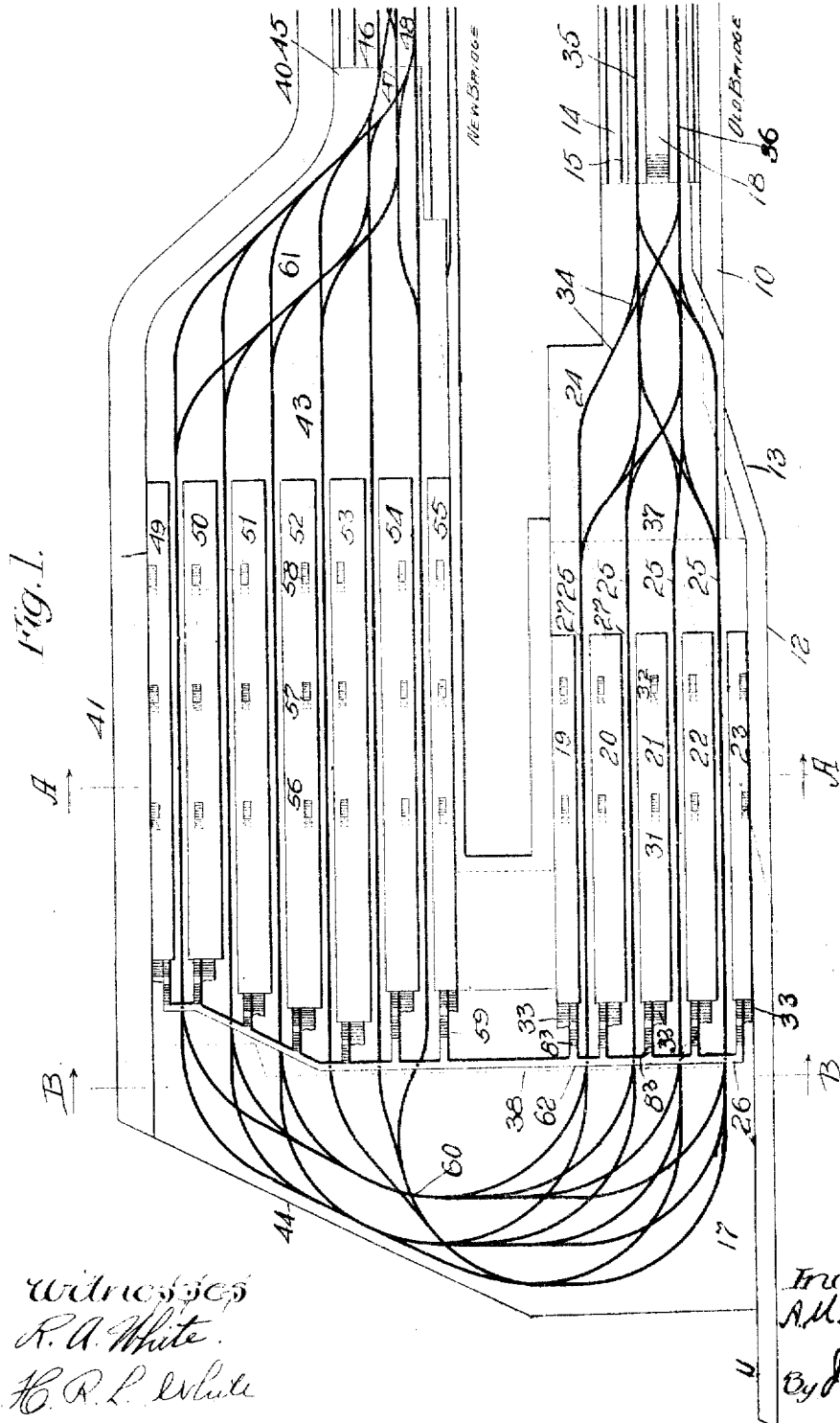


A. M. IRVING.
 TERMINAL PASSENGER STATION AND OTHER RAILWAY STRUCTURE.
 APPLICATION FILED MAR. 10, 1909.

953,169.

Patented Mar. 29, 1910.

4 SHEETS—SHEET 1.



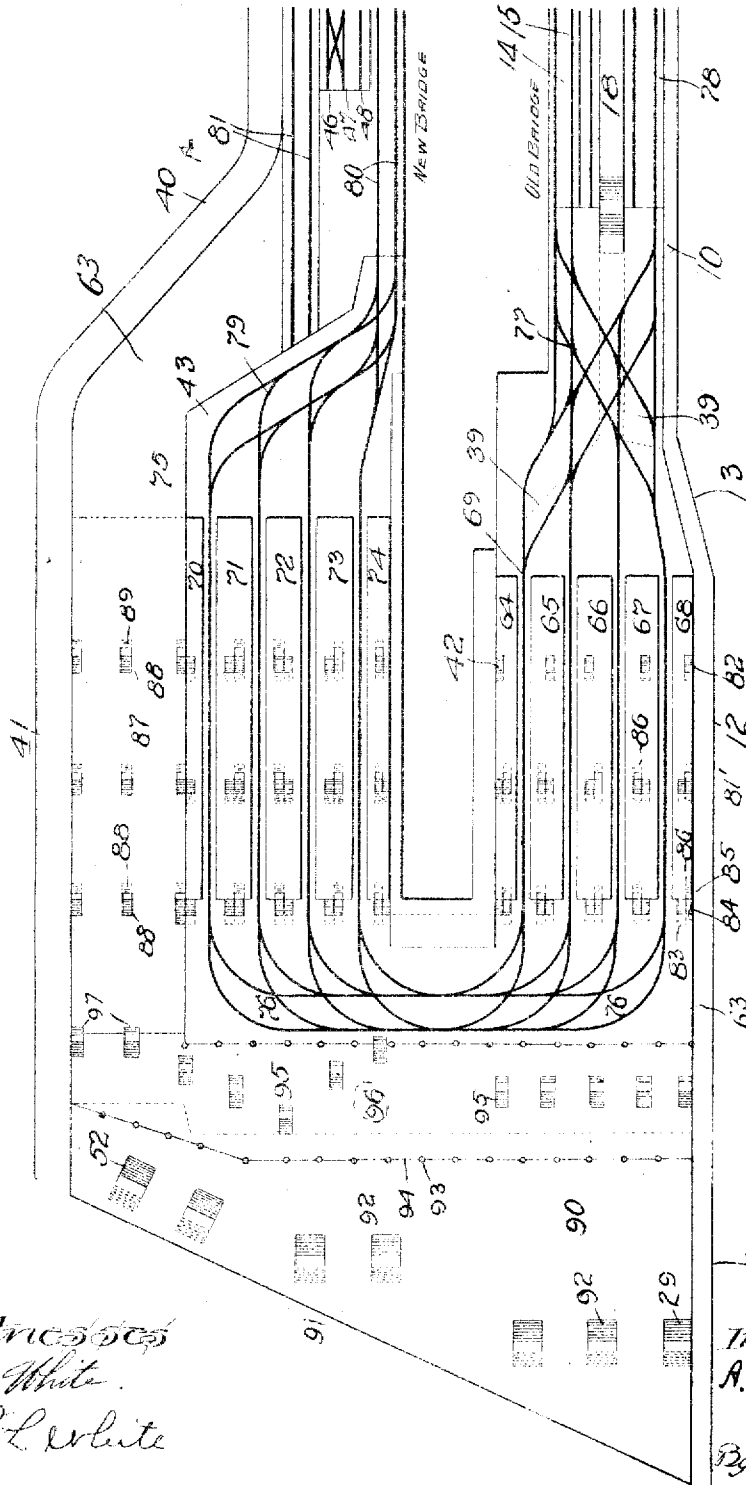
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4 SHEETS—SHEET 2.

Fig. 2.



Witnesses
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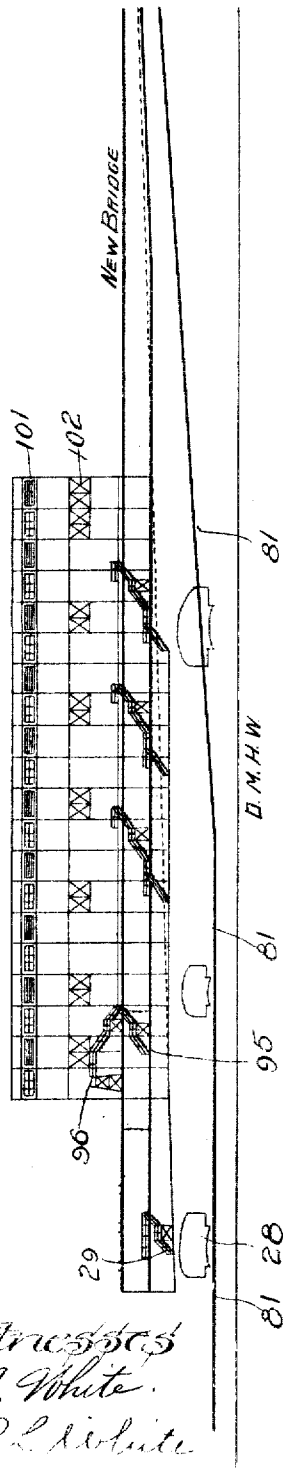
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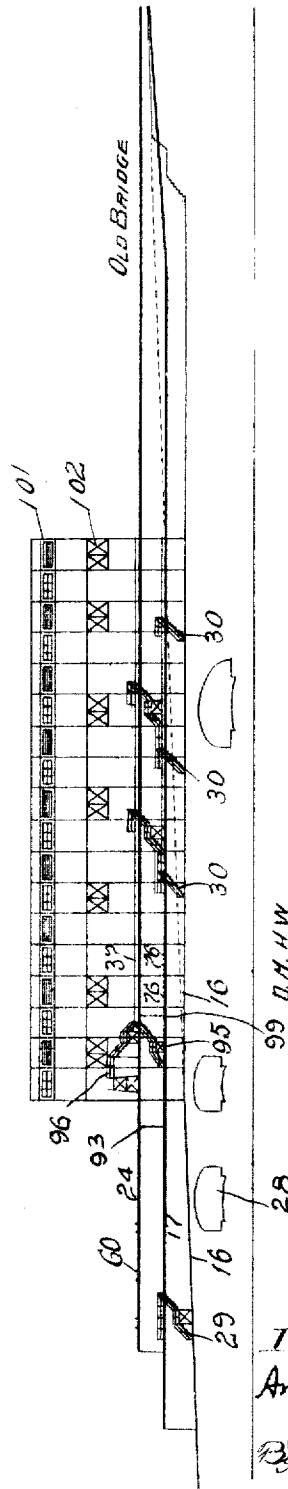
4 SHEETS—SHEET 3.

FIG. 3.



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FIG. 4.



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4 SHEETS—SHEET 4.

Fig. 5.

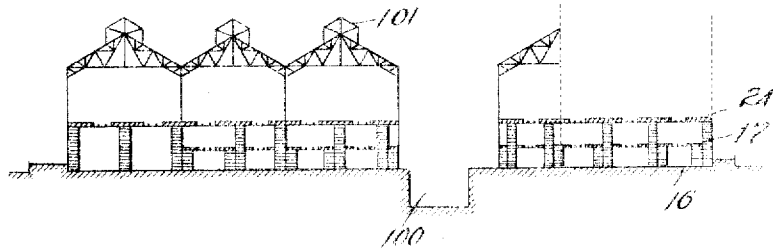


Fig. 6.

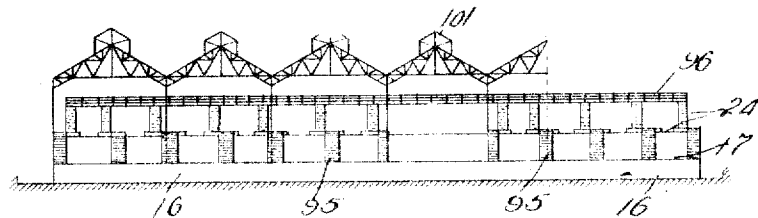


Fig. 7.

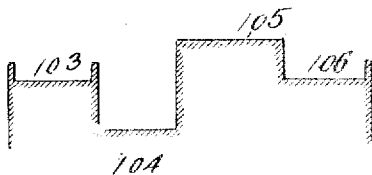


Fig. 8.

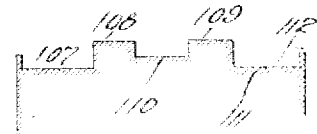
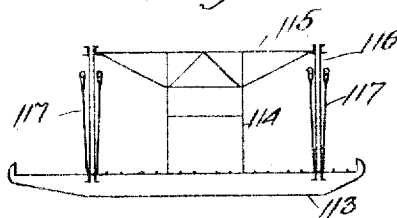


Fig. 9.



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UNITED STATES PATENT OFFICE.

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JOHN C. McFARLAND, OF CHICAGO, ILLINOIS.

TERMINAL PASSENGER-STATION AND OTHER RAILWAY STRUCTURE.

953,169.

Specification of Letters Patent.

Patented Mar. 29, 1910.

Application filed March 10, 1909. Serial No. 482,500.

To all whom it may concern:

Be it known that I, ANDREW MACROBERT IRVING, a citizen of the United States, and a resident of New York, in the county of Kings and State of New York, have invented certain new and useful Improvements in Terminal Passenger-Stations and other Railway Structures, of which the following is a full, clear, and exact specification.

This invention relates to improvements in terminal passenger stations and other railway structures, and particularly those in which there are no intermediate stations and the passenger traffic is substantially greater in one direction in the morning hours and in the opposite direction in the early evening hours, as is the common occurrence with regard to suspension and other passenger railway structures, connecting large cities, an example of which is well illustrated by the Brooklyn bridge connecting the cities of New York and Brooklyn, the capacity of which is limited to a double and single surface trolley car track and to two elevated tracks, the former of which are looped on the New York side and the latter branch into pockets between elevated platforms at opposite ends of the bridge, from which elevated tracks however trains in Brooklyn but not in New York may now be switched to four differing street elevated railroads, the station tracks, platforms and the pockets however being sufficient in number for receiving and landing overcrowded passengers from the cars of these four elevated railroads, and from the bridge trains proper.

The elevated tracks and platforms of the terminal stations of the Brooklyn bridge were, for several years, sufficient to accommodate, with ease to the bridge and convenience to the passengers, the traffic during the rush hours, but in view of the fact that the passenger traffic for the year 1884 was 8,529,840, and increased in 1897 to 45,542,627, and was occasionally 410,467 per day, which would equal 149,820,455 for the year and has since increased in numbers annually estimated to be on an average of about 243,000 per day, with a corresponding increased number of passengers during rush hours from Brooklyn to New York in the morning hours and New York to Brooklyn in the early evening hours, it has for several years been wholly inadequate to meet the demand

upon it. The result of this constant increase in traffic is that in recent years, and particularly at the present time, the bridge has been twice daily so overloaded and seriously strained that it is not only notoriously dangerous to the lives of the passengers crossing it, but to the life and limb of the passengers, through their uncontrollable crowding on the platforms in efforts to gain entrance to outgoing trains, and to escape from the platforms of incoming trains to the street, to say nothing of their danger from packing in the cars, as may be daily witnessed during the rush hours referred to. The decrease in strength, and danger of destruction of the Brooklyn bridge due to this repeated and daily increasing strain, and the danger to its passengers from crowding on its platforms cannot be remedied by increasing the rapidity and number of the cars passing over it, by increasing the capacity of its platforms or the substitution of continuous, or by loop tracks for the present double track shuttle and pocket system of running trains, for the reasons that cars and trains of cars are now run so rapidly and close together as to alone be an element of danger; that the station platforms are of more capacity than is necessary to accommodate more passengers than the cars can carry; and that even if the bridge were substantially strengthened, which is not possible, it could not, for lack of track space, meet the demands for passenger traffic over it.

The cost of the Brooklyn bridge and its present value is too great to justify its replacement by another bridge, and although engineers, and the public through the newspapers, have repeatedly advised and urged the construction adjacent thereto of a larger and modern suspension bridge for carrying a portion of this rush traffic, no one prior to this invention has devised any plans by which the two bridges may be so connected and utilized to more than meet the present demands of the two structures, much less the daily increasing future demand of the passengers and which accrue to this invention. In other words, so far as I am aware, no one before this invention has devised any plan or construction by which, with a new adjacent bridge, the Brooklyn bridge may be exclusively used for light passenger traffic, its capacity for carrying passengers

in one direction and the accommodation of the number of different lines of cars can be substantially increased without now impossible additional bridge tracks, or changing the form, size and arrangement of the present passenger receiving and discharging terminal platforms, or by any arrangement of receiving and discharging platforms, and tracks compelling the train to move from a discharging to a receiving platform, and a complete separation of incoming from outgoing passengers from the moment they pass through the entrances and exits to the terminal stations.

The prime object of this invention, broadly stated, is to relieve bridges, and particularly suspension bridges, from overstrains and overcrowding during the rush hours of passenger car traffic through the medium of an adjacent bridge, by means of platforms and trackways cooperating with each other to the end that it is practical to confine all light passenger traffic to the older and weaker bridge, and have the rush traffic be exclusively carried by the stronger and more modern adjacent bridge, and by which provision is made for the continuous forward movement of cars from one track to the other, and at will reversible in directions around duplex groups of platforms, and across said bridge.

More specifically stated, the prime object of this invention is to relieve an old overstrained and overcrowded railroad passenger traffic bridge by an adjacent, modern and stronger railroad traffic bridge, without increasing the strength of the old bridge, changing the trackage, or the terminal station platforms of the old bridge, and by such an arrangement of platforms for the terminal stations of the new bridge, and connection of the tracks of both in the terminal stations, that the new bridge, will substantially without limit, supply all increasing demands of rush passenger traffic in opposite directions at intervals of the day, the light traffic to be confined entirely to the old bridge, and the receiving and discharging platforms of both bridges; that incoming and outgoing passengers cannot obstruct each other after entering the stations; and that the old bridge may without possible strain accommodate cars from a greater number of different lines of roads, and carry, without strain or crowding its platforms, more passengers to its terminal stations, than before possible.

Another object of this invention is a terminal station provided with duplex groups of platforms, one group of which is a receiving and the other a discharging platform for passengers, the incoming and outgoing tracks of which are continuously so connected that cars running therein must be moved forwardly from their incoming tracks

and discharging platforms, to the outgoing tracks of their receiving platforms and that said cars may be directed to any predetermined platform of both groups.

Another object is, not only to relieve an old bridge from objectionable and dangerous strains and the overcrowding of passengers on its platforms without changing its platforms and trackage, by the employment of another bridge adjacent thereto, but to have the entrances, exits and approaches to the platforms of the terminal stations of both of said bridges so arranged and cooperating therewith that it is not possible for incoming and outgoing passengers to at any time obstruct the passage of the other in going to and coming from trains whereby the egress and ingress of the passengers from trains and through the stations and to their train platform, is correspondingly facilitated.

A further object of this invention is to reduce to a minimum the power necessary for operating the trains upon both bridges and the handling of the passengers to and from their trains.

A further object of this invention is to provide means by which to avoid any necessity for the transmission of empty cars from one terminal station to the other to meet usual rush traffic in either direction between the two stations.

With these ends in view, this invention finds embodiment in certain features of novelty in the construction, combination and arrangement of parts by which the said objects and certain other objects are herein-after attained, all as fully described with reference to the accompanying drawings, and more particularly pointed out in the claims.

In said drawings Figure 1 represents in plan view the second level platforms and tracks of a terminal station and the approaches thereto embodying my invention. Fig. 2 is a similar view showing the first level thereof, the street level approaches and stairways therefor. Fig. 3 is a vertical section of one of the terminal stations showing the adaptation thereof from the station of a subway train to the platform of city elevated and also bridge trains. Fig. 4 is a similar view showing exit passages from bridge trains to city elevated trains and subway trains. Fig. 5 is a detail transverse section through a terminal station showing the station inclosure, platforms and tracks and space providing for the storage of excess cars therein. Fig. 6 is a similar view showing an elevated walk from which passengers may pass from one group of platforms to the other and to the platforms of any of the bridge or city elevated tracks. Figs. 7 and 8 are diagrammatic transverse views respectively, showing the different

levels of the roadways, subway, city elevated and bridge tracks of the new and the old bridge, and Fig. 9 is a diagrammatic view illustrating the transverse supports of the tracks and roadways of the new bridge.

Similar characters of reference indicate the same parts in the several figures of the drawings.

For convenience of description the present Brooklyn bridge structure and terminal station on the New York end will be described as the "old bridge" together with its trackways, platform levels, approaches, etc., and the adjacent bridge as the "new bridge" together with its platform levels, approaches, etc.

Extending along one side of the old bridge (see Fig. 1) is a wagon road 10 connected with the level of a street 11 by an incline 12 converging at 13, the opposite side of the bridge being occupied by double tracks 14 and 15 for surface trolley cars, terminating in a loop crossing the basement floor 16 (see Fig. 4) which is substantially on a level with the street within the station house, and an obstruction and danger to the entrance to and exit of the passengers from the station because necessarily crossed before access can be had from the basement floor to either the ticket offices or bridge trains, which track crossing by my invention may be removed as hereinafter described.

Next above the basement floor 16 of the station is the floor of the first level 17 now trackless and exclusively used for access to the bridge foot path 18 and as a landing for passengers ascending and descending to passengers' platforms 19, 20, 21, 22 and 23, supported by and rising above (see Fig. 4) the second level 24 of the terminal station, and on which are supported tracks 25, four in number, passing between the platforms and terminating at the front wall 26 of the station house, with the result that the cars run into pockets 27 between the platforms and must therefore run out of them at the point at which they entered, the floor of the second level 24 (see Fig. 4) projects over and across a street 28 in front of the station house and is accessible from the opposite side of the street by a single stairway 29 (see Figs. 2 and 4) internally of the station house by a number of stairways 30, 30.

Access to and exit from the platforms on the second level is had by means of stairways 31 and 32 from the floor of the first level up through such platforms, and also by stairways 33 at the ends of the platforms.

The tracks 25 are connected by switches 34 supported on the second level 24 with the double bridge tracks 35 and 36 of the bridge proper, and for the support of these switch tracks the floor of the second floor 24 extends somewhat beyond the switches, which

latter are so constructed that trains may be switched to any one of the tracks 25 for landing passengers.

The dotted line 37 in Fig. 1 indicates the line of the rear wall of the station house, the dotted line 38 the front wall, and in Fig. 2 the dotted line 39 the base floor connection with the foot walk.

The wagon road of the old bridge is not wide enough nor can it be widened to meet the present and ever increasing demand upon it, nor can the bridge tracks do so because its tracks must be used to simultaneously carry passengers in opposite directions, and, as before suggested, the trolley tracks crossing the base floor are a menace to the life and limb of the passengers entering and departing from the terminal stations, and as the first now trackless level is more than sufficient for the dangerous overcrowding of the platforms of the second level and overloading the bridge, it is important not only that a new and adjacent bridge be constructed for relieving the old bridge from overstrains and accommodating the present excess of passengers in its terminal stations and across it, but for meeting all future seemingly possible demands upon both structures on increasing several fold without an excessively wide and strong new bridge, and it is to these ends my invention is directed. The adjacent new bridge should, however, be of modern construction, preferably somewhat greater in width, provided with a wider roadway 40, street approach 41, a foot path if desired, the platforms of its terminal stations of greater capacity and in numbers, access thereto accordingly, than are possible in the old bridge and with means by which trains from several differing railroads leading thereto, including elevated, surface and subway railroads, may be conducted over one or both bridges. It is, however, proper to suggest that this invention is of such a character as to provide, as will be understood later on, for increasing several fold the passenger traffic capacity of independently operated adjacent bridges, and this without overstrains, even though the new bridge were similar in all respects and its platforms and approaches thereto of no greater capacity than those of the old bridge.

In the construction of the new bridge, and in order that its weight may be supported independently of the old bridge, the new bridge is supported upon entirely new piers of its own, and for the further reason owing to the greater width of the base of adjacent piers a space 42 is provided between the bridges and their passenger platforms for convenient storage and access to excess cars on both the first and second levels of the station where they are conveniently in the way when wanted and out of the way when

not wanted of the passengers, the main tracks, and the switch tracks to the platforms, when not in use.

The floor 43 upon which the tracks of the second level are supported extend to a line 44 rearwardly of the platforms to a point 45 to nearly the terminal of the several switches to duplex and may be triple tracks 46, 47 and 48 on the new bridge, and is formed continuous with the second level floor 24 of the old bridge, the switch tracks from the two bridges being distributed between seven platforms, 49, 50, 51, 52, 53, 54 and 55, every one of which are longer by extending them toward the bridge beyond the platforms of the old bridge, and preferably many, if not all of them, are substantially wider and with access thereto from the first level, by means of stairways 56, 57 and 58 greater than those employed or necessary for the platforms of the old bridge and each of them provided with end stairways 59 leading from the floor of the second level and located adjacent the stairway 26 inside the station leading from the base floor to the floor of the first level and therefore, as hereinafter described, to the platforms of bridge trolley cars and the elevated trains of other lines to the second level.

The track passage between the platforms of the new bridge is open at both ends as they now are in the platforms of the old bridge on the second level, by reason of which the laterally increased space occupied by the platforms of the new bridge is vacant space now between the ends of the track of the old bridge and the front wall of the station and the correspondingly located space resulting from the extension or enlargement of the second level floor of the station house for the new bridge provides for a continuous connection of the tracks of the new and old bridges in the terminal station, and also by means of switches 60 which in conjunction with the switches from the bridge tracks to the platforms affords a means by which cars may be shifted to any platform of the new bridge and thence to any predetermined platform of the old bridge, and a means by which, during rush traffic, any one or more vacant platforms may receive or discharge passengers from the next incoming train or trains.

The switches 34 between the platforms 55 and the bridge tracks, as now used in the old bridge, need no changing, and the switches 61 connecting the tracks of the new bridge with the platforms are made to conform to the requirements and exigencies before stated, and it should also be noted that no changes are made or are necessary in the platforms 19 to 23 inclusive, for the space between them is now open at both ends and the present tracks terminate at the end wall indicated in Fig. 1.

Below the second level floor 43 is (see Fig. 2) the first level floor 63 extended to the wall of the station house adjacent the wagon road 40 and toward the new bridge somewhat forwardly beyond the end of the old platform.

My invention includes the erection on the first level floor of the old bridge of five passenger platforms 64, 65, 66, 67 and 68 elevated above the floor end to the line of the floors of the cars running on tracks 69 between them, and on the same line of the new bridge a similar number of platforms 70, 71, 72, 73 and 74 with tracks 75 running between them, which tracks are continuous by means of switches 76, the tracks 69 being by means of switches 77 connected beyond the platform with the double trolley tracks 14 and 15, and next the wagon road by a single track 78, the tracks 75 of the new bridge being connected by switches 79 in turn connected with a double trolley bridge tracks 80. In this connection it should be noted that in Figs. 1 and 2 are shown double tracks (see Fig. 3) to which subway trains may be switched and thence transferred across the bridge.

The added platforms 64 to 68 inclusive on this first level are accessible by means of stairways 81 and 82 directly through the platforms, and end stairways 83 preferably adjacent which or some of which stairways 81, 82 and 83 are stairways 84 leading from the base floor thereto and with a landing 85 thereon, and thence by stairways 86 to and through the platforms on the second level, there being, however, between the road 41 and the platform 70, floor space 87 on the first level not occupied by elevated platforms and whence passengers may ascend and descend by stairways 88 directly to and through the overhead platforms, 49, 50 and 51 on the second level, adjacent stairways 89 directly connecting the floor space 87 with the basement floor, with the result that a large number of passengers may pass from the basement floor to the first level, and thence ascend to the platforms on the second level without coming in contact with passengers going to and from the platforms on the first level.

This invention contemplates and includes having the street portion 90 extend the entire width of the front of the terminal station, and although it is somewhat narrowed, owing to the direction of the present street 28 (Park Road) and as indicated at 91, it is estimated to be of sufficient capacity to, with the six additional broad stairways 92, shown in Fig. 2, accommodate all increase of passengers using it for some years to come, and for whose convenience ticket offices 93 and gates 94 extend across the second level as indicated in Fig. 2.

As a means by which the street crossing

passengers, immediately on entering the station house, may have direct access to and from the broad platform 87 and thence to the overhead platforms 49, 50 and 51 on the second level, and particularly during rush hours, stairways 95, adjacent the front entrance of the terminal station, lead directly up through the floor of the second level 24, and thence to a platform 96 (see Figs. 2, 3, 4 and 5) connected by stairways 97 to the broad platform 98 on the first level immediately below the platforms 49, 50 and 51 of the second level, to which they may then ascend by means of the stairways 89.

Ticket offices and gates for outgoing passengers to the first level platforms should (see Fig. 4) extend across the platform as indicated at 99, so that passengers from the street crossing platform of the first level, after paying their fare at the ticket offices 93, may, without passing these latter ticket offices, have access to the platforms on the second level.

Ticket offices for foot passage to the bridge and both groups of platforms on the first level should also be provided, with their arrangement suited to the needs of passengers entering thereon, and need not be shown or described in detail, as for example they may extend across the floor of the basement directly below the ticket offices as indicated at 99.

In Fig. 5 is indicated diagrammatically a cross section of a duplex station, elevations, etc., on the line A—A of Fig. 1, looking in the direction of the arrows, showing means by which the space between the duplex station houses may be utilized for the storage of cars, or, as indicated at 100, the base floor of the station house to meet the demands to any unusual, and particularly any unexpected rush of traffic, and to these ends such cars may be so stored in both terminal stations ready for immediate use.

As shown in Figs. 3, 4, 5 and 6 the roofs of these stations may be provided with suitable windows and ventilators 101, and the side walls thereof with windows 102 for the admission of light and ventilating purposes.

In Fig. 7, 103 indicates the level of the wagon road, 104 the level of the subway tracks, 105 the support for the tracks of the upper level, and 106 the support for the trolley tracks at the point of their passage through the main piers of the new bridge.

In Fig. 8 the support of the present double trolley tracks on the piers is indicated at 107, the duplex bridge track ways at 108 and 109, the foot road at 110, the single trolley track support at 111 and the wagon road way at 112.

Fig. 9 diagrammatically illustrates a means for supporting the tracks of the new bridge and in which the girder 113 supports a truss frame 114, to which is also trussed a

top cross bar 115, projecting laterally beyond the frame and connected by vertical bars 116 with the girder 113 and by means of suitable truss rods 117.

So far as the tracks across the old bridge are concerned there is no change over those present and provided for, except that of placing a third track adjacent the double trolley tracks now at one side of the bridge, and for which there is ample room, whereby it is made possible by this invention to use three tracks for carrying rush traffic and the single track next the old wagon road exclusively for light traffic, and just as it is proposed to do with regard to the passenger traffic from the platforms on the second level and for which provision is likewise made. In other words, by my invention it is first made possible and practical to run the cars upon both levels on a continuous track, and by reversing the direction of their running to exclusively use an adjacent and newer bridge and its platforms for rush traffic at different times of the day in both directions, and entirely separated therefrom, the group of platforms on the old bridge and without change exclusively for light traffic, without straining the old bridge and overcrowding its platforms.

Furthermore, my invention also provides means by which the present waste space upon the first level of the old bridge may be utilized for tracks and platforms for the cars of surface and elevated systems and from a larger number of differing lines than has before been possible without straining the old bridge and the overcrowding of its passenger platforms and trains, and the co-operating therewith of platforms on the same level for the adjacent bridge without necessarily changing the number of trolley tracks on the old bridge while making it practical to add a fourth track, and whereby it is practical and possible for all rush trolley car and elevated train traffic may be accordingly carried entirely by the new bridge and the lighter traffic exclusively by the old bridge, without overstraining or overcrowding either the platforms or cars of the latter at either terminal station, or whereby provision has been made for a new bridge with a width of wagon road capable of meeting present as well as future demands and for transporting subway trains to and from the terminal stations thereof upon either a single or double track system.

In the operation of the duplex bridge tracks and duplex groups of platforms in which my invention finds embodiment, all trains on both levels, during the rush hours, are run in that direction on the new bridge to and through its platforms, and in the opposite direction to and past the platforms of the old bridge, this direction of the trains being reversed when the direction of the

rush travel is reversed as for example, the rush hours from Brooklyn to New York are between seven and 10 in the morning and from New York to Brooklyn between four and seven in the evening, and as a result of this all passengers during the rush hours in the morning will take trains at the group of platforms of the new bridge at the Brooklyn terminal station and pass from said trains to the new group of platforms in the terminal station in New York, and thence to the street, without any necessity of coming in contact with or obstructing passengers then coming through the station to enter the emptied train standing at the group of platforms of the old bridge and bound for Brooklyn and leaving the trains upon the platforms of the terminal station of the old Brooklyn bridge on their arrival.

By the arrangement of platforms described, it will be seen that no passenger can enter so long as it is standing at the platforms of the new bridge nor until it is switched to the platforms of the old bridge, and this is true as to the corresponding platforms at both of the terminal stations, the switch approaches to the several platforms and from one platform to the other providing a means by which a train on entering a station may be switched to any one of the group of platforms therein, and by the switches connecting the two groups of platforms be switched from the platform of any one group to any platform of the other group and with a continuous forward movement of the cars and permitting the cars to be directed to any particular platform of either group and particularly to a temporary vacated platform when others are occupied by cars.

In the evening when the rush traffic is from New York to Brooklyn the direction of the movement of the trains is reversed, that is to say, passengers from Brooklyn are exclusively transported over the old bridge and to its platforms, and the rush traffic from New York to Brooklyn entirely over the new bridge from and to its terminal platforms.

From the foregoing it will now be obvious that in thus making it practical for the old bridge to carry only the lighter traffic during the rush hours and that for running all trains thereon simultaneously in one direction there is a substantial increase in its capacity for accommodating without strain or overcrowding its passenger cars from a large number of both elevated and surface Brooklyn lines than heretofore practical or possible, and this without cars passing as closely over the bridge as heretofore owing to the quickness of their transmission due to their continuous movement on the two bridges and from one to the other of the duplex platforms at their terminal stations.

My invention also provides for the storage of excess cars between rush hours adjacent the platforms where they will next be needed and to this end contemplates switching such cars from time to time from the bridge tracks upon tracks (not shown) between the two opposing groups of platforms on the first and second levels, such space not only being more than ample for this purpose but affording a means by which a further number of cars for sudden emergencies may conveniently be on hand in both terminal stations, as for example by having tracks (not shown) on the level 104 (see Fig. 7) which may descend below the level of the base floor of the station and be connected by switches with the bridge tracks or by elevators be lifted to tracks in a plane above, the elevators preferably being provided with tracks registering with the upper tracks above referred to.

With the arrangement of bridge tracks and platforms herein shown and described, it will be seen that the platform capacity of the old bridge is doubled without the contraction of any space necessary for these platforms, that provision is made for still a larger number of platforms of substantially greater capacity for the new bridge and access to and exit therefrom, and that incoming and outgoing passengers from the stations cannot possibly obstruct each other, thereby correspondingly hastening their passage to and from trains and that by running the trains continuously there is a gain in time of one minute in the running time of every train now consumed by the necessity of the motorman, after entering a station, to pass to the opposite end of the train for controlling its exit therefrom.

Further, it is estimated by skilful engineers that the construction herein shown and described, reduces the present strain upon the old bridge seventy per cent. (70%) and enables the handling of ten thousand (10,000) passengers per minute without their being crushed or jammed, that is to say, six hundred thousand (600,000) passengers per hour, and certainly a sufficient number to meet all possible demands for many years to come.

Again, my invention provides for a substantial saving of power in running these two bridges as compared with that of the present bridge, for three sets of power machinery will run all of the trains of both bridges notwithstanding their numbers are increased upward of six fold, whereas two sets of machinery are now employed respectively for the trolley and bridge trains now employed.

My invention contemplates and includes the employment of automatically operated switches and signals controlled by train dispatchers and of the construction now com-

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monly employed upon railroads generally and whereby the train despatcher may direct an incoming train to any platform of one group and an outgoing train to any platform of the adjacent group of platforms and also excess cars stored between the tracks of the two bridges.

In conclusion, it should be stated and understood that my invention is not limited to means by which suspension and other bridge structures may be relieved from overstrains by reason of rush traffic nor is it limited to the terminal stations for bridges, for my invention includes, without regard to bridges of any kind, the construction and arrangement of terminal passenger stations generally for railroads when elevated or otherwise.

Having described my invention, what I claim and desire to secure by Letters Patent of the United States is:

1. In a railway passenger station the combination of two groups of platforms, each group having associated therewith a suitable number of tracks adapted to communicate with the tracks of the other group and one of said groups having a greater capacity for receiving and discharging passengers than the other, the equipment of the system being such that the platforms of the group of the larger capacity may be used either as a receiving or as a discharging station.

2. In a railway passenger station the combination of two groups of platforms on separate levels, each group having associated therewith a suitable number of tracks adapted to communicate with the tracks of the other group and one of said groups having a greater capacity for receiving and discharging passengers than the other, the arrangement of the various tracks being such that the platforms of the groups of the larger capacity may be used either as a receiving or as a discharging station at the option of the party in charge of the transportation.

3. A railway passenger station comprising in combination groups of platforms, tracks between the platform of each group, and segmental track loops, so arranged that trains of cars can be run both in and out of the platform group having the greatest number of tracks, the entire terminal station being so arranged that trains and cars can be run from, into, and from into out to in, any platform group at the will of a train despatcher.

4. For handling rapid transit passenger crowds quickly, the combination and arrangement of switches and segmental loops, by which are increased the number of tracks emanating from each main line and run between platforms outside the loops, thereby increasing the number of trains and cars which can be run between the various plat-

forms and loaded or unloaded simultaneously, and also increasing the rapidity of loading and unloading and the manipulation of passageways and stairways of a terminal station.

5. A railway passenger station comprising in combination an elevated track level, two groups of platforms, tracks for the platforms of each group, segmental track connections around one end of both platforms, segmental track connections between the opposite ends of said platforms to a less number of main tracks leading from said station, and approaches from the entrance of the station to each group of platforms, which said approaches are so arranged and separated that the passengers of one group of platforms cannot obstruct the passengers for the other group of platforms.

6. A railway passenger station comprising in combination two track levels one above the other, two groups of platforms on each level, tracks for all of said platforms, segmental track connections at one end thereof, segmental tracks connecting the platform tracks with a less number of main line tracks adjacent the station, and means whereby passengers for the several platforms may approach and have access without opposing or obstructing their passage to any other platform, substantially as described.

7. A railway passenger station comprising in combination a base level free from tracks, first and second track levels immediately over the base level, the base level providing an unobstructed passage for passengers directly to a foot path extending beyond the station, stairways from the base level to the first level and thence to the second level, stairways directly from the base level directly to the second level, all of said stairways being so arranged that passengers to outgoing trains on both levels cannot obstruct passengers from incoming trains at any point within the station, substantially as described.

8. A railway passenger station comprising in combination a base level, a first track level extended to bridge an otherwise open street beyond the station, stairways leading from the opposite side of said street thereto, ticket offices and gates on said bridge adjacent the station proper, two groups of platforms, tracks therefor continuously connected at one end of said platforms, and switch connections between said platform tracks and a less number of tracks on the main line, a second track level immediately above provided with two groups of platforms, the arrangement of which and their track connections being similar to those on the first level, the arrangement of said ticket offices being such that passengers over the elevated street crossing may not be obstructed by outgoing

passengers from the station, substantially as described.

9. A railway passenger station comprising in combination first and second track levels one immediately above the other, two groups of passenger platforms on each of said levels, tracks therefor continuously connected by segmental tracks at one end thereof on each level; switches connecting the platform tracks with a less number of main tracks on each of said levels respectively and crossing two bridge structures, one of which bridges is provided with additional double tracks and approaches thereto for subway trains, substantially as described.

10. A railway terminal passenger station comprising in combination two separated groups of platforms parallel to each other, tracks between each of said platforms, a less number of main tracks beyond one end of each of said platforms, tracks between the several platforms of each group, segmental connections continuously connecting the terminals of said tracks with each other and with the main line tracks, means whereby said terminal connections may be automatically operated at will to shift trains from one main line to any platform of that line and from any one of said platforms to any plat-

form of the other group and thence to its main line tracks, and means whereby egress and ingress to one group of platforms is separated from the other group of platforms, substantially as described.

11. A railway terminal passenger station comprising in combination a track level in a plane above the street approach thereto, a second track level immediately above said first level, groups of platforms in duplex arrangement separated from and parallel to each other, tracks between the adjacent platforms on each level, segmental tracks continuously connecting the terminals thereof, a less number of main tracks and segmental tracks connecting all of the platform tracks therewith, means by which the trains on any one track may be switched to every platform track in said groups, and means by which said switching may be automatically produced, substantially as described.

In witness whereof, I have hereunto set my hand and affixed my seal, this ninth day of March A. D. 1909.

ANDREW MACROBERT IRVING. [L. s.]

Witnesses:

VINCENTE K. SMITH,
ETHEL CURRY.