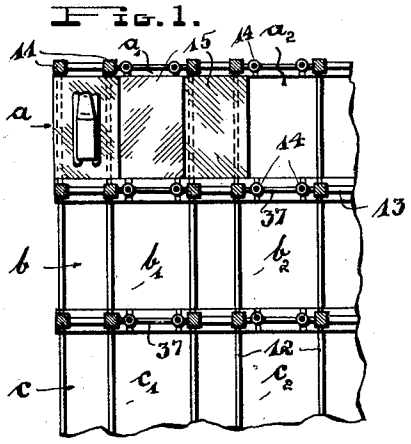
April 5, 1932. E. H. ZIEBARTH 1,852,633

AUTOMATIC GARAGE

Filed May 7, 1928 2 Sheets-Sheet 1

Fig. 1.



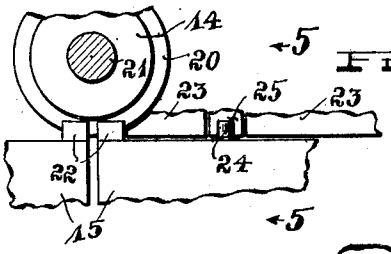


Fig. 4.

Fig. 5.

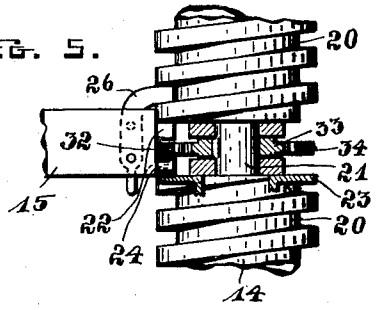


Fig. 2.

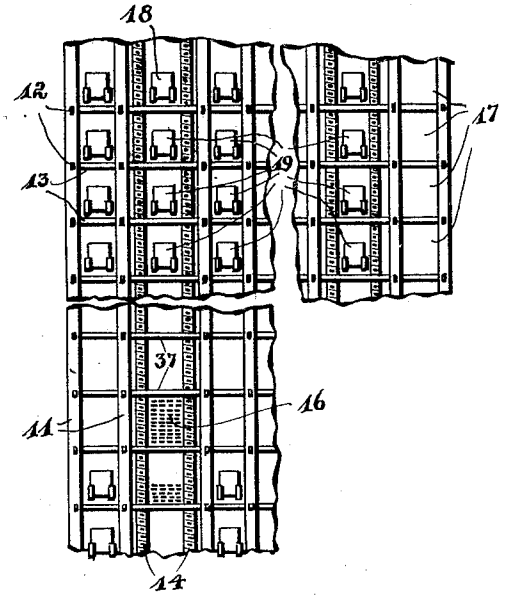
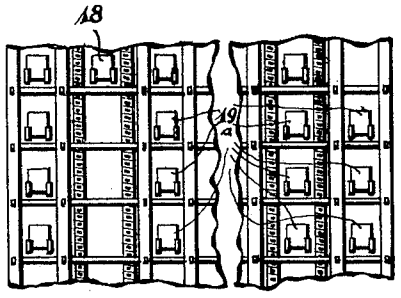


Fig. 3.



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AUTOMATIC GARAGE

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FIG. 6.

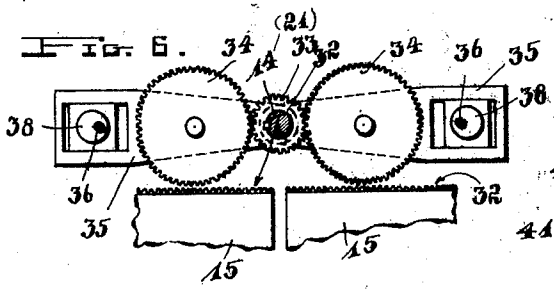


FIG. 9.

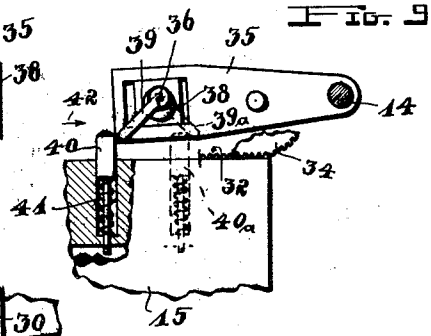


FIG. 8

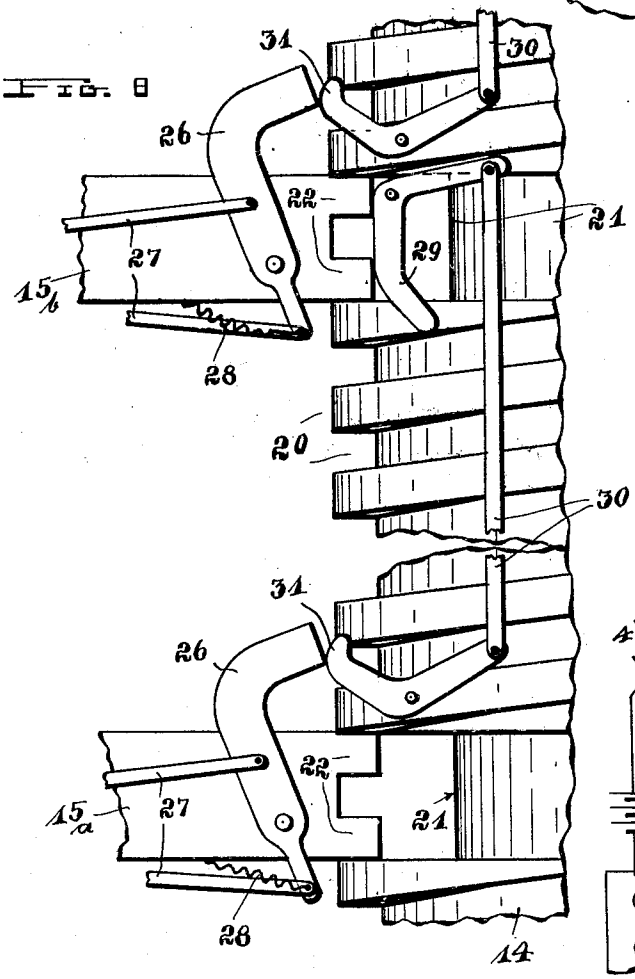


FIG. 7.

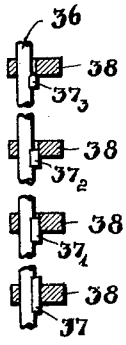
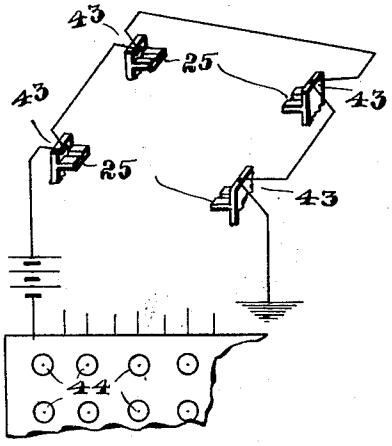


FIG. 10.



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Patented Apr. 5, 1932 1,852,633

UNITED STATES PATENT OFFICE

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AUTOMATIC GARAGE

Application filed May 7, 1928. Serial No. 275,825.

This invention relates to structures in which vehicles, such as automobiles, can be parked and stored in great numbers in a manner to be readily movable and removable.

One of the objects of this invention is to facilitate an automatic or semi-automatic parking and storing of automobiles.

Another object is to provide a skeleton building through which automobiles may be moved vertically and laterally.

Another object is to facilitate a vertical moving of automobiles by means of threaded spindles.

Another object is to provide connecting means whereby vertically moved automobiles may be moved laterally by the operation of the spindles.

Another object is to provide a selecting mechanism whereby the moving of automobiles can be controlled in a desired manner.

Another object is to provide automatic controls whereby the moving of automobiles is checked on reaching points close to other already stored automobiles.

Another object is to provide indicating means whereby the storing facilities of the structure may be observed.

Other objects will appear from the following description and appended claims as well as from the accompanying drawings, in which—

Fig. 1 is a fragmentary horizontal section through a building skeleton without the outside walls with vertical threaded spindles indicated and two platforms in their operative position in relation to the spindles and to the skeleton structure according to this invention.

Fig. 2 is a fragmentary vertical section through a building skeleton, having automobiles outlined in storing positions according to this invention.

Fig. 3 is a similar fragmentary vertical section illustrating the manner in which the stored automobiles are moved preparatory to a removal of a certain automobile from a higher level or floor downwardly.

Fig. 4 is a fragmentary detail horizontal cross section through the spindle and cooperating parts of a platform and rail according to this invention.

Fig. 5 is a fragmentary detail vertical cross section on line 5—5 of Fig. 4.

Fig. 6 is a fragmentary detail cross-sectional view illustrating the operating means in conjunction with the vertical spindles by which the automobile supporting platforms can be moved laterally.

Fig. 7 is a fragmentary side elevation of a selecting rod or shaft having various keys provided thereon to engage the different cams for actuating any or all of the gears located on the different floors for lateral movement of the platforms.

Fig. 8 is a somewhat diagrammatic illustration of controlling means for stopping a platform on a floor below another platform that has already been moved to the floor above.

Fig. 9 is a somewhat diagrammatic illustration of a mechanism by which a platform can be automatically controlled in its lateral movements.

Fig. 10 is a somewhat diagrammatic illustration in connection with an electric indicator by which the proper storing of certain vehicles can be observed at a central station.

As illustrated, the building structure which forms a part of this invention is especially designed in order to facilitate the installation of the various apparatus and mechanisms which combined constitute the invention. The building is, therefore, principally constructed of a somewhat skeleton form without any floors or wall partitions though outside walls, not shown, of course, are and should be provided. As far as this invention is concerned, however, one is interested only in the inside structure which is distinctly of skeleton form without any horizontal or vertical partitions.

As illustrated in Fig. 1, the vertical columns 11 are interconnected by horizontal beams 12 and 13 which practically comprise the whole basic structure of the building.

Within this basic skeleton building structure vertical turnable columns 14 are provided as the principal operating means for handling vehicles within the basic skeleton building structure, the columns being jour-

naled in the interconnecting cross beams 37.

These turnable columns are shown of screw or spindle form, but, of course, various conventional spindles or columns may be used as long as a transporting and moving of platforms can be accomplished thereby in the manner disclosed in this application.

Platforms 15 are provided of a suitable number to correspond with the number of storing places for individual vehicles in the building. Such platforms are stored or maintained at a suitable place within the several elevating shafts on one or more of the floors, as, for instance, indicated by dotted lines at 16 in Fig. 2. The stored platforms, of course, may be moved up and down in groups or one at a time. If desired in a certain floor or for certain purposes, a single platform may be engaged to be used for supporting an automobile.

On the other hand, if entrance is desired below the stored platform, of course, the whole series of stored platforms may be moved in a group to a floor or several floors above so that access may be had to the floors below the position which the stored platform so far occupied.

To differentiate from the stationary structural columns of the skeleton building, the turnable columns will hereafter be called spindles.

The general idea of handling automobiles will best be understood with reference to the illustrations in Figs. 1, 2 and 3.

Any number of automobiles may be parked and stored one behind the other and one beside the other on each of the several floors depending on the size of the structure, as will be clear from the illustration in Fig. 1. It will also be clear from this illustration that spindles are provided throughout the building.

As illustrated, the arrangement provides a dividing of the building into vertical sections one behind the other, one section being indicated at *a*, the second section being indicated at *b* and a third section being indicated at *c*, whereby automobiles can be handled in each section separately from the other sections, so that automobiles are only shifted on the several floors in a sidewise direction but not forward or backward.

However, it will be understood that this is merely a matter of choice of arranging mechanisms and that automobiles may just as easily be moved forward and backward, that is in any lateral direction. According to the illustrated arrangement, in section *a*, for instance, an automobile may be moved up and down through a shaft indicated at a_1 and a_2 and from these shafts a_1 and a_2 may be shifted either to the left or to the right or eventually through the whole width of the building from any one of the shafts, such as a_1 and a_2, in a sidewise direction.

In the vertical section *b* there are similar shafts b_1 and b_2 where automobiles can be moved vertically and from which automobiles can be moved in a sidewise direction on reaching any of the floors of the building structure.

The section *c* indicates similar shafts c_1 and c_2.

Comparing the illustrations of Figs. 2 and 3, the handling of automobiles in one of the vertical sections such as indicated at *a*, *b* and *c* in the illustration of Fig. 1 is further elucidated. If, for instance, such a section is completely filled with automobiles, there is always one parking space left on each of the floors at one end as indicated at 17. If then the automobile indicated at 18 in Fig. 2 is to be removed from its storage place, all the automobiles indicated at 19 on the lower floors are moved in a sidewise direction to take the positions indicated at 19_a in Fig. 3. It will be seen that the elevating shaft is in this manner cleared so that the automobile 18 may be moved vertically through the building to the lower floors.

In order to facilitate such a lifting and vertical moving of platforms and a sidewise moving of the platforms with the automobiles, several mechanisms have been illustrated in the drawings though these mechanisms may vary considerable, and I do not limit myself to any specific detail of such mechanisms as long as a moving and storing of automobiles is made possible in the manner disclosed in this application and more particularly set forth in the appended claims. Details of the building structure, such as uprights, laterals and supports for the moving platforms must, of course, be designed to comply with local laws and to suit the requirements of structural engineers and designers who undertake to build a garage according to this invention and to make a moving of platforms possible in the desired manner.

As illustrated in Figs. 4, 5 and 8, each of the spindles is provided with threaded portions between the floors, as indicated at 20, and a smooth bearing portion indicated at 21. Any rotating of the spindles, therefore, moves any engaged platform from floor to floor if once brought into engagement with the spindles. On reaching any of the floors a platform may be disengaged from the spindle to stay at the floor such a platform has reached.

The platform, as illustrated, has for this reason teeth 22 that become located between threaded portions of the spindles, that is at about the space where the smooth portion of the spindle is held in bearings in the skeleton building structure. Upon reaching any of the floors with the teeth 22 of the platform between the threaded portions 20 of the spindle 14, the platform is, furthermore, sup-

ported on rails 23 that are provided at the different floors by certain rollers 24 provided on the platform. Short sections indicated at 25 of the rails 23, of course, are necessarily made collapsible or movable in any conventional manner, or, on the other hand, if the rail is desired by any structural engineer to be continuous, then the rollers 24 on the platform 15 are made movable in any conventional manner in order to pass the rails 23 while moving up and down through the elevating shaft. It will therefore be understood that a platform will rest by means of its rollers 24 on the rails 23 on any floor to which the platform has been elevated and since the teeth 22 are then in a position sidewise of the space provided for the bearing 21 on the spindle 14, a rotating of the spindle 14 will not effect such a stored platform. A platform can then only be lowered by freeing the cooperative engagement or support between the rollers 24 and the rails 23 on any of the floors.

To lift a platform 15 past such a gap in the spindle 14 between the threaded sections 20, an elevating hook 26 is provided near each corner of the platform to engage adjacent spindles. Such a hook is illustrated in Fig. 5 in engagement with the spindle 14.

The illustration in Fig. 8 shows portions of platforms 15_a and 15_b to be on different floors of the building. Both elevating hooks 26 are shown disengaged from the spindle 14 indicating that neither of the platforms can be moved further upwardly. Either one or both platforms can easily be moved downwardly as described above since the teeth 22 are sufficient for a downward movement and will come into direct engagement with the threaded sections of the spindle 14 as soon as the rollers 24 of the two platforms have been disengaged from the rails 23 on the two floors of the building.

Rods 27 are provided by which the elevating hooks 26 can be operated either manually or mechanically in any conventional manner from some central station in the building. The springs 28, on the other hand, serve to engage the elevating hooks 26 automatically as soon as the platforms are below certain automatic disengagers.

The automatic disengagers serve to stop any platform on a certain floor if it is in its proper storing position. The teeth 22 in the upper platform 15_b, for instance, actuate the lever 29 and thereby pull the connecting rod 30 upwardly so that the hook 31 automatically disengages the elevating hook 26 of the platform 15_a from the spindle 14 when the platform 15_a reaches the floor below the floor on which the platform 15_b has previously been stored.

For moving any platform with an automobile in a sidewise direction upon reaching any certain floor, the mechanisms illustrated in Figs. 5 and 6 may serve to make it clear that this can be done though these mechanisms again are subject to slight changes depending on local conditions and requirements of building contractors.

As illustrated, the platforms are provided with gear racks 32 normally free of engagement.

A gear 33 is securely keyed to the smooth bearing portion 21 of each of the spindles 14 as illustrated in Fig. 5. This gear 33 is comparatively small in order not to interfere with any of the elevating and operating mechanisms. Two larger gears 34 are operatively engaged with each gear 33 as illustrated in Fig. 6. These gears 34 in form of idlers are swingably mounted on the arms 35. Selecting shafts 36 are provided through the several floors of the building by which certain of the gears 34 may be brought into engagement with certain of the platforms stored in the building.

In Fig. 7 the sections of the selecting shaft 36 illustrate different keys 37, 37_1, 37_2 and 37_3. This arrangement makes it possible that any of the arms 38 may be engaged with the selecting shaft or rod 36 by a suitable vertical shifting of the selecting rod 36.

As illustrated, for instance, the selecting rod has been shifted upwardly to the extent that all but the uppermost cam have been brought into engagement with the selecting rod 36. A turning of the selecting rod in this condition would then only result in a turning of the three lower cams without having any effect upon the uppermost cam.

Taking this feature into consideration in connection with the illustration of Fig. 6, it will be understood that a turning of a selecting rod with any of the cams must move the corresponding arm 35 with the gear 34 carried by that arm towards the gear rack 32 on an adjacent platform. A rotating of the spindles 14 throughout the building or of any particular set of spindles, including a spindle to which the engaged gear 34 has cooperative engagement, transmits the rotating movement of the spindles to the engaged gear or gears 34 and thereby causes a sidewise shifting of the engaged platform 15 by means of the racks 32.

As soon as the selecting rod 36 is turned to neutral position, the arm 35 carrying the gear 34 is also moved to neutral position and the platform is again disengaged from the spindle 14, and in particular from the gear 33 on the smooth bearing portion 21 of the spindle 14.

As a safety measure, an automatic disengaging of the gears 34 from the gear racks 32 of the platforms is, of course, desirable. A means of accomplishing this is illustrated in Fig. 9.

A lever 39 is provided on the selecting rod 36 to be actuated by a yielding bolt 40. This

yielding bolt is mounted operatively on the platform 15 consisting principally of a bolt held yieldingly in its outermost position by the spring 41. If the platform moves in the direction of the arrow 42 this bolt 40 comes into contact with the lever 39 on the selecting rod 36 and as long as the gear 34 is still in engagement with the gear rack 32 on the platform 15 a continuous movement of the platform 15 in the direction of the arrow 42 causes a moving of the lever 39 to the position indicated in dotted lines at 39_a which is its position for stopping the platform.

A stopping is accomplished by the turning of the selecting rod 36 with the arm 38 to its normal inoperative sidewise position, whereby the gear 34 is disengaged from the gear rack 32 on the platform. If a further movement or a turning moving of the platform is desired, the selecting rod 36 with the lever 39 can be forced against the bolt 40 so as to push this bolt inwardly against the tension of the spring 41 past the front end of the bolt 40.

When this selecting rod is turned to bring the lever 39 past the bolt 40, the cam is again turned into a position whereby the arm 35 and thereby the gear 34 is moved towards the platform and towards the gear rack 32.

A rotating of the spindles results again in a desired moving of the platforms. When the bolt 40, in this instance, comes under the lever 39 while the platform is moving in a direction opposite to the arrow 42, the bolt 40 is merely forced inwardly against the tension of the spring 41 so that the platform 15 will keep on moving past the cam in this manner.

In Fig. 10 a diagram has been outlined by which the movement of any automobile and platform can be followed and observed, and the storing and parking of automobiles can thereby be controlled from a central station in the building.

A contact 43 is preferably provided near each normal resting place of each of the rollers on a platform. Such contacts are in a series in an electric circuit and in connection with an annunciator board. The rotation of any certain platform with automobile may be observed by several lights 44 on the board.

By providing the several contacts for the support of the several rollers on one platform in a circuit in series, as roughly outlined in Fig. 10, it is made possible to avoid an accidental dislocation of a platform. Furthermore the lamp for any certain parking position on the annunciator board will not light until all the rollers of any platform are properly located in their resting position. This electric arrangement provides therefore besides the control also a certain desirable safety.

From the above it will be understood that automobiles can be moved in a vertical and lateral direction through a skeleton building, and it must be understood that I may use slightly modified forms of any of the devices or mechanisms and I do not wish to limit my self to the certain details or mechanisms shown in the drawings as long as the results may be obtained as set forth in the appended claims.

Having thus described my invention, I claim:

1. In an automatic garage, a building structure having uprights and laterals spaced so that an automobile may be moved in a vertical as well as lateral direction throughout the structure, and an operating means apparatus including spindles for moving automobiles vertically and laterally through the building.

2. In an automatic garage, a skeleton building structure having uprights and laterals spaced so that a vehicle may be moved vertically as well as laterally in the structure, operating means for moving the vehicle in a vertical direction, and other operating means operative by the first-named operating means for moving a vehicle in a lateral direction.

3. In an automatic garage, a skeleton building structure having uprights and laterals spaced so that a vehicle may be moved vertically as well as laterally in the structure, operating means for moving the vehicle in a vertical direction, other operating means operative by the first-named operating means for moving a vehicle in a lateral direction, and shifting means for controlling the movements of vehicles in relation to one another.

4. In a garage, a skeleton building structure having uprights and laterals spaced so that an automobile may be moved in an up and down as well as in a lateral direction throughout the structure, operating means for moving a vehicle in an up and down direction, other operating means for moving the vehicles in a lateral direction, means for automatically checking the movements of the vehicle through the building, and means for controlling the movements of a vehicle through the building from a central station.

5. In an automatic garage, an apparatus for storing automobiles, including a building constructed of skeleton form with passages arranged both vertically and horizontally, platforms designed to move through said vertical and horizontal passages, means disposed within said building for raising and lowering automobiles when disposed on said platforms, and other means associated with said first-named means for transferring said automobiles horizontally and shifting same either singly or in groups and in any single level or several levels.

6. In an automatic garage, a skeleton building structure having uprights and laterals spaced so as to form passages vertically and horizontally, platforms designed to

move through said vertical and horizontal passages and adapted to be stored closely one above another at any level, operating means for engaging any number of stored platforms for a movement in a vertical direction into a lifted position above the storing level, means associated with the first-named operating means for moving platforms from the lifted position horizontally, controlling means whereby the second-named means can be brought into operative engagement with platforms for moving horizontally, and checking means for automatically disengaging the controlling means when the horizontally moving platform reaches a point beyond which it cannot and should not move.

7. In an automatic garage, a skeleton building structure having uprights and laterals forming horizontal and vertical passages, platforms designed to move through said vertical and horizontal passages, vertically disposed turnable spindles, means on the platforms for operative engagement with said spindles for vertical movements, and means for automatically disengaging the platform from the spindle when the platform reaches a certain predetermined position.

8. In an automatic garage, a skeleton building structure having uprights and laterals forming horizontal and vertical passages, platforms designed to move through said vertical and horizontal passages, vertically disposed turnable spindles, means on the platforms for operative engagement with said spindles for vertical movements, and means for automatically disengaging the platform from the spindle when the platform reaches a point at which a further movement is obstructed either by another platform or a part of the building structure.

9. In an automatic garage, a skeleton building structure having uprights and laterals forming horizontal and vertical passages, platforms designed to move through said vertical and horizontal passages, vertically disposed turnable spindles, means on the platforms for operative engagement with said spindles for vertical movements, means for automatically disengaging the platform from the spindle when the platform reaches a point at which a further movement is obstructed either by another platform or a part of the building structure, and horizontal controlling means disposed adjustably to operatively engage with said spindles for moving platforms horizontally by the operation of the vertically disposed spindles.

10. In an automatic garage, a skeleton building structure having uprights and laterals forming horizontal and vertical passages, platforms designed to move through said vertical and horizontal passages, vertically disposed turnable spindles, means on the platforms for operative engagement with said spindles for vertical movements, means for automatically disengaging the platform from the spindle when the platform reaches a point at which a further movement is obstructed either by another platform or a part of the building structure, horizontal controlling means disposed adjustably to operatively engage with said spindles for moving platforms horizontally by the operation of the vertically disposed spindles, and checking means for automatically disengaging the horizontal engaging means from the spindle when a horizontally moving platform reaches a point beyond which its movement is obstructed by another platform or any part of the building structure.

11. In an automatic garage, apparatus for parking or storing automotive vehicles on movable platforms in a series of vertical passages and intersecting horizontal passages, platforms having means for direct automatic engagement with and disengagement from elevating means disposed at corners of vertical passages and to means in horizontal passages for lateral movement, either singly or in groups and further means for control of movement of platforms in all passages.

In testimony that I claim the foregoing as my invention I have signed my name.

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