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GARAGE CONSTRUCTION

Filed June 13, 1938

2 Sheets-Sheet 1

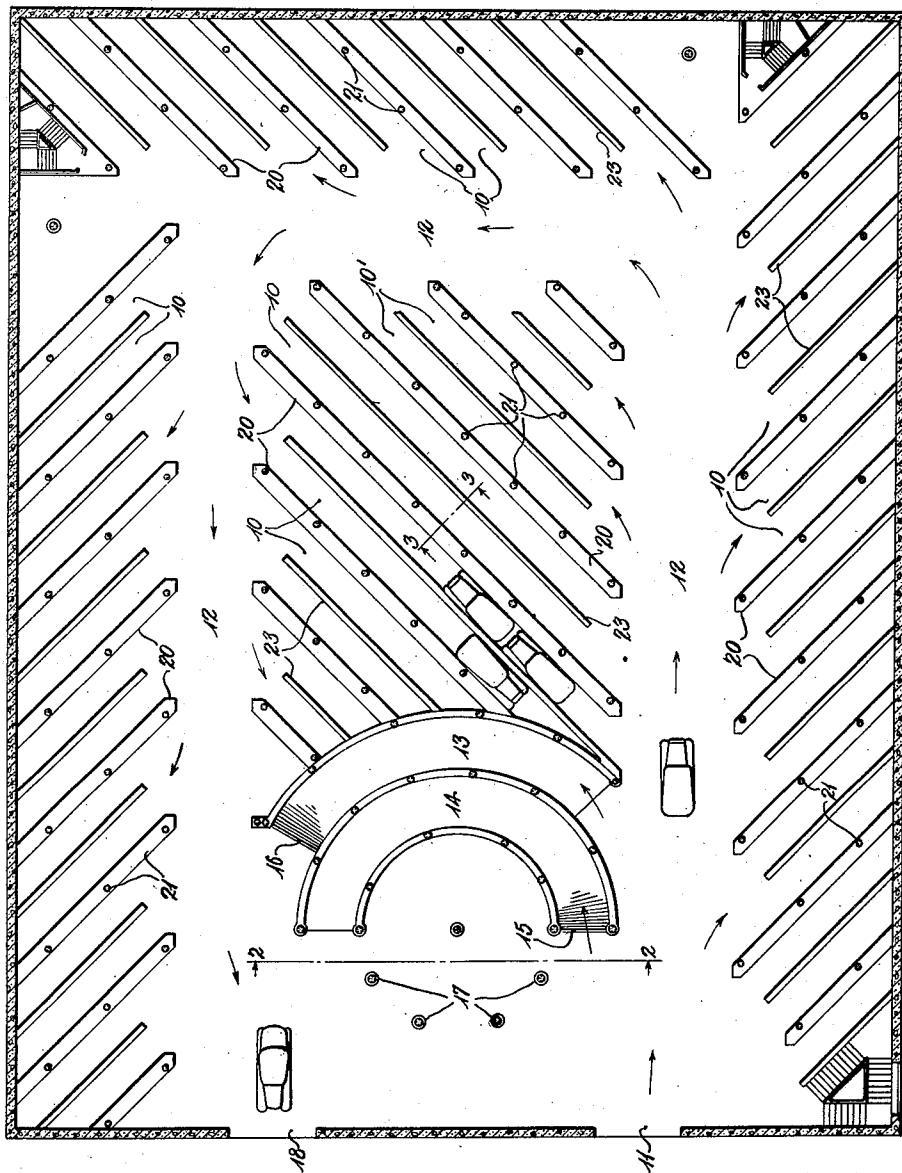


Fig. 1.

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2 Sheets-Sheet 2

Fig. 2.

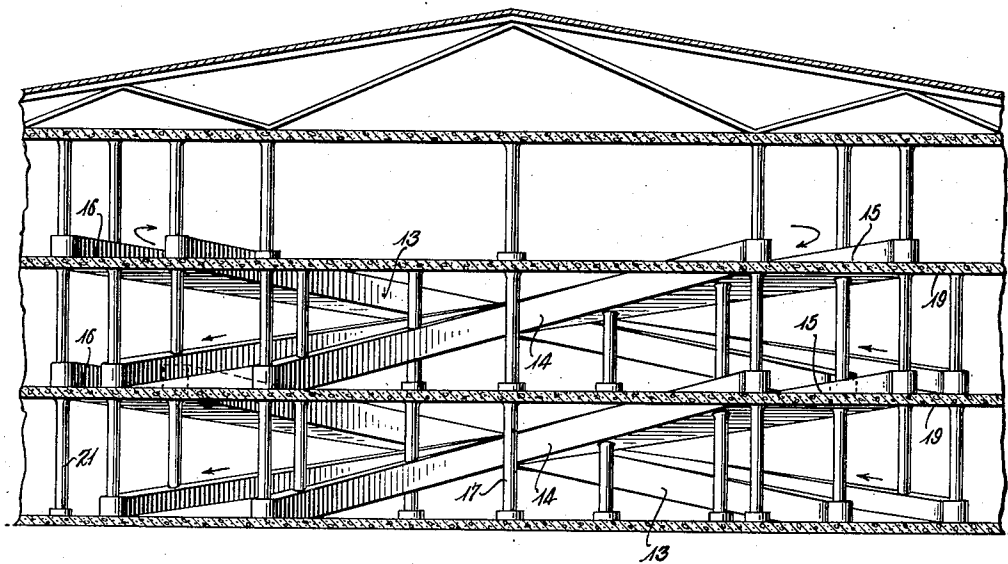
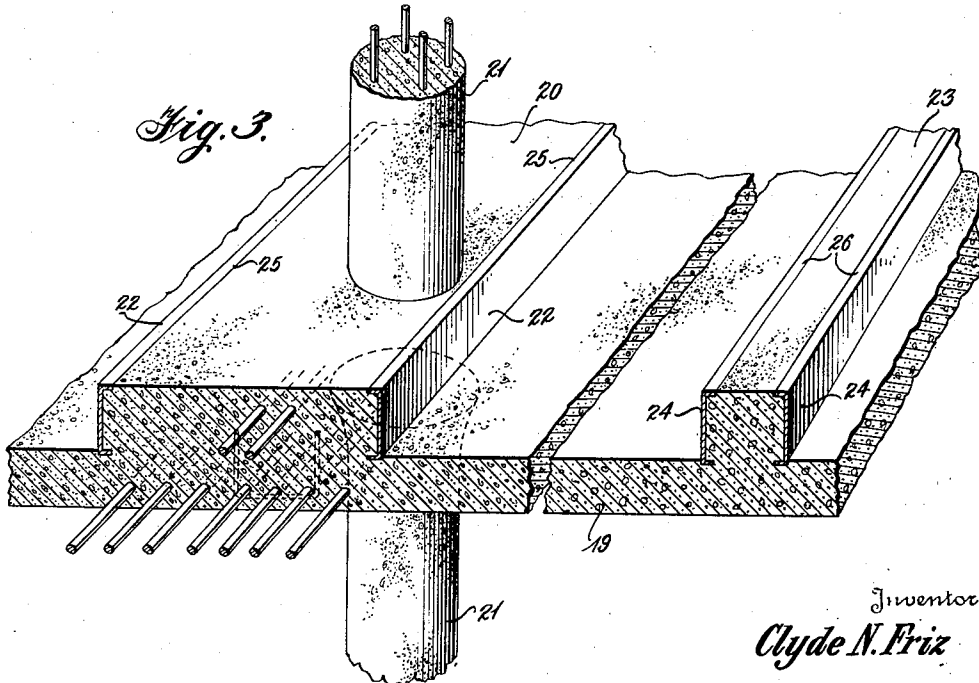


Fig. 3.



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GARAGE CONSTRUCTION

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10 Claims. (Cl. 20—1.13)

The invention relates to garages and has as an object the structure of a garage which enables the utilization of the well-known diagonal parking practice to the fullest advantage.

5 It is a further object of the invention to provide a garage constructed with floor slabs having stiffening elements arranged diagonally of the structure in order to utilize the diagonal parking principle with a saving of head room.

10 It is a further object of the invention to provide a garage planned for diagonal parking in which vehicles passing by means of ramps from floor to floor and also circulating upon the respective floors all move in the same direction
15 from inlet to outlet.

It is a further object of the invention to provide a garage equipped to effectively prevent contact between cars maneuvered therein.

20 It is a further object of the invention to provide a garage so arranged that drivers will naturally and perforce follow the correct path from floor to floor and on each floor to avoid confusion and car damage.

25 It is a further object of the invention to provide a garage having ramps placed in advantageous relation to the storage space on the respective floors.

30 It is a further object of the invention to provide a building having floor slabs stiffened by members extending above the level of the floor.

35 Further objects of the invention will appear from the following description when read in connection with the accompanying drawings showing an illustrative embodiment of the invention, and wherein:

Figure 1 is a plan view of a typical floor showing the location of the parking stalls and ramps;

Fig. 2 is a detail vertical section on line 2—2 of Figure 1 showing ramps in side elevation; and

40 Fig. 3 is a detail perspective view partially in vertical section on line 3—3 of Figure 1.

45 Figure 1 illustrates a plan view of a floor taken as the ground floor of the structure. The floors above or below this level will be substantial duplicates of this plan with the exception that the inlet and outlet doors will be omitted.

50 As shown, the stalls 10 for the vehicles are arranged diagonally in such manner that cars entering the inlet door 11 must be driven into any stall head-on and almost necessarily must circulate around the driveways 12 in the direction of the arrow to secure access to any stall. The longest stalls in the central block are shown for purposes of illustration as of a length to accom-
55 modate four cars of which two may be driven in

from the right hand end and the remaining two by following the driveway 12 around to the left hand side to be driven in therefrom. In the arrangement shown the outside stalls each accom-
modate two vehicles.

6 Drivers entering the door 11 may go to ramp 13 or along aisle 12. They cannot get the wrong ramp as the entrance to ramp 14 is at the floor above. They can only drive into a large majority of the stalls head on as there is not room to turn
10 around, at least without great difficulty. The cars moving in the passages on each floor must therefore all move in the same direction. The stalls 10 involve a 135° turn in order to be entered at their far end. Preferably three or four
15 cars will be driven into these stalls from their right hand end. However it is possible to back a car into these stalls from their left hand end, in which case they will depart from them in the direction of general movement.

20 The ramp 13 is indicated for upwardly passing vehicles and the ramp 14 for downwardly passing vehicles, the end 15 of the ramp 14 being situated at the floor above, as indicated in Figure 2, which figure shows two floors above the one shown in
25 Figure 1. Therefore cars entering the door 11 and bound for an upper floor will pass into the ramp 13 to reach the second floor at 16 and if bound for a third story will pass around the columns 17 at the second story to the lower end of
30 the ramp 13 upon its way to the said third story.

35 Cars descending from an upper story entering at 15 will, if upon the ramp between the second and first stories, be delivered contiguous to the outlet door 18 moving in the same direction as
outbound cars from the ground floor passing by way of driveway 12 upon that floor.

40 The space inside of columns 17 and the ramps may be used for storage of vehicles or if upon the first floor may be used for office or shop stand
purposes if desired.

45 Provision of the columns 17 on an arc of a circle coaxial with the arcs of the ramps insures that cars will not turn too short between ramps, and will be in a position to properly enter the
next ramp on the way up or down and cannot
well attempt to cut in ahead of other cars.

50 The sides of the ramps should be as shown raised to such a height, say two feet, as to make it impossible for a car out of control to jump out
of the ramp. If desired the ramps may be entirely enclosed but for purposes of visibility it is preferred to have them open, at least adjacent their
ends, in order that a driver may see a car ap-
55

proaching the ramp space or the outlet door on the floor being approached.

The location of the ramps in relation to the storage space and doors is important. Cars bound to or from an upper floor do not circulate at all on the respective floors intermediate their destinations, thus providing for the minimum congestion and confusion.

Stairways, for which elevators may be substituted, are shown at corners of the building in what would otherwise be waste space, at least space not usable for car storage.

As shown in Figure 3 the ceiling 19 of each story is flat and unobstructed and may therefore be formed with a clearance but little more than is required by the tallest vehicle to be expected. To stiffen the slabs of the floors without sacrifice of head room, there are shown girder members 20 supported upon columns 21, the girders and columns being placed diagonally and serving as means for providing clearance between vehicles, the edges of the girders providing curbs 22.

Since the span between the columns 21 may readily be made in excess of the width of one vehicle, it is preferred to make this span the width of two vehicles plus the necessary clearance. To prevent contact between the cars, a curb or rib 23 is shown between each pair of girders 20, the thickness of the rib 23 being sufficient to provide merely a sure clearance between the running-boards and fenders of cars upon opposite sides thereof when the wheels are in contact with the curbs 24 provided by these ribs, and the height such as to allow running-boards to lap over them. To take the wear of rubbing wheels against the curbs 23, 24, there are desirably faced with steel channel sections 25, 26, as shown. These channel sections may be utilized as forms in the placing of the concrete.

The width of the girders 20 is shown as sufficient to provide a cat-walk for drivers leaving cars, to give them access to the driveway 12 for egress from the building. In order to utilize this passageway to the best advantage, the columns 21 are shown as placed off center upon the girders 20. The upper ends of the columns 20 may be mushroomed, as shown, to an extent which will not interfere with the roofs of the cars.

Girder and slab floors as now in use are always constructed with the girder below the slab and the lower portion of the girder is in tension resisted by the steel. Building codes and authorities enforcing the same will give no credit for an 8 or 10 inch girder placed above the slab for the reason that no T of compression is developed thereby as a result of which the girder will fail under stress by buckling or exploding at its upper central portion. However a girder of a lateral extent around thirty inches is not subject to the objection. I do not regard my curbs 23 as girders for the above reasons.

So far as known to applicant he is the first to provide a stiffening member or girder for a concrete slab floor, placed above the floor and integral therewith, as shown, and considers this feature an element of his invention.

Calculations indicate that a given size of lot provided with the garage of the present invention will accommodate approximately twenty per cent more cars than any practicable garage structure heretofore known, and moreover that by saving of head room an additional substantial percentage of cars may be stored upon the same ground space, producing a combined sav-

ing in construction cost of storage per car of substantially fifty per cent.

In order to secure the full advantage of the invention, a size of lot should be chosen such as to permit of the arrangement shown. If less than two cars lengths are provided on each side of the driveways, the percentage of floor space taken by the driveways mounts very rapidly. If more than two cars are accommodated per stall, an excessive cost for attendants results, as 10 three cars will require two attendants to move the cars out to allow the driver to get the third car. When three or four cars are placed in the stalls 10', as referred to above, one attendant and the driver of one car can still handle the situation, 15 since two cars may move out forwardly or may back out, as required.

It is within the purview of the invention to provide an open parking lot with the division curbs and passageways arranged as upon a single floor of a garage of the invention without columns or roof.

It has been proposed to provide a garage in which the driveways between the stalls in themselves comprise the ramps passing from floor to floor. This structure however is not permissible under fire regulations, and involves danger of accidents should a car go out of control anywhere.

The reinforcement of concrete as shown or as applied in the present invention is conventional.

Because of the arrangement and of the fact that cars are guided in channels when driven into the stalls, it is quite feasible for the driver of the car to place his car himself when entering the garage, without damage to cars owned by others.

A garage of the invention if erected on a space inordinately long for its width as compared with the dimensions shown herein may be constructed with inlet and outlet at each end and also if desired a set of ramps also at each end arranged relative to the inlets and outlets as shown.

Garage structures must be constructed to certain limiting dimensions in the elements of head room, width of passages and stalls. Head room cannot be safely less than seven feet. The necessary safe clearance whether more or less than this amount can be secured by my above-the-slab girders with a saving of from 8 to 10 inches per story. This means that by virtue of my invention in the height of an 8 or 9 story building as now constructed an added story may be had, and the floor space required for the girders is utilized for the necessary passageways between the stalls.

The minimum width for passageways, with rectangular parking is about 26 feet to enable cars to enter and leave stalls without maneuver and with diagonal parking about 21 feet. The widths of stalls must be about 8 feet. By providing two stalls between my above-the-floor girders I am able to utilize a slab between girders of 16 feet, still securing the necessary passageway to and from every parked car, and freedom for spacing columns in diagonal rows as closely as desired. This with the 21 foot passageways for vehicles enables the use of the lightest possible construction, and with the saving of head room explains the stated saving of substantially 50% in construction cost for housing a given number of cars.

Minor changes may be made in the physical embodiment of the invention within the scope of the appended claims without departing from the spirit thereof.

I claim:

1. A structure of the class described comprising, in combination: a substantially level polyg-

onal area; a one-way passage extending continuously parallel with and spaced from all but one side of said area from an inlet to an outlet both at said one side; a series of stalls each projecting at an angle of substantially 45° from the direction of movement of vehicles in said passageway from the passage to the limit of the area; a series of stalls enclosed by said passageway and extending at a like angle thereto; curbing between said stalls; the wheel-facing surfaces of alternate curbing spaced apart a distance to provide a "catwalk" between vehicles in adjacent stalls and the remaining curbing being only sufficient in width to prevent contact between adjacent cars.

2. A structure of the class described comprising, in combination: a plurality of superposed circumscribed areas; a passageway upon each of said areas extending parallel with and spaced from all but one side of each thereof and from an inlet and an outlet both adjacent said one side of each area; a series of stalls arranged about each of said areas on all but said one side of each exteriorly of said passageways, each stall opening from said passageways at an angle of substantially 45° thereto; a series of stalls in the spaces circumscribed by said passageways and each opening therefrom at a like angle thereto; a pair of ramps connecting each of said superposed areas comprising an "up" and a "down" ramp in each pair in X relation to each other; said ramps opening adjacent said one side of each area and adjacent the inlet and outlet ends respectively of said passageways; and a common passageway on each of said areas except the first, connecting the entrances of the "up" and "down" ramps leading therefrom, whereby all vehicles moving in the structure shall travel in the same direction.

3. The combination of claim 2 in which substantially all of said stalls have a length to accommodate a plurality of cars each.

4. A structure of the class described comprising, in combination: a plurality of reinforced concrete, superposed floors of polygonal outline, a passageway upon each of said floors extending parallel with and spaced from a plurality of the sides thereof; stalls opening diagonally from each side of said passageways; stiffening girders for said floors cast integral therewith, projecting thereabove, and serving to delimit said stalls; rows of supporting columns rising from certain of said girders to the ceiling of the respective stories; said girders and rows of columns placed diagonally of the entire structure.

5. The combination of claim 4 wherein the width of alternate girders exceeds the thickness of said columns to provide a cat-walk between said stalls.

6. A structure of the class described comprising, in combination: a plurality of reinforced concrete, superposed floors of polygonal outline; the lower surface of each floor dividing said stories formed substantially in a single plane surface throughout; a passageway upon each of said floors extending parallel with and spaced from the sides thereof; stalls opening diagonally from each side of said passageways; stiffening girders for said floors cast integral therewith, projecting thereabove, and serving to delimit said stalls; rows of supporting columns rising from alternate girders to the ceiling of the respective stories; said alternate girders of a width equal to the thickness of said columns plus a cat-walk between adjacent stalls; the remaining girders of a width merely to provide safe clearance between fenders of vehicles in the stalls on opposite sides thereof.

7. The combination of claim 6 wherein the columns are spaced from one side of the wide girders only sufficiently to provide a safe clearance from the fenders of vehicles in the stall adjacent thereto to provide cat-walk space at one side only of said wide girders.

8. A structure of the class described comprising, in combination: a substantially level circumscribed area; a U shaped passageway for one way traffic on said area; a series of two car length stalls exteriorly of said passageway and opening thereto at an angle acute to the direction of traffic; a series of four car length stalls extending between the parallel portion of said passageway and each opening into each of said portions at an acute angle.

9. A reinforced concrete garage structure comprising, in combination: a substantially rectangular floor slab; a plurality of parallel girders extending diagonally or integral with, and extending upwardly from said slab; said girders spaced to provide stalls for a plurality of vehicles between adjacent girders; the lateral extent of each girder sufficient to develop the necessary resistance to compressive stresses for service as a girder and for use as a cat walk between adjacent vehicles in said stalls.

10. A reinforced concrete garage structure comprising, in combination: a substantially rectangular building structure; at least one floor structure dividing said building structure into stories; said floor structure having a substantially planar lower surface; said floor structure formed integrally with girders projecting above its upper surface of a lateral extent sufficient to develop girder resistance to compressive stresses; said girders extending diagonally of the building structure and spaced apart to receive a plurality of vehicles therebetween.

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