July 24, 1934. D. L. LINDQUIST 1,967,832

ELEVATOR ARRANGEMENT

Filed April 23, 1930 2 Sheets-Sheet 1

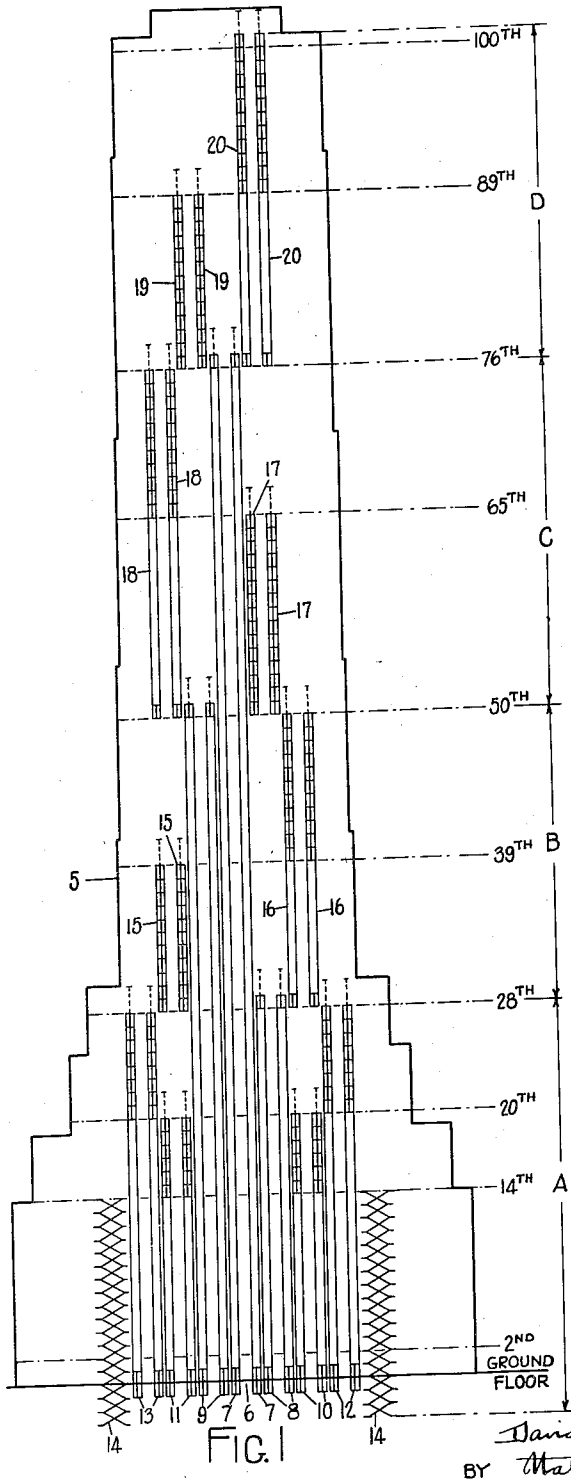


FIG. 1

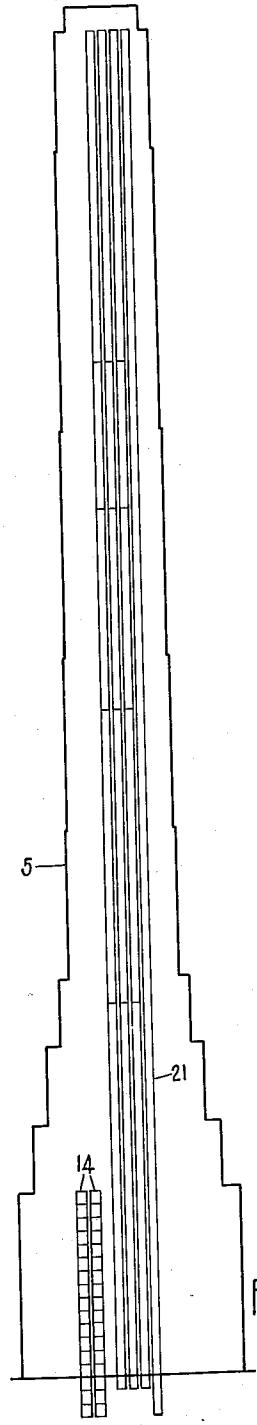


FIG. 2

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Filed April 23, 1930 2 Sheets-Sheet 2

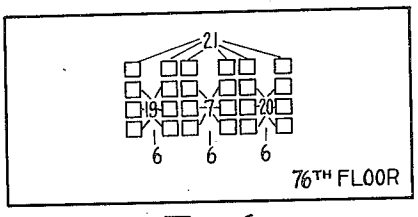


FIG. 6

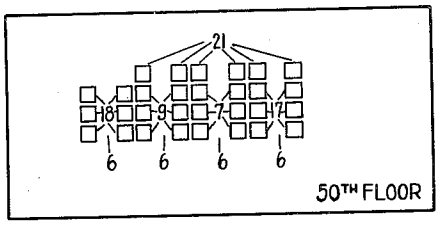


FIG. 5

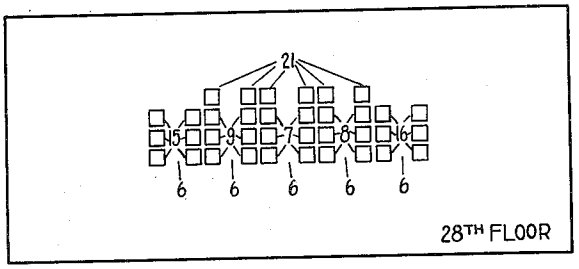


FIG. 4

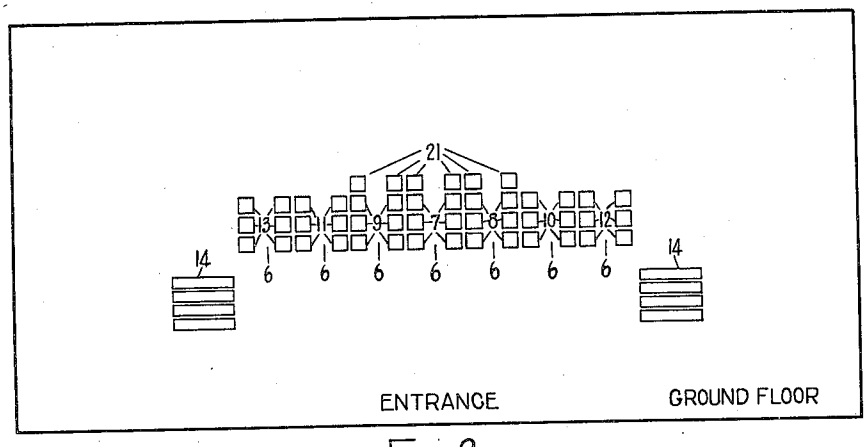


FIG. 3

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Patented July 24, 1934 1,967,832

UNITED STATES PATENT OFFICE

1,967,832

ELEVATOR ARRANGEMENT

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Application April 23, 1930, Serial No. 446,588

2 Claims. (Cl. 187—1)

This invention relates generally to elevators and refers especially to a novel system of arranging the same in high buildings.

An important factor in determining the height to which a building may be erected is that of elevator transportation. In consideration of the size of the plot and the set-back regulations, the building height is limited by the space required for the elevators. With increasing land values and the erection of higher buildings the importance of reducing the space occupied by elevators to a minimum becomes of vital consideration. The set-back regulations, in order to insure adequate light and air for the building and adjacent buildings, generally require that above a specified point the tower cross-sectional area should not exceed a certain percentage of the plot area. If the usual elevator arrangement for servicing the upper floors is adhered to, the shafts of the elevators for these floors must be carried the entire height of the building, and thus the major portion of a tower above a certain height may be taken up by elevator shafts. The principal object of the present invention is to remedy this situation by providing a system whereby the elevator shafts are combined in such manner as to economize space.

One feature of the invention resides in superposing the hatchways of certain elevators on the hatchways of certain other elevators.

Another feature of the invention is to provide an elevator arrangement in which certain elevators run express from a main terminal floor of a building to different floors, arbitrarily designated secondary terminals, and other elevators serve other floors of the building from the secondary terminal floors.

A third feature of the invention involves superposing the hatchway of each of the elevators, which serve other floors from the secondary terminals, on the hatchway for an elevator serving floors below.

Other features and advantages become apparent from the following description and appended claims.

The invention involves the provision of elevators which run express from a main terminal of a building to different secondary terminals. These secondary terminals are suitably spaced to accommodate different sections of the upper part of the building. Shuttle elevators are provided for each of these sections, each shuttle elevator operating to serve floors in its section from the secondary terminal floor for that section. Additional elevators are provided for serving the lower portion of the building and escalators may also be employed if desired. With this arrangement, passengers desiring to be carried to floors in the upper part of the building are carried on the express elevators to the secondary terminal for the section in which their destination is located, where they transfer to a shuttle elevator to complete the trip.

In another aspect the invention involves superposing the hatchways of the shuttle elevators on the hatchways for elevators serving floors below. These latter hatchways may be for express elevators, for elevators serving the lower portion of the building or for shuttle elevators serving another section of the building.

For the purpose of illustrating the genus of the invention a typical concrete embodiment is shown in the accompanying drawings in which:

Figure 1 is a diagrammatic view illustrating the arrangement of elevators in a building, as viewed from the front thereof;

Figure 2 is a side view of the same; and

Figures 3, 4, 5 and 6 are floor plans taken at various levels within the building.

The particular embodiment of the invention shown comprises a building 5, the various floors of the same being designated by legend. For convenience, the building will be regarded as divided into four sections, A, B, C and D, section A including the first twenty-seven stories and the basements, B including stories 28 to 49 inclusive, C stories 50 to 75 inclusive, and D the remaining top portion of the structure. As illustrated, the part of the building above the 30th floor is the tower and the part below this floor constitutes the main building.

According to the present invention sections B, C and D are each served by a group of express elevators running from the ground or main terminal floor to intermediate floors 28, 50 and 76 respectively. These intermediate floors serve as terminals and may be termed secondary ground or secondary terminal floors. Each section B, C or D is also served by groups of shuttle elevators running from its terminal floor to other floors of the section. The elevators which make the longest runs in the building are those of the express group extending to floor 76. These elevators are designated by the numeral 7 and are located as nearly as possible to the center of the building. This group is arranged in a pair of banks of three elevators each, separated by an entrance corridor or aisle 6 so that a prospective passenger may observe the signals of all the elevators in the group. Express elevators 8 and 9

for the 28th and 50th floors respectively are disposed in similar groups with one bank of each group arranged in back-to-back relation with each of the banks of the 76th floor group. The express groups thus occupy the central portion of the building and the banks of each group are disposed parallel to the sides of the building.

In section A, four groups of local elevators 10, 11, 12 and 13 are arranged in opposed banks of three elevators each. One bank of each of groups 10 and 11 is disposed in back-to-back relation to the other banks of the 28th and 50th floor express groups respectively and one bank of each of groups 12 and 13 are arranged back-to-back relative to the other banks of groups 10 and 11 respectively. The first fourteen floors of the main building and the basements may be served by locals or by escalators such as those designated by numeral 14 in Figures 1, 2 and 3. The elevators 10 and 11 are express from the first to the fourteenth floor and local from the fourteenth to the nineteenth. Elevators 12 and 13 run express from the first floor to the twentieth and local from that floor to the twenty-seventh.

Referring particularly to Figures 4, 5 and 6 and section B of Figure 1, the first shuttle elevators and their arrangement will be seen. A group of elevators designated 15 serves locally floors 28 to 38 inclusive and a second group of elevators 16 serves locally floors 39 to 49 inclusive, running express to the 39th floor from terminal floor 28. Elevators 15 and 16 are located in hatchways disposed directly above the hatchways of local elevators 11 and 10 respectively. In section C of the building the shuttle elevators are designated as 17 and 18 and are located directly over express elevators 8 and shuttle elevators 15 respectively. Service from the ground floor to secondary terminal floor 50 is obtained through express elevators 9. Shuttle elevators 17 and 18 serve section C in two zones such as from 50 to 64, and 65 to 75. Section D is served from the ground floor by express elevators 7 to the terminal floor 76, and shuttle elevators 19 and 20, located directly over express elevators 9 and shuttle elevators 17. The lower zone of section D is elevatored by shuttles 19 running locally from floor 76 to 88 inclusive and the upper zone by shuttle 20 running express from 76 to 89 and local from that floor to floor 100. Depicted in Figures 2, 3, 4, 5 and 6 in the same lines with the express elevators 7, 8 and 9 are six elevators 21 which run from the basements to the top of the building. Elevators 21 may be employed for service, interfloor or night traffic as desired and may be arranged to stop at every floor. For clearness, these elevators are not shown in Figure 1. The particular arangement of elevators 21 and the escalators or locals to the fourteenth floor and basements is not material to the present invention.

Attention is directed in Figures 1 and 2, to elevators 7, 8, 9, 10, 11, 12 and 13 in which certain or all cars of each group may descend to the first basement or subway level so as to afford two entrance levels. This is particularly desirable in the event that two levels are readily available such as afforded by a difference in street levels, city subway terminals in or accessible to the basement, or other conditions. This divides the number of prospective passengers at each level and lessens the congestion in the entrance corridors 6.

Other arrangements of the elevators and the aisles or corridors may be employed such as disposing the express elevators for the seventy-sixth floor in banks of three each in back-to-back relation and at the center of the building. At the ground floor of the building, in this arrangement, there would be extending from the vertical centerline toward each of the sides of the building: a bank of express elevators to the seventy-sixth floor, an aisle, a bank of express elevators to the fiftieth floor, a bank of express elevators to the twenty-eighth floor in back-to-back relation to those going to the fiftieth, an aisle, a group of locals in banks of three elevators each in back-to-back relation serving floors 14 to 19 inclusive, an aisle, another similar group of locals serving floors 20 to 27 inclusive, an aisle and other locals or escalators serving the first fourteen floors and the basements. The shuttle elevators for sections B, C and D would be disposed over the express elevators running to the twenty-eighth and fiftieth floors and the local elevators terminating at the nineteenth floor. Other arrangements of the elevators and aisles may be employed which are adaptable to the particular shape of the building in which they are to be installed. Also, the installation may be varied in other ways. For example, the secondary terminal floors of sections B, C and D may be at an intermediate floor rather than at the lower floor of the section. For example, floors 38, 64 and 88 may be made the secondary terminal floors, in which case express elevators 8, 9 and 7 would run to these floors and shuttle elevators 16, 18 and 20 would start from these floors, thus omitting the express runs of these shuttle elevators.

With the arrangements thus described, a person desiring to go to any floor in the tower of the building except the secondary terminal floors can reach the same by taking an express elevator to the secondary terminal floor of the section which includes the desired floor, transferring there and taking the proper shuttle elevator to his objective. For the terminal floors a person need only take an express elevator. In the main building the floors may be reached by the locals or escalators. In leaving the building from all floors of sections B, C and D except the secondary terminal floors a person can reach a main terminal floor by taking a shuttle elevator to the secondary terminal floor of the section and transferring to an express which goes to a main terminal floor.

Interfloor traffic may be handled by way of a main terminal floor. This traffic in the case of a diversified tenancy building would be very light as compared with the peak traffic occurring during the filling and emptying the building. If desired, certain of the elevators 21 could be used to handle interfloor traffic. At other than peak periods express elevators 7, or a part of these, could stop at floors 50 and 28 and be used in conjunction with shuttle and local elevators or in conjunction with certain of elevators 21 for handling interfloor traffic. As a further aid to the handling of interfloor traffic, elevators 12, 13, 16 and 18 may be run to the secondary terminal floors 28, 50 and 76 instead of to the floors below as shown.

The principal advantage inherent in the use of a system of superposed elevators in high buildings, over the usual direct arrangement, in which all elevators run to a main terminal or ground floor, lies in the space saved in the building. A direct system having an equal number of elevators of the same capacity as those employed in the shuttle system may handle during the same period of time, about three per cent more people

due to the time saved by obviating the transfer from express to shuttle elevators and vice versa; but it also consumes about fifty per cent more space in the building. Whereas, by increasing the capacity of the elevators or the number of elevators in the superposed system approximately three per cent, an arrangement is effected which has the same handling capacity per unit time as the direct system but takes about sixty-nine per cent of the space required by the direct system. Thus, the superposed system affords a saving in required elevator space of about forty-five per cent. The space in buildings, which is valuable for offices and the like is that around the outside walls where light and air are available. In high buildings, a certain amount of office space must be available in the tower structure in order that the building may be economically feasible. The elevators, according to the arrangement described, take up space only in the center of the building and the saving in floor space involved insures that the elevators do not encroach upon the space which is usable for offices in the tower structure. Thus, in high buildings on large plots a maximum of office space is provided by the superposing of the elevators according to the invention and in high buildings on small plots sufficient usable office space is insured to render such buildings entirely practical. A saving in the cost of the construction of the building is also effected by the superposed system inasmuch as only about two-thirds of the number of floor openings would be required.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description and showing shall be interpreted as illustrative and not in the limiting sense.

What is claimed is:

1. An elevator installation for a high building comprising; a first elevator hatchway extending from the ground floor of the building to a floor at least twenty floors above; an elevator car operating in said first hatchway and serving only said ground floor and said floor above; a second elevator hatchway extending upwardly from said floor above and through a zone of at least seven floors; an elevator car operating in said second hatchway and serving said floor above and each of the floors in said zone; a third elevator hatchway extending from the ground floor of the building to a floor above the uppermost floor of the second hatchway; an elevator car operating in said third hatchway and serving only said ground floor and said floor above the uppermost floor of the second hatchway; a fourth elevator hatchway extending upwardly from the uppermost floor of the third hatchway and through a zone of at least seven floors; and an elevator car operating in said fourth hatchway and serving said uppermost floor of the third hatchway and each of the floors in said zone of the fourth hatchway; said first and second hatchways being parallel but in different vertical lines and opening onto the same corridor on the uppermost floor of the first hatchway, said third and fourth hatchways being parallel but in different vertical lines and opening onto the same corridor on the uppermost floor of the third hatchway, the vertical line of the third hatchway being parallel to but different from those of the first and second hatchways while the fourth hatchway is over the first hatchway and its vertical line is the same as that of the first hatchway, all of said hatchways being separate and distinct.

2. A system for elevatoring a building whereby the space taken up by the elevators is minimized without sacrifice of traffic handling capacity comprising, a group of elevator cars operating in hatchways extending from the main floor of the building to a transfer floor in a certain section of the upper part of the building for carrying passengers whose destinations are in said section of the building directly to the transfer floor from the main floor without intervening stops, a group of elevator cars operating in hatchways in said section of the building for receiving passengers from the first named elevators at said transfer floor and distributing them at the floors they desire, a group of elevator cars operating in hatchways extending from the main floor of the building to a second transfer floor in a section of the building above the first named section for carrying passengers whose destinations are in said second section of the building directly to the second transfer floor from the main floor without intervening stops; and a group of elevator cars operating in hatchways in said second section of the building for receiving passengers from the third named elevators at the second transfer floor and distributing them at the floors they desire, the hatchways of the fourth named elevators being superimposed on the hatchways of the first named elevators but being separate and distinct therefrom.

DAVID LEONARD LINDQUIST.