECHANISM

Application filed November 24, 1928. Serial No. 321,687.

My invention relates to elevator structures, and, while not limited for such use, it has been designed more particularly for the purpose of quickly elevating and/or lowering automobiles from the several floors of a garage.

The main object of my invention is to provide compact elevating and lowering mechanism involving the use of a minimum amount of machinery and space.

A further object of my invention is to provide an elevator structure comprising two sets of continuous chains, preferably arranged in pairs; said chains being arranged to move continuously in parallel relation and having cooperative elements adapted for engagement with vertical channel guides. Each set of said chains is operatively connected to platforms which are horizontally disposed during the vertical movements of the chains and are arranged to follow the chains in their movement over chain wheels or sheaves arranged at the top and bottom of a shaft or other space in which such elevating and lowering mechanism is located.

A further object of my invention is to provide the platforms with bracket members which, with said platforms, receive cross rods whose opposite ends are adapted to vertical guides arranged in the elevator shaft: said rods being arranged in pairs and operatively connected to the chains. All of the rods pass through links of the several chains; alternate platforms being connected to rods supported by one set of chains while the rods of the other platforms are supported by the other set of chains. In order that such platforms may be maintained in horizontal position, these rods pass through the top and bottom portions of said bracket members and provide proper connection with the chains; the bottom portions of said members being slotted in order that the platforms may readily pass over the chain wheels or sheaves with the chains, since the relation of the rod connections with the platform brackets will be shortened during this part of the movement of the chains.

A further object of my invention is to provide elevating and lowering mechanism with two sets of chains which may be arranged in pairs, and wherein one set of chains is shorter and is arranged for cooperative movement within the other set; both sets of chains moving in perfect synchronism with each other and each set of chains carrying portions of platforms which are brought into horizontal registering position during the vertical movements of the respective sets of chains.

These and other features of my invention are more fully described hereinafter; reference being had to the accompanying drawings, in which:

Figure 1 is a general view in elevation, partly broken away and partly in section, of one form of elevator structure within the scope of my invention.

Fig. 2 is a sectional plan view taken on the line II—II, Fig. 1, on a slightly larger scale.

Fig. 3 is an elevation of a portion of the structure illustrated in Fig. 1, partly in section, looking in the direction of the arrow *a*.

Fig. 4 is an enlarged sectional view of a portion of the structure shown in Fig. 3.

Fig. 5 is a perspective view, partly in section, illustrating a detail of my invention.

Figs. 6, 7 and 8 are views of one form of chain which may be employed with my improved elevator structure.

Fig. 9 is a view in elevation, similar to Fig. 1, illustrating another form of elevator structure within the scope of my invention.

Fig. 10 is a sectional plan view on a slightly larger scale, taken on the line X—X, Fig. 9, and

Fig. 11 is an enlarged sectional view of a portion of the structure shown in Figs. 9 and 10.

Referring to the drawings A, A represent the walls of a space in which my improved elevating and lowering mechanism may be located. The supporting structure for the elevator mechanism may comprise metal columns B, preferably H-shape in cross section, which may be supported by a suitably braced frame C surmounting the usual footing, and connected to cross beams C′ at the top of the

shaft or space in which the elevator mechanism is located. The columns B are preferably tied together throughout their length by cross braces to maintain their desired rigidity and parallelism and they carry, near their upper portion, the driving means for the elevator mechanism. Any means of supporting, staying or positioning the columns B in proper vertical alignment may be employed.

The driving mechanism may comprise a motor E suspended from one of the floors of the building in which the elevating mechanism is located, whereby a shaft F may be driven; the latter transmitting movement through a suitable gear train to a shaft or axle 1, carrying chain wheels or sheaves 2, over which chains 3 pass. The shaft or axle 1 may be mounted in bearings 1^a suitably supported in proper relative position upon a platform G carried by and disposed between the columns B adjacent the upper ends of the latter. The shaft F is provided with a solenoid switch F′ and a non-reversing brake F^2; a coupling *f* being interposed between the motor and the non-reversing brake.

At the lower end of the shaft or space receiving the elevator mechanism, the several chains pass around chain wheels or sheaves 4, mounted upon a shaft or axle 5, journaled in suitable bearings 5^a, supported by a suitable platform G′ which may be carried by the lower ends of the columns B or by the frame C. Each shaft carries a chain wheel or sheave for the respective chains; said chain wheels having their teeth disposed in alignment in planes parallel with said shafts 1 and 5, in order that the chains may be moved in unison; the links of each chain of each set, whether said sets consist of two or more chains, being disposed opposite each other throughout their entire length.

Connected at regular intervals to the respective sets of chains are a series of platforms made up of structural frames which may include members 9 and 10 arranged at an angle to each other and connected by diagonal bracing members 11 and 12, which may be provided with suitable gusset plates 13; all of the parts of such structure being secured together by rivets or other means common to the fabrication of structural metal elements. These frames are provided with floors on their upper and lower surfaces.

Depending from opposite ends of the frames made up of the members 9 and 10 and disposed at one side of the same, are brackets 15, arranged in pairs; each of said brackets being apertured at 16 and having a slot 17 in the lower portion of the same. The several platforms are connected with the chains by means of pairs of cross rods 18 and 19 supported by the chain links; one of each pair of said rods, that indicated at 18 for instance, passing through the apertures 16 of the brackets 15, while the other of each pair of rods, that indicated at 19 for instance, passes through the slotted portions 17 of said brackets 15.

The rods 18 and 19 occupy fixed positions relatively to the links of the several chains, but when the platforms are passing over the top and bottom chain wheels, the distance between said rods will shorten. When passing over the upper chain wheels those rods which occupy the lower position relatively to the platforms in the upward flight of the latter will move relatively to the slotted portions of the brackets 15, so that each platform structure may pass properly over the chain wheels. The same action takes place, but in the reverse direction, when passing over the bottom chain wheels. In order that the brackets 15 may pass the shafts carrying the chain wheels, said brackets are notched or shaped as indicated at 15^a. The ends of the cross rods are provided with rollers 20 adapted to the space between the flanges of the columns B, whereby the platforms may be guided and maintained in proper horizontal position during the vertical movements of the chains; the guided brackets providing the desired cantilever support for the respective platforms.

Each platform comprises the structural frame referred to and floors 21 and 22, secured to the opposite surfaces of said frame above and below the same. One floor, indicated at 22 for instance, is uppermost when the chains are moving in the opposite direction, as downward at the left side of Fig. 1.

In the type of construction illustrated in Figs. 1, 2, 3, et seq., two sets of chains are employed which are connected to alternate platforms or flights, as the case may be, through the cross rods 18 and 19 which pass through the brackets 15 depending from said platforms; said rods carrying small rollers at the ends arranged to travel between the flanges of the vertical channel members B.

Referring more particularly to Fig. 3, which illustrates an enlarged view of two of the platforms and the respective chains supporting the same, attention is called to the fact that the platform indicated at X is supported by the chains indicated at Y, while the platform indicated at X′ is supported by the chains indicated at Y′. In this arrangement, the rods 18 and 19 which pass through the platform and the brackets, are positioned with respect to the particular links of the supporting chain through which they pass by means of wear blocks 25 shown more particularly in detail in the enlarged view of a link illustrated in Fig. 8. These blocks may have flanges 26 engaging one face of the link, with a detachable cover plate 27 for the opposite face of the link which may be held in place by a screw 28. And the links

of each chain connected to the respective rods thereof in order that the relation between said rods and the links of their supporting chains shall be maintained in definite position during vertical movements.

In like manner the platforms X′ are connected to the chains Y′, and the rods are supported in the respective links by blocks 25 in the same manner as described with reference to the platforms X and chains Y.

At the point where the upper rod of each platform X passes through a link of the chain Y′, there is no blocking, and the same is true of the lower rod where it passes through a link of the chain Y′. Under these conditions, provision is made for movement of the chains and rods relatively to each other in the open or unblocked spaces of the respective links through which said rods pass: an arrangement that has been provided with a view of avoiding collapse of the elevator structure should a link of either chain break.

An important feature of my improved elevator structure resides in the fact that the distance between the platforms in their vertical movement coincides with the distance between the floor levels, and I so arrange the actuating means that whenever the elevator structure is brought to rest, a platform will be opposite each floor, so that continuous floors are provided under all conditions of rest. In other words, when the elevator is not in motion attendants may pass from side to side of a floor through the elevator structure without danger of being precipitated into the shaft. It will be understood, of course, that independent of this arrangement each floor will be equipped with safety gates, which will be in operative position during movement of the elevator, and these gates will be of a type that will prevent motion of the elevator mechanism until the gate is in the lower and active position, and movement of the gate until the elevator is at rest. When the elevating and lowering mechanism is at rest, these gates may be raised.

Platforms K are arranged between the columns B at the level of each floor for the passage of attendants and these platforms may be screened from the shaft spaces through which the moving platforms operate, if desired.

In the structure illustrated in Figs. 9, 10 and 11, two sets of chains, with two chains Y^2 and Y^3, respectively, in each set, are employed; one set of chains, Y^2 for instance, being arranged for movement within the other set, as indicated at Y^3. Each set of chains carry portions of platforms which may be of the same type, except for size, as those illustrated in Figs. 1, 2 and 3. Each portion comprises one half of the full platform constituting the support for a car or other structure to be elevated or lowered, and these portions are brought into horizontal register as the chains are moved by the operating mechanism therefor, which may be arranged in the upper part of the shaft.

As will be understood, the outer set of chains indicated at Y^3 carry a greater number of platform sections than the inner chain Y^2, and the same sections of the respective chains do not register successively with each other in the operation of the elevator structure, although perfect register of separate sections will recur sucessively at the lower floor level and continue throughout the vertical movement of same in this form of my improved elevating and lowering mechanism.

I claim:

1. In an elevator structure, a plurality of sets of endless chains, sprocket wheels over which said chains pass, platforms disposed between said sets of chains, sets of spaced rods disposed in pairs and operatively connecting the respective platforms to the respective sets of chains in alternate relation, means whereby said rods may alter their spaced relation with respect to said platforms when passing over the sprocket wheels, and means for simultaneously driving the respective sets of chains in one direction.

2. An elevator of the character described, comprising a plurality of platforms and chains carrying said platforms, there being two of said chains at each side of the platforms and members projecting laterally from the platforms and engaging the chains in such manner as to support the platforms substantially at right angles to said chains, the laterally projecting members of each alternate platform being positively engaged with and carried by one of the chains at a side of said platform, and the laterally projecting members of the remaining platforms being positively engaged with and carried by the other chain at the same side of the platform.

3. An elevator of the character described, comprising a plurality of platforms and chains carrying said platforms, there being two of said chains at each side of the platforms and members projecting laterally from the platforms and engaging the chains in such manner as to support the platforms substantially at right angles to said chains, the laterally projecting members of each alternate platform being positively engaged with and carried by one of the chains at a side of said platform, and the laterally projecting members of the remaining platforms being positively engaged with and carried by the other chain at the same side of the platform, the laterally projecting members in each case passing through the chain with which it is not positively engaged to thereby establish a loose engagement between said members and said last named chains.

4. An elevator of the character described, comprising a plurality of platforms and chains by which said platforms are carried,

said platforms comprising L-shaped brackets, one of the arms of each of said brackets being disposed in parallelism with the chains and being engaged with said chains at its upper and lower ends, the other arms of said brackets projecting substantially at right angles to said chains and spaced floors secured to the upper and lower faces of the last named arms of the brackets, the length of the arms of the brackets which are disposed in parallelism with the chains being materially greater than the distance between said special floors.

5. A structure as recited in claim 4, wherein the engagement of the first named arms of the brackets with the chains at one end of said arms, is a sliding one.

6. An elevator construction comprising two pairs of endless chains, and platforms supported between the pairs of chains with one run of each of the pairs disposed at one side of the line of travel of the platforms and the remaining runs of the said pairs disposed at the opposite sides of the line of travel of the platforms, L-shaped brackets constituting parts of the platforms, transverse members projecting from the upper and lower portions of said brackets, and through both of the chains of a pair at each side of the line of travel, and guides outwardly of said chains in which said transverse members engage, said platforms comprising upper and lower floor portions secured to the upper and lower faces of the other arms of said brackets, said transversely projecting members being positively engaged with one run and being loosely engaged with the other run of the chains at each side of the platforms.

7. An elevator construction comprising a plurality of platforms, and chains by which said platforms are carried, said chains being arranged in two pairs, the chains of one pair being disposed upon opposite sides of the line of travel of the platforms and the chains of the other pair being likewise disposed upon the opposite sides of the line of travel of the platform, and moving in juxtaposition to and in parallelism with the chains of the first pair, said platforms comprising L-shaped brackets, one of the legs of each of said brackets lying in parallelism with the chains and the other leg of said bracket projecting substantially at right angles to said chains, upper and lower floor sections secured to the opposite faces of the last named legs of the brackets, transverse rods passing through the upper and lower portions of those legs of the brackets which lie in parallelism with the chains, guide members with which the outer ends of said rods are engaged outwardly of the chains, and means for connecting said transverse rods positively to one of the chains and loosely to the other of the chains at each side of the respective platforms.

8. An elevator construction comprising a plurality of platforms, and chains by which said platforms are carried, said chains being arranged in two pairs, the chains of one pair being disposed upon opposite sides of the line of travel of the platforms and the chains of the other pair being likewise disposed upon the opposite sides of the line of travel of the platform, and moving in juxtaposition to and in parallelism with the chains of the first pair, said platforms comprising L-shaped brackets, one of the legs of each of said brackets lying in parallelism with the chains and the other leg of said bracket projecting substantially at right angles to said chains, upper and lower floor sections secured to the opposite faces of the last named legs of the brackets, transverse rods passing through the upper and lower portions of those legs of the brackets which lie in parallelism with the chains, guide members with which the outer ends of said rods are engaged outwardly of the chains, means for connecting said transverse rods positively to one of the chains and loosely to the other of the chains at each side of the respective platforms, the said positive connection of each alternate platform being with one of said chains and of the remaining platforms with the other of said chains, the free ends of those legs of the brackets which lie in parallelism with the chain, being slotted for the passage of said transverse rods.

In witness whereof I have signed this specification.

J. STARR DA COSTA.