Dec. 19, 1933. A. D. STARK 1,939,729

ELEVATOR SYSTEM

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Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5. Fig. 6.

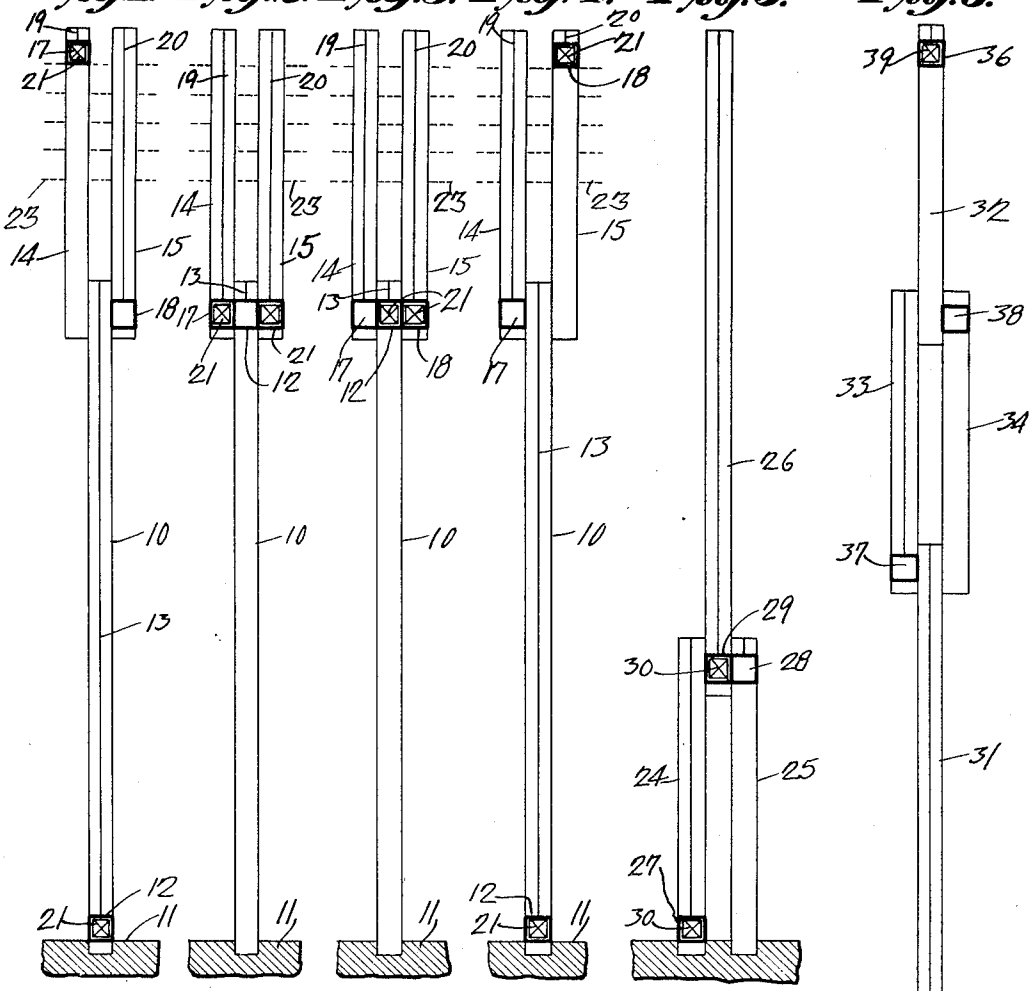
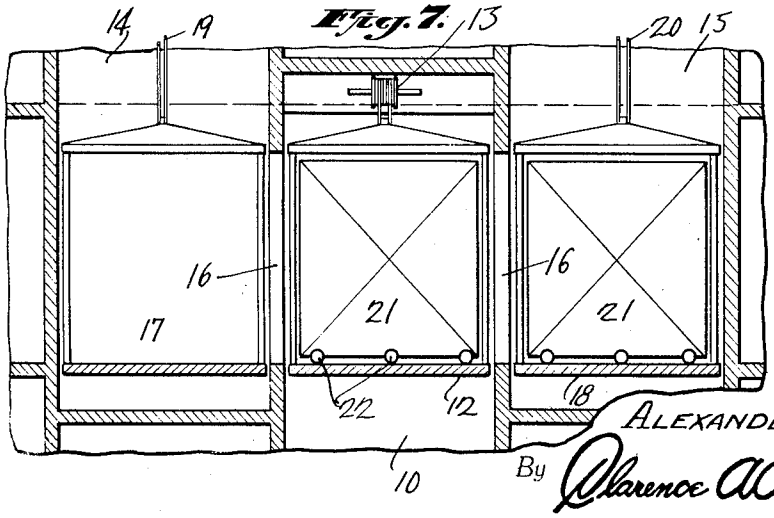


Fig. 7.



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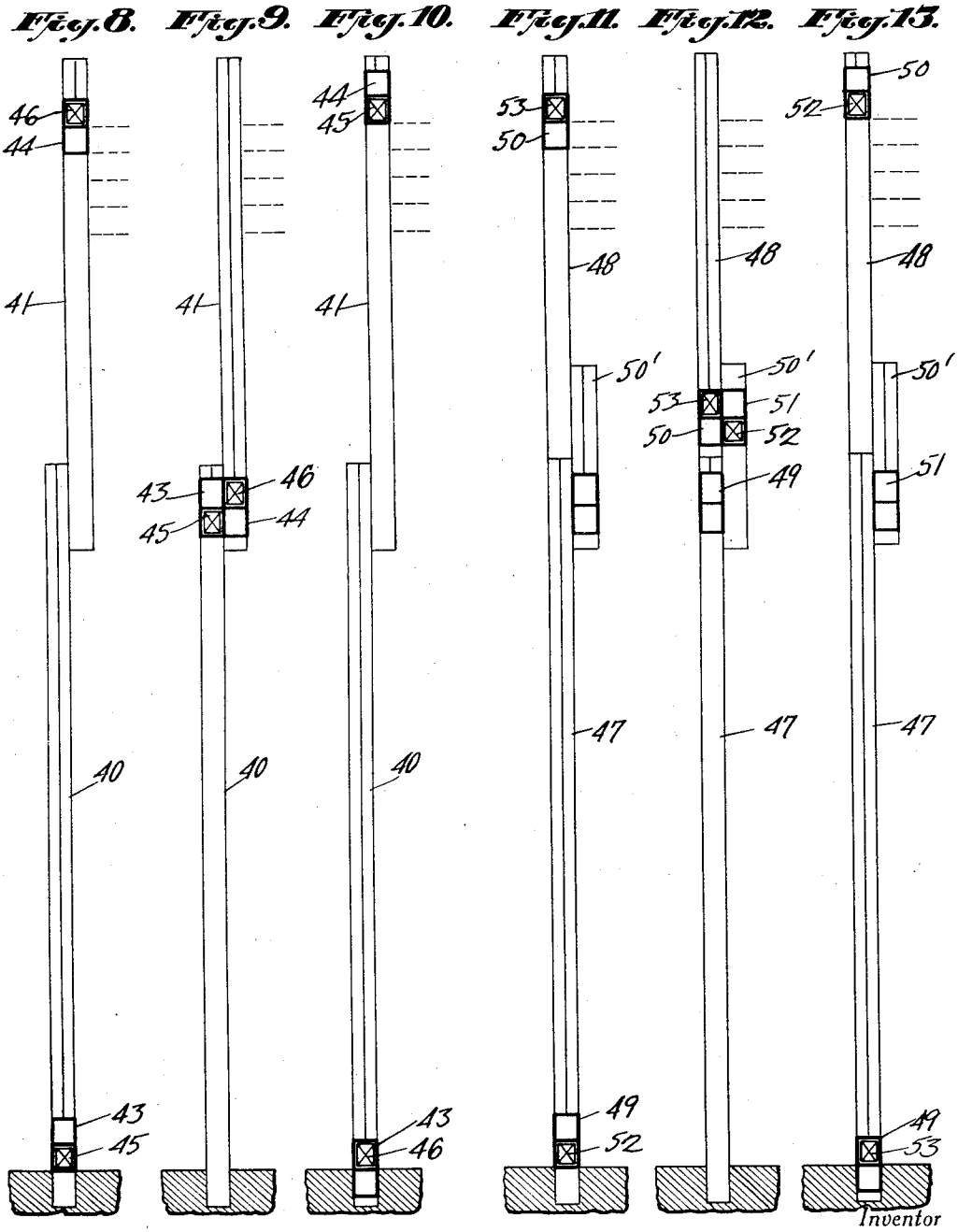
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ELEVATOR SYSTEM

Filed Jan. 29, 1930 3 Sheets-Sheet 2



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ELEVATOR SYSTEM

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Fig. 14. Fig. 15. Fig. 16.

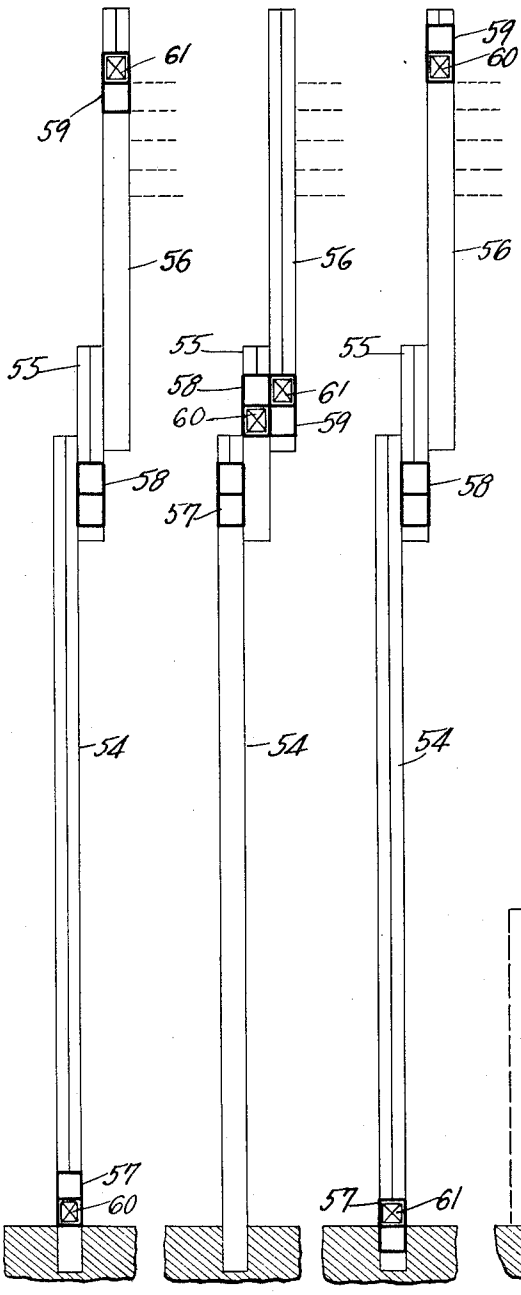
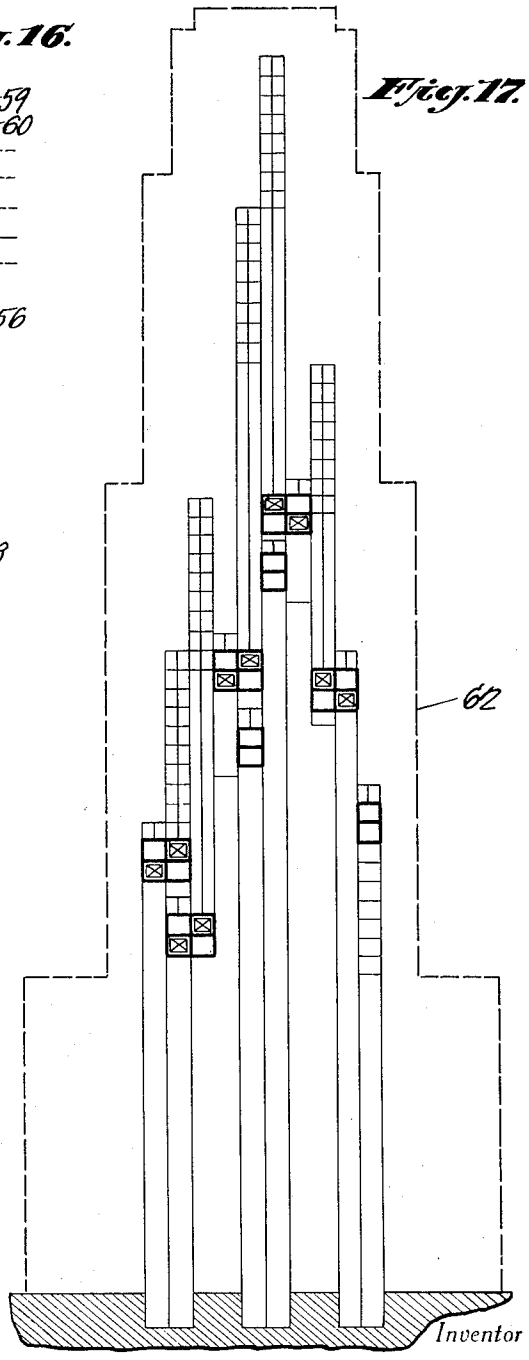


Fig. 17.



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ELEVATOR SYSTEM

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8 Claims. (Cl. 187—1)

This invention relates to improvements in elevator systems for modern buildings of the skyscraper type.

In order to meet the demand for adequate rapid elevator service in tall buildings, many systems have been put into effect, chief among which is the system wherein but one elevator shaft is carried up to the limit allowed by the building structure and which may be very much short of the top of the building, thus requiring passengers to transfer from one elevator to another in order to reach the floor desired. This is most inconvenient to the passengers and further tends to slow up the service, and it is therefore the primary object of this invention to overcome this inconvenience by delivering the passenger directly to the floor desired without changing from one passenger car to another, irrespective of the height of the building.

Another object of the invention resides in a system of elevator service in which a portable passenger car may be shifted or transferred from the conveyor in one elevator shaft of a predetermined length to the conveyor operating in an adjacent communicating shaft and vice versa.

A further object is to provide an elevator system in which the elevator shafts are so arranged that they require but a minimum amount of space, thus effecting a saving in floor space on the floors through which the shaft must pass.

Other objects will appear as the following specification is proceeded with and by reference to the accompanying drawings, in which:

Figures 1 to 4 inclusive are diagrammatic views of the preferred form of my invention and showing the manner in which the passenger cars may be transferred from one elevator shaft to another.

Figure 5 is a diagrammatic view illustrating a slightly modified form of that shown in Figures 1 to 4, inclusive.

Figure 6 is a diagrammatic view showing a further modification.

Figure 7 is an enlarged detail sectional view illustrating the transfer of the passenger cars to the various shafts and which illustrates the cars in the same position as shown in Figure 3.

Figures 8 to 10, inclusive, are diagrammatic views illustrating a further modified form and showing various positions of the passenger cars.

Figures 11 to 13, inclusive, are diagrammatic views of another modification.

Figures 14 to 16 are diagrammatic views of a still further modified form, and

Figure 17 is a diagrammatic view illustrating the system installed in a modern building of the skyscraper type.

In the several views of the drawings I have illustrated my invention diagrammatically and it will be appreciated that various mechanical devices will be used in connection therewith for the purpose of operating the system, but it is not believed necessary to go into detail on such construction.

In Figures 1 to 4, inclusive, I have illustrated the preferred form of my invention wherein the numeral 10 designates an elevator shaft rising vertically from the ground floor 11 of a building structure and which shaft may be carried up any desired number of floors. Movable within the shaft 10 in an up and down direction is a conveyor or lift 12 suspended by the usual lifting and lowering cable 13. Overlapping the top end of the shaft 10 are auxiliary shafts 14 and 15, respectively and which are respectively disposed on opposite sides of the shaft 10, the overlapping portions having communication with the shaft 10 through passages 16 as shown in Figure 7 of the drawings. The auxiliary shafts 14 and 15 may be carried up any desired height and movable therein are conveyors or lifts 17 and 18 respectively, the same being suspended by the usual cables 19 and 20, respectively. Associated with the conveyors 12, 17 and 18 are a pair of passenger cars 21 both of a like construction and which are slidable on wheels or rollers 22, although tracks may be provided within the lifts or conveyors on which the cars may be rolled.

Assume that the system hereinbefore described is installed in a building of the skyscraper type and that certain floors at the top of the building are to be served and which floors are indicated for the sake of illustration by the horizontal dotted lines 23. With one of the cars 21 disposed within the conveyor 12 in the main shaft 10 and the conveyor being in a lowered position at the ground floor 11, and the other car 21 supported upon the conveyor 17 in the shaft 14, and the conveyor 18 in a lowered position within its shaft in alinement with one of the passages 16, it will follow that as the conveyor 12 moves upward in its shaft and making no stop, will reach a horizontal position in alinement with the conveyor 18 approximately at the same time as the conveyor 17 carrying the car 21 moves downward to a position also in alinement with a communicating passage 16, it being understood that the conveyor 17 must stop at the service floors to take on and discharge passengers. The conveyors are now in the position shown in Figure 2

of the drawings at which time the passenger car 21 from the conveyor 12 is shifted over or transferred onto the conveyor 18, after which the car 21 from the conveyor 17 is shifted on to the conveyor 12. The conveyor 12 may now start downwardly in its shaft while the conveyor 18 simultaneously moves upward to take on and discharge passengers on the service floors. When the conveyor 12 reaches the ground floor and the conveyor 18 reaches the limit of its upward movement, the cars 21 may again be moved toward the point of transfer and on this trip, the car 21 from the conveyor 12 is shifted onto the conveyor 17 while the car 21 brought down by the conveyor 18 is in turn shifted onto the conveyor 12 and the various conveyors operated in a manner as that hereinbefore described.

In Figure 5 of the drawings I have shown a slightly modified form wherein the shaft shown in Figures 1 to 4 inclusive have been reversed, that is, I provide a pair of spaced parallel elevator shafts 24 and 25 rising from the ground floor, between which is interposed one end of a shaft 26, the same overlapping the elevator shafts 24 and 25 adjacent their top. The shafts 24 and 25 have lifts or conveyors 27 and 28 respectively, while the central shaft 26 is provided with a conveyor 29. Two cars 30 are used in connection with the three shafts, the conveyors 27 and 28 serving to lift the passenger cars 30 from the ground level to the point of transfer to the conveyor 29 of the shaft 26. The principle involved in this form is identical to that of the preferred form, that is, I provide two branched shafts or sidings in which conveyors are respectively mounted, and which communicate with a single shaft having a conveyor therein, the three conveyors being associated with a pair of passenger cars which may be moved in opposite directions simultaneously.

In Figure 6 I illustrate a pair of vertically alined separate shafts 31 and 32 which are joined by overlapping communicating branch shafts 33 and 34. The shafts 31 and 32 have conveyors or lifts 35 and 36 respectively movable therein while the branch shafts or sidings 33 and 34 are equipped with movable lifts or conveyors 37 and 38 respectively. Associated with the respective conveyors are a pair of passenger cars 39 and in the drawings I have illustrated the two cars in the conveyors 35 and 36, the former being shown at the ground floor level, while the latter is at the top of its shaft. It will be seen that as the conveyor 35 starts upward, the conveyor 36 may move downward and when the conveyor 35 reaches the low level of the conveyor 37, the car 39 may be shunted or shifted from the conveyor 35 to the conveyor 37, while the passenger car 39 in the conveyor 36 upon reaching a horizontal plane with the conveyor 38 may be shunted into the latter conveyor. Thus it will be seen that the upgoing car and the down car may pass each other when moving in opposite directions in the branch shafts 33 and 34, and upon reaching the limit of their movements in such shafts, the cars are again shifted onto the conveyors 35 and 36.

In Figures 8 to 10 inclusive I provide a pair of overlapping offset elevator shafts 40 and 41, the same overlapping each other at their meeting ends and being provided with a communicating passage similar to that shown in the preferred form.

Movable up and down in the shafts 40 and 41 are conveyors or lifts 43 and 44 respectively which are provided with a double compartment or double deck. Associated with the double deck conveyors 43 and 44, are passenger cars 45 and 46 and in Figure 8 of the drawings, the car 45 is shown disposed in the lower compartment of the conveyor 43 while the car 46 is positioned in the upper compartment of the double deck conveyor 44. Assuming that the conveyors are in the position shown in Figure 8 of the drawings, and the conveyor 43 starts its ascension while the conveyor 44 begins its descent and when the conveyor 44 reaches the lower end of its shaft and the conveyor 43 reaches the top of its shaft as shown in Figure 9, the upper and lower compartments of the respective conveyors are disposed on the same horizontal plane.

By shifting the passenger car 45 from the lower compartment of the conveyor 43 and the passenger compartment 46 from the conveyor 44 to the upper compartment of the conveyor 43, the two passenger cars will be interchanged with respect to the conveyors whereupon the conveyor 44 may begin its ascent in its shaft and the conveyor 43 start its descent in its respective shaft.

Figures 11 to 13 inclusive illustrate another modified form in which two separate vertical shafts 47 and 48 are disposed in alinement in which are arranged double deck conveyors 49 and 50 respectively. Overlapping the adjacent ends of the shafts 47 and 48 is a branch shaft or shuttle shaft 50' having a double deck shuttle conveyor 51 movable therein. Associated with the several conveyors are passenger cars 52 and 53 which in Figure 11 are shown as being disposed respectively in the lower compartment of the double deck conveyor 49 and the upper compartment of the double deck conveyor 50. Assuming that the conveyors and passenger cars are in the position shown in Figure 11, it will be seen that as the conveyor 49 starts to ascend and the conveyor 50 starts its descent, the same will in turn reach the top and bottom respectively of their shafts. The conveyor 51 being at the lower end of its shaft will be met on a horizontal plane by the conveyor 49, whereupon the passenger car 52 is moved horizontally into the lower compartment of the double deck conveyor 51, after which the conveyor 51 moves upward to the position shown in Figure 12, at which time the conveyor 50 has reached the limit of its descent, the passenger car 52 then being moved from the lower deck of the conveyor 51 to the lower deck of the conveyor 50 while the pasenger car 53 is being shunted from the upper deck of the conveyor 50 to the upper deck of the conveyor 51. After the shuttle conveyor 51 has made its transfer to the conveyor 50 and moved to a lowered position to transfer the descending car to the upper compartment of the conveyor 49, the latter conveyor is free to start its descent to the ground floor as illustrated in Figure 13 of the drawings.

Figures 14 to 16 inclusive illustrate a further modified form wherein I provide a vertical elevator shaft 54 rising from the ground floor, while overlapping the top of the same and disposed out of alinement therewith is a shuttle or transfer shaft 55 which shaft is overlapped by the lower end of a vertically rising shaft 56, the intermediate shaft 55 having communication with the shafts 54 and 56 at its upper and lower ends respectively. Movable lengthwise of the shafts 54, 55 and 56 are double deck conveyors 57, 58 and 59 respectively, while associated with the several conveyors are passenger cars 60 and 61.

Assuming that the conveyors and passenger cars are in the position shown in Figure 14, wherein the conveyor 57 is at the lower end of its shaft with the car 60 in its lower compartment, while the conveyor 58 is at the lower end of its shaft 55 and the conveyor 59 is at the top of its shaft with the passenger car 61 disposed in its upper compartment. By starting the conveyor 57 upwardly and the conveyor 59 downwardly, the two cars are moving simultaneously in opposite directions, and when the conveyor 57 reaches the top of its shaft, it is disposed on a horizontal plane with the conveyor 58, whereupon the car 60 is transferred to the lower compartment of the double deck conveyor 58. The conveyor 58 then moves upward in its shaft to the position shown in Figure 15 and during which time the conveyor 59 has reached the limit of its downward movement in its shaft, thus positioning the conveyor 59 on a horizontal plane with the conveyor 58. It is now possible to transfer the passenger car 60 from the lower compartment of the shuttle conveyor 58 to the lower compartment of the conveyor 59 and simultaneously transfer the passenger car 61 from the upper compartment of the conveyor 59 to the upper compartment of the conveyor 58, whereupon the conveyor 59 starts its upward trip and the shuttle conveyor 58 moves down to a plane with the raised conveyor 57 at which time the passenger compartment 61 is transferred onto the upper compartment of this conveyor 57, whereupon the said conveyor may start its downward trip to complete the descension to the ground floor of the passenger car 61.

In Figure 17 of the drawings I have illustrated in dotted lines the outline of a modern type building designated by the numeral 62 and which is of the step-in type of architecture. The principle of my improved elevator service system which has been hereinbefore described is shown installed within the outline 62, and it will be seen by reference to the drawings that it is highly adaptable to buildings of the step-back type. By this system considerable floor space is saved and the elevator service is speeded up to a high degree.

While I have shown and described what I deem to be the most desirable embodiment of my invention it will be understood that various details of construction may be resorted to if desired, and I do not desire to limit myself to the structure herein shown and described, nor to anything less than the whole of my invention, limited only by the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:—

1. In an elevator service system, a pair of separate alined elevator shafts having conveyors movable therein, slidable passenger cars carried by said conveyors, means by which the passenger cars of the said conveyors may be interchanged, said means including a pair of auxiliary shafts respectively disposed on opposite sides of the alined elevator shafts and overlapping the same and respectively communicating therewith, and conveyors movable in said auxiliary shaft for receiving the passenger cars from the first mentioned conveyors for transferring the same from one of the alined elevator shafts to the other.

2. In an elevator service system, a pair of separate vertically alined elevator shafts, an elevator siding shaft overlapping the adjacent ends of the alined elevator shafts and communicating therewith, double deck conveyors movable in the respective elevator shafts, and a pair of slidable passenger cars interchangeably shiftable from the double deck conveyors in the vertical alined elevator shafts to the double deck conveyor of the elevator siding shaft.

3. In an elevator service system, a pair of spaced offset elevator shafts having double deck conveyors movable therein, an intermediate shaft overlapping the adjacent ends of said offset shafts and communicating therewith and having a double deck conveyor therein, and a pair of slidable passenger cars shiftable to and from the conveyors in said offset shaft to the conveyor in said intermediate shaft.

4. In an elevator service system, a pair of separate vertically alined elevator shafts, conveyors vertically movable within said alined shafts, a pair of auxiliary shafts bridging the adjacent ends of said vertically alined shafts and communicating therewith, conveyors vertically movable in said auxiliary shafts, a plurality of passenger cars movable to and from the conveyors in said alined shafts to the conveyors in said auxiliary shafts.

5. In an elevator service system, a pair of offset elevator shafts having one of their ends overlapping and communiacting with each other at their overlapping ends, a double deck conveyor movable in each of said shafts, and a pair of slidable passenger cars shiftable to and from the conveyors in said shafts when the same are in horizontal alinement within the overlapping ends thereof.

6. In an elevator service system, multiple offset elevator shafts each shaft having one of its ends overlapping and communicating with an adjacent shaft, a multiple compartment conveyor movable in each of said shafts, and a slidable passenger car contained within one of the compartments of each conveyor, the cars of the respective conveyors being interchangeable relative to the various compartments when the conveyors are stopped at the communicating points in said shafts.

7. In an elevator service system for use in sky scraper buildings, a pair of parallel elevator shafts, the top end of one shaft terminating adjacent the lower end of the other shaft, the adjacent ends of the shaft having direct communication with each other through a lateral passage, a conveyor movable up and down in each of said shafts, slidable passenger cars carried by the conveyors, and means including the lateral passage for directly interchanging the cars from the respective conveyors upon lateral movement of the same through the passage when the conveyor of one shaft is at the top end thereof, and the conveyor of the other shaft is at the bottom of the same.

8. In an elevator service system for use in sky scrapers of the step-back type of architecture, a lower elevator shaft, an upper elevator shaft disposed to one side of said lower elevator shaft, the bottom end of the upper elevator shaft and the top end of the lower elevator shaft terminating adjacent each other and being in direct communication through a communicating passage, a conveyor movable up and down in each elevator shaft, and slidable passenger cars carried by the conveyors, and means including the passage for directly interchanging the cars from one conveyor to the other when the conveyors are at adjacent ends of said shafts.

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