

Feb. 10, 1925.

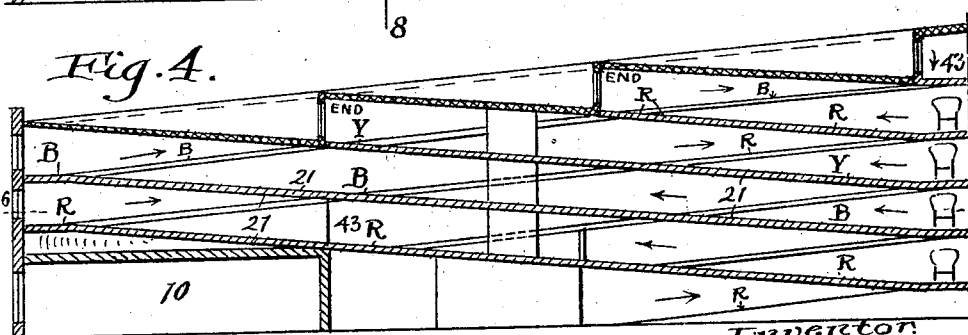
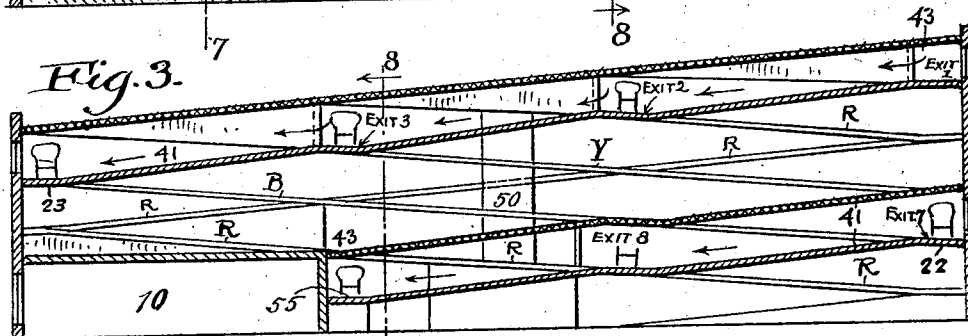
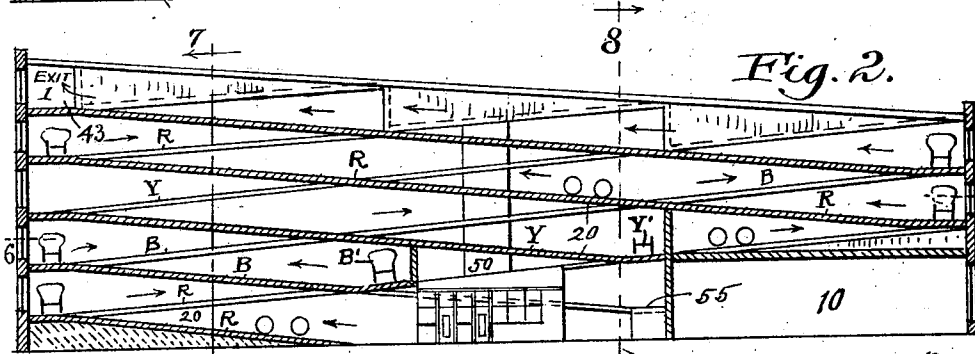
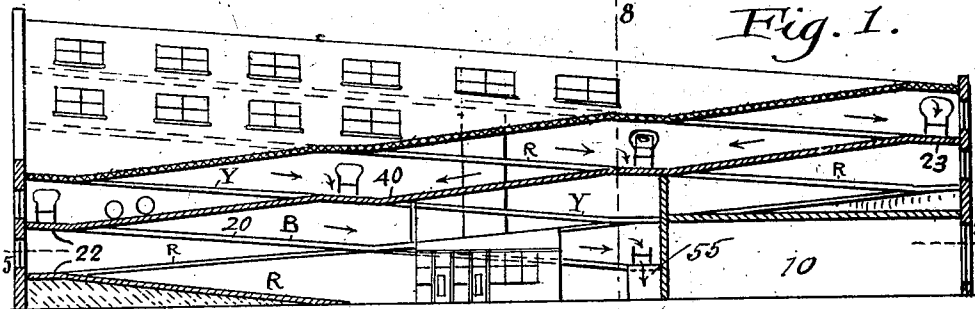
1,525,917

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GARAGE STRUCTURE

Filed Dec. 16, 1920

3 Sheets-Sheet 1



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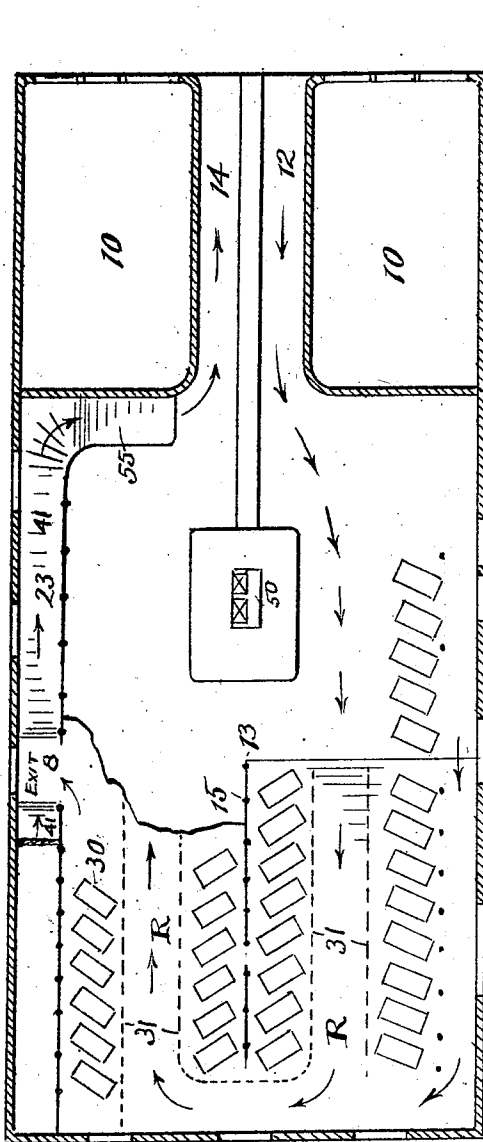


Fig. 5.

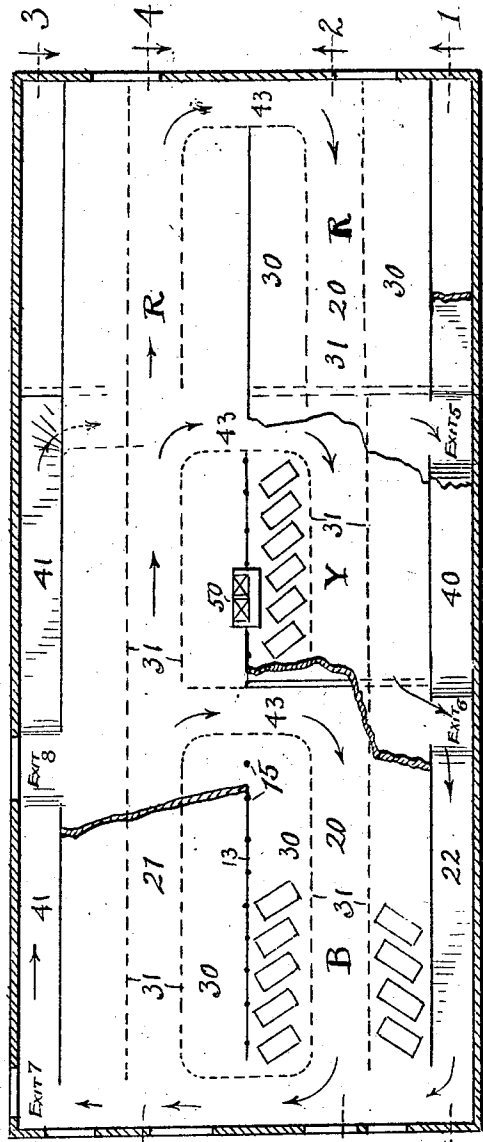


Fig. 6.

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3 Sheets-Sheet 3

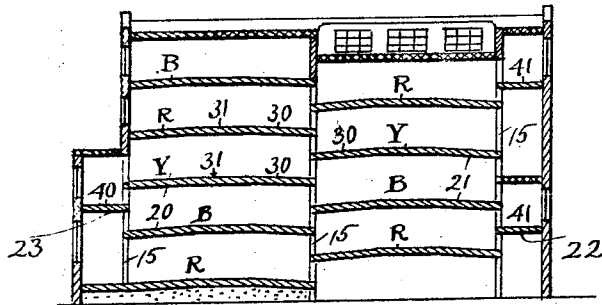


Fig. 7.

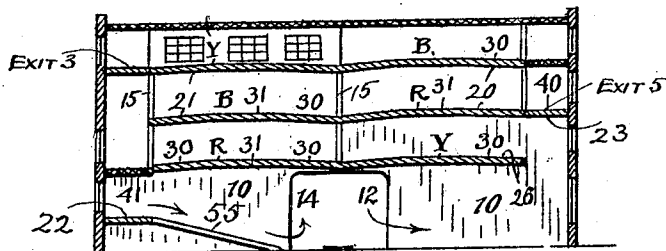


Fig. 8.

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# UNITED STATES PATENT OFFICE.

ARTHUR COBB, OF CLEVELAND, OHIO.

## GARAGE STRUCTURE.

Application filed December 16, 1920. Serial No. 431,123.

*To all whom it may concern:*

Be it known that I, ARTHUR COBB, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Garage Structures, of which the following is a full, clear, and exact description.

The objects of this invention are to provide for the storage of a maximum large number of motor cars within the enclosed cubical space; to enable cars to proceed under their own power to any and every storage stall without danger of collision with other cars going to storage stalls, or going out of the building from storage stalls; to enable each driver to park his car in any storage stall, and to take his car out of said storage stall and leave the building without help or guidance from an attendant, and without substantially delaying the progress of any other car to or from its storage stall; to enable a large number of cars during rush hours to enter the structure and proceed to and park in storage stalls, or to get out of such stalls and out of the building in the shortest possible time without being substantially impeded by others, and with a minimum of danger of collision with other cars.

With these ends in view, the invention consists in the construction and combination of parts shown in the drawing and hereinafter described and pointed out definitely in the appended claims.

In the drawings, Fig. 1 is a sectional side elevation of a structure which embodies the invention, the section being in the plane indicated by the line 1—1 on Fig. 6; Fig. 2 is a sectional side elevation in the plane of line 2—2 on Fig. 6; Fig. 3 is a sectional side elevation in the plane of line 3—3 on Fig. 6; Fig. 4 is a sectional side elevation in the plane of line 4—4 on Fig. 6; Fig. 5 is a plan view in the plane of line 5—5 on Fig. 1; Fig. 6 is a sectional plan view in two planes on opposite sides of the central vertical plane of the structure,—the line 6—6 on Fig. 2 showing the plane on one side of the central vertical plane, and the line 6—6 on Fig. 4 showing the plane on the other side of said vertical plane; Fig. 7 is a transverse vertical sectional view in the

plane of line 7—7 on Fig. 2, and Fig. 8 is a vertical sectional view of one side of the structure in the plane of line 8—8 on Fig. 1.

A garage building manufactured to embody the present invention is so constructed that each car driver has substantially no option but to do those things which will contribute to the attainment of the desired ends, as above stated.

In car storage buildings or garages, as they have heretofore been constructed (other than the small one floor garages) there have been a plurality of level floors which are divided into storage stalls and communicating aisles along which the cars may proceed to or from the elevator or ramps which are sometimes provided for the cars to travel upon on their own power from one floor to another.

The present invention differs from prior structures in that it does not include any level car storage floors (except a portion of the ground floor which may be used for car storage purposes if desired), but on the contrary is constructed with one or several systems of communicating straight ramps or inclines which in effect amount to inclined one-way streets, which are of sufficient width to provide for diagonal storage stalls along the sides thereof, and for an aisle between these two rows of storage stalls along which the cars may proceed. The cars may go up one ramp to its upper end and then go transversely on a balcony provided for the purpose to the lower end of another ramp, and so on until the car arrives at the proper storage stall in which it is to be parked, which may be anywhere from the bottom to the top of this particular system. Thus by following the winding path comprising the side by side but oppositely inclined ramps and the balconies by which they are connected, a car ever climbing over a path on which there are no cars going in a contrary direction and which no cars may cross, may reach any storage stall in the system.

Depending upon the length of the building, there may be more than one of these winding and generally upwardly proceeding storage ramp systems. These several systems, however many there may be, will be located between other systems; and there are transverse passageways through which

a car on the primary system near the ground lever thereof may pass onto the low end of any of the other storage systems.

The structure is also made with a winding exit passage made up of oppositely inclined ramps along the sides of the structure, and balconies by which the low end of a ramp may be put into communication with the high end of the next ramp of the series. Moreover, there are numerous lateral passageways from the storage ramps located at the points where the plane of the outgoing ramp intersects the plane of a storage ramp through which a car which is moving up on a storage ramp may turn and pass onto the outgoing ramp.

A construction embodying the present invention has some of the characteristics of a maze although not one which is difficult to travel through. It is my present thought that the patrons of the garage will be enabled to more easily go to the particular storage stall allotted to them if the several systems be painted with a characteristic color. Of course, this is not necessary, but I think it is desirable, and in any event the assumption that the several systems are so distinguished will greatly aid in understanding the construction shown in the drawing and herein described. In the construction shown in the drawing there are three ramp storage systems, viz: the primary system which will be referred to as the red system, the system next above it which will be called the blue system, and the next system above that which will be called the yellow system.

Referring now by reference characters to the various parts shown on the drawing; it will be noted that a certain amount of space on the ground floor level at the front of the building is partitioned off for use as stores, 10, two of these stores are shown; and between them is the entrance passageway 12 to the structure, and the outlet passageway 14. It will be clear that these inlet and outlet passageways may be located at any place along the front of the building. The space within the building exclusive of the store space and the end balconies to be hereinafter mentioned may be assumed to be divided by a centrally placed longitudinally extended vertical plane indicated by line 13 on Figs. 5 and 6; although there need be no actual dividing partition. There will, however, be ramp supporting columns, and may be a row of ramp supporting vertical columns 15 arranged substantially in said vertical plane.

The ramps 20 belonging to the red, blue and yellow systems are distinguished respectively by the letters R, B, and Y, associated with the reference characters 20, and so with respect to all similar parts, those belonging in the different systems will be

indicated by these letters following the reference numerals.

On one side of this central plane, inclined ramp floors are placed, these being all inclined from the front to the rear of the structure, they being located one over another. On the opposite side of this central plane are other inclined ramp floors 21 arranged one over another; but these are oppositely inclined, that is, they incline from a point near the rear end of the building upward toward the front end. The upper end of each inclined floor ramp 20 on one side of the said vertical plane is connected with the low end of an inclined floor ramp 21 on the opposite side by a transversely extended balcony, the balconies adjacent the rear end of the structure being indicated by 22, and those adjacent the front of the structure by 23. A car going up one of the ramp floors may proceed transversely on these balconies onto the next oppositely inclined associated ramp floor, in series on the other side of the central plane.

The length of the building and the grade established for the inclined ramp floors determines how much space there will be between one ramp floor and the ramp next above it in the same system. It is believed that the ideal grade for the ramp floors should be about 6% but that may be varied. Whenever the distance between ramp floors of the red system (which distance is determined by the length of the ramp floors and the grade) is more than twice the distance required for car storage, other systems may be built in between the parts of the red system, and thereby utilize what would otherwise be waste space. In the construction shown there are two other systems which as before stated are designated the blue and yellow systems. The low end of the bottom ramp floor 20<sup>B</sup> begins at a point in the length of the ramp floors of the red system at which there is a suitable distance, say 12 feet, above the low ramp floor 20<sup>R</sup>. The low ramp floor 20<sup>B</sup> overlies the low ramp floor 20<sup>R</sup>, and is parallel with it. The other ramp floors of the blue system overlie corresponding ramp floors of the red system, are parallel with them, and are at a constant distance from them; and the ramp floors of the blue system are connected in series by balconies 22<sup>B</sup>, 23<sup>B</sup>. The ramp floors 20<sup>Y</sup> and 21<sup>Y</sup> of the yellow system, and the balconies of this system overlie the corresponding parts of the blue system,—and of course underlie the corresponding parts of the red system.

In order that cars may be driven onto the blue system said cars proceed up on the ramp floor 20<sup>R</sup> and 21<sup>R</sup> until they reach the level of the low end of the lowest ramp floor 20<sup>B</sup>, at which there is a lateral passage B' through which the cars may pass onto

the ramp floor 20<sup>B</sup>. To get on to the yellow system the cars go up a little farther on ramp floor 21<sup>R</sup>, where at the proper elevation there is a lateral passage Y' through which cars may travel onto the low end of the bottom ramp floor 20<sup>X</sup>. There may be like lateral passages leading from the ramp floors of one system to those of another system, at any and every place where the plane of a ramp floor 21, of one system, intersects the plane of a ramp floor 20 of another system. It may be a convenience to have these passages at all of said intersections, but the lowest passages B and Y above described are the only ones which are necessary.

Along both sides of all the ramp floors 20 and 21 are the parking places for the cars or stalls 30, as they are called. These are arranged diagonally with respect to the sides of the ramp floors. Therefore, a car going up a ramp floor and arriving at a stall in which it is desired to park the car has simply to turn to the right or left as the case may be, to enter that stall. The help and guidance of attendants is no more necessary than it is upon public streets on which it is customary to park cars in the diagonal manner stated. When one desires to get out of the stall he simply backs out and cramps his front wheels and so gets his car in the aisle 31 between two rows of stalls on the sides of the ramp floors. His car is now again headed uphill and it must go uphill, thereby going in the same direction that every other car must go so long as it is on any of the storage rampways described, until he arrives at a lateral passage through which he may go onto the outgoing ramp system. The ramp floors shown are of such width as to permit the storage of cars on both sides thereof, with an aisle between the two rows of cars; but obviously they might be made narrower so as to accommodate only one row of cars, or wider so as to provide room for two or more aisles and room for rows of car stalls on both sides of all aisles.

This outgoing ramp system surrounds the storage ramp systems described, and comprises, along the sides of the structure, inclined ramps 40, 41, said ramps being oppositely inclined with respect to the storage ramps alongside of which they lie; that is to say, the storage ramps 20 inclined upward toward the rear end of the building, but the outgoing ramps 40 alongside of them incline downward toward the rear end of the building. The storage ramps 21 incline upward toward the front end of the building while the outgoing ramps 41 alongside of them incline downward toward the front end of the building. Therefore the planes of the outgoing ramps frequently intersect the planes of the storage ramps. At the ends of the building the lower end of an

outgoing ramp at one side of the building is connected with the upper end of an outgoing ramp at the other side of the building by a horizontal balcony 42 which in some cases be a part of a balcony which is utilized for connecting ends of the storage ramps.

At those points at which the plane of the outgoing ramps intersect the plane of the storage ramps there are lateral passageways 43 from the latter to the former. A car, having been backed out of its stall, proceeds uphill until it reaches one of those lateral passageways, through which it turns and passes onto the outgoing ramp at the same level, and then proceeds downhill along the outgoing ramp system, winding around the building, to whatever extent circumstances require, and finally coming to the ground floor level where communication is established with the outlet passageway 14.

At some or all of the points where the plane of the outgoing ramps intersect the planes of the adjacent storage ramps the outgoing ramps are made to member with the storage ramps; that is to say, to have the same inclination. This is of advantage for several reasons. The drivers of cars on the outgoing ramp system will not, for safety's sake go very fast, because of the presence of these oppositely inclined short stretches which would act to bounce the car off of the roadway if the car was going too fast. But the principal advantage of these oppositely inclined parts of the outgoing ramps is that they advise the drivers of cars on the outgoing rampway to be careful in approaching those places so as to avoid collision with cars which may come through them onto the outgoing rampway.

When cars are parked along diagonally inclined ramps 20 and 21 the rear ends of the cars would be lower than the front ends, and therefore there would be a tendency of the car to back out of the stall in case the drivers, when leaving the cars, failed to put on the brake. Various expedients could be adopted to prevent the cars from so backing out of the stalls, but an expedient which will effectually serve that purpose is to make the sides near the edges of the ramps 20 and 21 incline downward as shown, the inclination being such that when the front wheels are driven onto the inclined sides 26 of the ramp floors each front wheel will be at the same level as the rear wheel on the same side of the car, and therefore there will be no tendency for the car to back itself out of its stall.

From the foregoing it is quite evident that a car coming in through the inlet passage may have to turn slightly behind the stores 10 and thereby come into line with the low end of the first or lowest of the ramp floors 20<sup>R</sup>. It will go up that ramp

floor along the communicating balcony 23 and onto ramp 21<sup>R</sup> and if this car is to be parked in any stall which is a part of the red system it will proceed along the winding path described of which the red system is composed to that stall. If, however, the stall in which it is to be parked is a part of the yellow or the blue system the car will proceed up the red ramp 21 until it arrives at the lateral passageway B or Y, as the case may be, through which it may go onto the lowest of the ramp floors 20 of the selected system.

It will be seen that as the cars enter the garage and proceed to the stalls allotted to them they are proceeding along what is in effect a one-way street which cars are not able to cross. Cars may come onto the inclined ramp floors of the blue and yellow systems from the red system at certain places, which, however, may be plainly marked. In the preferred construction, however, there is only one of these lateral passages leading from the red system to each of the other two systems, and these are at the extreme lower ends of the blue and yellow systems. Therefore, the chance of collision between cars on any of the ramp floors or their connecting balconies is practically negligible.

To get out of the garage the driver backs his car out of its stall into the aisle between the cars which are parked on that particular ramp floor, and then proceeds uphill until it reaches a lateral passage 43 through which it may go onto the outgoing rampway. When it gets onto that rampway it goes downhill just as all of the other cars on said rampway go downhill. In fact, no cars ever go uphill on the outgoing rampway, and the only chance for collision between cars is that a car going from a storage ramp onto the outgoing rampway through a lateral passage 43 may collide with a car coming down the rampway. There is, however, to be no partition such as will shut off the view of the driver of a car on the outgoing rampway or the storage rampway on the same side of the building. Therefore, the drivers of cars on the outgoing rampway as well as the drivers of those cars on the storage rampways who propose to turn onto the outgoing rampway can see each other, and therefore there is little danger of collision.

It is not thought necessary to describe the structural details of the structure described. It is not thought that any instructions concerning them are necessary. Any engineer will be competent to do the engineering and designing work required for the erection of the described structure with the ramps arranged relatively and for the co-operation as above described.

At approximately the center of the build-

ing a vertical well 50 is erected. This may contain a winding stairway upon which persons may go from the ground level up to that car storage ramp on which their cars are respectively parked. There may be one or more elevators within this well. This well may also house the executive force of the garage. The entrance to this well may be had by a passage preferably in the form of a raised platform which in the construction shown is located between the inlet and outlet passages referred to.

Having described my invention, I claim:—

1. A built up garage structure which includes, in combination, a set of inclined longitudinally extended ramp floors which are located one above another on the same side of a longitudinally extended vertical plane and are parallel with each other, another set of longitudinally extended ramp floors which are inclined in the opposite direction and are located on the opposite side of said vertical plane and are disposed one above another, and transversely extended balconies which establish communication between the high ends of the ramp floors on one side of said vertical plane and the adjacent low ends of ramp floors on the other side of said vertical plane, thereby forming a continuous winding road system on which automobiles may run from the bottom to the top thereof, the inclined parts of said road system having car storage stalls along their sides, and another continuous winding roadway system comprising inclined ramps which are located between and are parallel with the correspondingly inclined floors of the first named road system, and other oppositely inclined longitudinally extended ramp floors which are located between and are parallel with the correspondingly inclined ramp floors of the first named road system, and balconies which are located between the balconies of the first named road system and which establish communication between the high ends of the inclined ramp floors of the second system, and the adjacent low ends of the ramp floors of said system there being a lateral passageway which establishes communication between a ramp floor of the first system and a ramp floor of the other system, the inclined parts of the second road system having also car storage stalls along their sides.

2. A built up garage structure which includes, in combination, a set of inclined longitudinally extended ramp floors which are located one above another on the same side of a longitudinally extended vertical plane, and are parallel with each other, another set of longitudinally extended ramp floors which are inclined in the opposite direction and are located on the opposite side of said vertical plane and are disposed one

above another, and transversely extended balconies which establish communication between the high ends of the ramp floors on one side of said vertical plane and the adjacent low ends of ramp floors on the other side of said vertical plane, thereby forming a continuous winding incoming road system on which automobiles may run from the bottom to the top thereof, the inclined parts of said road system having car storage stalls along their sides, and an outgoing road system which is located outside of and winds around the incoming road system and comprises longitudinally inclined ramps which are located adjacent the sides of the structure and alongside of the inclined ramp floors of the incoming road system and are inclined oppositely to the ramp floors to which they are adjacent, and balconies which establish communication between the high ends of ramps on one side of the structure and low ends of ramps on the other side of the structure, there being lateral passageways establishing communication between ramp floors and adjacent ramps at points where the planes of the ramps and ramp floors intersect.

3. A built up garage structure which includes, in combination, a set of inclined longitudinally extended ramp floors which are located one above another on the same side of a longitudinally extended vertical plane, and are parallel with each other, another set of longitudinally extended ramp floors which are inclined in the opposite direction and are located on the opposite side of said vertical plane and are disposed one above another, and transversely extended balconies which establish communication between the high ends of the ramp floors on one side of said vertical plane and the adjacent low ends of ramp floors on the other side of said vertical plane, thereby forming a continuous winding incoming road system on which automobiles may run from the bottom to the top thereof, the inclined parts of said road system having car storage stalls along their sides, and an outgoing road system which is located outside of and winds around the incoming road system and comprises longitudinally inclined ramps which are located adjacent the sides of the structure and alongside of the inclined ramp floors of the incoming road system and are inclined oppositely to the ramp floors to which they are adjacent, and balconies which establish communication between the high ends of ramps on one side of the structure and low ends of ramps on the other side of the structure, there being lateral passageways establishing communication between ramp floors and adjacent ramps at points where the planes of the ramps and ramp floors intersect, said lateral passageways and the outgoing ramps

with which they communicate lying in the same plane substantially as the adjacent ramp floors with which they communicate.

4. A built up garage structure which includes, in combination, a set of inclined longitudinally extended ramp floors which are located one above another on the same side of a longitudinally extended vertical plane and are parallel with each other, another set of longitudinally extended ramp floors which are inclined in the opposite direction and are located on the opposite side of said vertical plane and are disposed one above another, and transversely extended balconies which establish communication between the high ends of the ramp floors on one side of said vertical plane and the adjacent low ends of ramp floors on the other side of said vertical plane, thereby forming a continuous winding road system on which automobiles may run from the bottom to the top thereof, the inclined parts of said road system having car storage stalls along their sides, and another continuous winding roadway system comprising inclined ramps which are located between and are parallel with the correspondingly inclined floors of the first named road system, and other oppositely inclined longitudinally extended ramp floors which are located between and are parallel with the correspondingly inclined ramp floors of the first named road system, and balconies which are located between the balconies of the first named road system and which establish communication between the high ends of the inclined ramp floors of the second system, and the adjacent low ends of the ramp floors of said system there being a lateral passageway which establishes communication between a ramp floor of the first system and a ramp floor of the other system,—the inclined parts of the second road system having also car storage stalls along their sides and an outgoing road system which is located outside of and winds around the incoming road system and comprises longitudinally inclined ramps which are located adjacent the sides of the structure and alongside of the inclined ramp floors of the incoming road system and are inclined oppositely to the ramp floors to which they are adjacent, and balconies which establish communication between the high ends of ramps on one side of the structure and low ends of ramps on the other side of the structure there being lateral passageways establishing communication between ramp floors and adjacent ramps at points where the planes of the ramps and ramp floors intersect.

In testimony whereof, I hereunto affix my signature.

ARTHUR COBB.