to assent to Assembly bill No. 1417, known as the Apgar bill, which fixes May 1, 1905, as the day when the use of steam in the tunnel shall cease, but which grants to the State Board of Railroad Commissioners, "upon reasonable cause being shown and upon proper proof that the work of changing the motive power in said tunnel has been diligently, and in good faith, progressed," the power to "extend the time during which trains may be operated by steam locomotives in said tunnel, either in whole or in part."

If the railroad company were unwilling to make the desired changes, I should continue to urge the fixing of a date that should stand as a mandate of the Legislature, but in view of the letter already made public, addressed to me by the President and Board of Directors of the railroad company, I believe that the Apgar bill is in a form well calculated to assure the desired results. If the Legislature sees fit to go further in the matter of a date I shall not object, but personally I believe it to be better judgment to take the company at its word.

As to the rest I submit herewith as a substitute for Assembly bill No. 1124, and ask for its introduction, a bill which provides for the following procedure:

First, the railroad company shall make an earnest effort to agree with the city upon acceptable plans and upon a satisfactory equivalent for privileges granted and for city property taken. In the event of such agreement, the plans are to be submitted for approval or rejection to the State Board of Railroad Commissioners. If approved by this commission, the bill provides for the necessary condemnation of property and the immediate execution of the plans thus approved. If the plans are rejected by the Railroad Commission the railroad company must start again. If, on the other hand, the railroad company and the city cannot agree upon the plans, there is an appeal open to both parties to the State Board of Railroad Commissioners; and in the event of continued disagreement further appeal may be taken by the city to the Appellate Division of the Supreme Court, First Department, whose decision will be final. If the railroad company and the city agree upon the plans, but fail to agree upon the equivalent to be given to the city, then the courts in the last resort are to determine the compensation.

The bill also provides that an agreement must be reached between the railroad company and the city within sixty days after the plans are submitted to the city, or else the city shall be deemed to have disapproved the plans. By this provision the public demand that the desired changes shall be brought about as quickly as possible will be given full force and effect. In the meanwhile, in the event of disagreement, both the railroad company and the city have two appeals; first, to the State Board of Railroad Commissioners; second, to the Appellate Division.

Property owners affected will have a hearing as to any proposed plans by the city, and again by the State Board of Railroad Commissioners; and, in the event of disagreement between the railroad company and the city, by the said Appellate Division of the Supreme Court. In the event of the condemnation of their property, after plans have been approved, the usual procedure will be followed.

The Berlin-Naples express, which began running Jan. 16 last, leaves Berlin at 10 a.m., Mondays and Thursdays, passes Munich at 8:10 p.m., crosses the Alps by the Brenner Pass, arrives the next day at noon at Florence, at Rome 5:37 p.m., and at Naples 10:30 p.m. This is a great improvement on the facilities heretofore. It is a limited train with dining and sleeping cars, on which only first-class passengers are carried, with a charge of about ⅞ per cent. per mile for the sleeping car company. The custom-house inspection of baggage is made on the train. Once in two weeks one of the sleeping cars of this train is carried through to Palermo, going down the west coast of the Peninsula to Reggio, crossing the straits by car ferry to Messina, and thence along the north coast of Sicily—perhaps the most beautiful railroad route in the world, though a large part of this journey is by night.

Freight Yards of the Chicago Transfer & Clearing Co.

In our issue of March 8, last year, we published an outline of the work done up to that time on the new freight yards of the Chicago Transfer & Clearing Co., at Chicago, together with the proposed plan of the yard. In April, however, the plan now shown was substituted and this yard is nearing completion. The drainage system, water system, grading and track work are all finished and the work on the roundhouse, coaling station, power house equipment and signal and lighting systems is well under way. Doubtless everything included in the plans now shown will be completed by early spring. The company will then have an immense railroad switching yard connected by the belt and switching roads with all railroads entering Chicago. Beyond this point the plans of the company are not definitely made. The company now owns 3,700 acres of land, so there is ample room for duplicating the present yard several times, and still provide for warehouses, grain elevators and manufacturing sites when they are needed. The present article will only deal with the work now in hand.

The land owned by the company is bounded on the north by the projection of Sixty-third street and on the south by Seventy-ninth street projected, this tract being about 7½ miles west of the Lake. On the east side of this land is the Chicago & Western Indiana R. R., and on the west side are the Chicago Junction Ry. and the Chicago Terminal Transfer R. R., all three being belt and switching roads. One corner of the company's land extends to the Drainage Canal and Illinois & Michigan Canal. The whole tract is practically a level prairie, most of it being just outside of the city limits. It will soon be possible to reach the yard from the city by an electric car line now building.

General Plan.—The plan shown last spring was for a yard to be worked from a gravity mound in one direction only. That is, the receiving yard was on one side of the mound and the classification yard on the opposite side. However, the yard as built is essentially different and can be worked in either direction from the mound or in both directions at a time.

The general scheme is best shown by Fig. 1. The gravity mound carrying five tracks, connected by leaders and cross-overs, is at the center with the same grades and similar track arrangements either side of the summit. The mound tracks lead into the double ladders of the two classification yards B B, one either side of the mound, and each track of these yards is 2,400 ft. long. Each set of classification tracks covers the full width of the yard. The receiving yards C C, are on the general level, one being on either side of the gravity mound, with double ladders parallel to the classification ladders. The length of the receiving tracks varies from 1,600 to 3,000 ft. Tracks D D, at the outer ends of the classification yards are overflow tracks to be used in case the classification tracks are full. The space left vacant beyond the west classification yard is reserved for such purposes as repair tracks, storage tracks, icing houses and transfer houses. The whole yard north and south is 660 ft. wide, and the greatest number of parallel tracks is 49.

The three outer tracks on both the north and south sides of the yard are thoroughfare tracks joined by double-track Y connections to the switching roads on the east and west. A through track also extends straight through the middle of the yard to the roundhouse at the east end. The receiving and classification tracks are spaced 13.5 ft. center to center, and this spacing is maintained throughout, excepting that the outer thoroughfare track is 15 ft. center to center with the second thoroughfare, and the second and third thoroughfare tracks are 14 ft. centers.

Each of the two receiving yards has capacity for 540 cars, each of the two classification yards 2,580 cars, and each of the four sets of overflow tracks has capacity for 188 cars. In all there are now laid 105 miles of track and the grading is finished for 25 miles of additional tracks for overflow and storage purposes.

A brick subway under the gravity mound is provided for passage between the two receiving yards. The power house and office building are directly north of the gravity mound, and on the summit of the mound is a bridge supporting the signal tower, from which all the switches on the classification ladders are operated. It will be noticed that the offices, power house and signal tower are thus brought close together.

Operation.—By reference to Fig. 2, it will be seen that trains may enter from either end of the yard, over the Y connections with the belt roads and proceed on the outer thoroughfare tracks to one of the two receiving yards. The locomotive is then cut off and for a return load takes a train from one of the tracks in the classification yard, those ladders of the classification yards farthest from the gravity mound being used for this movement.

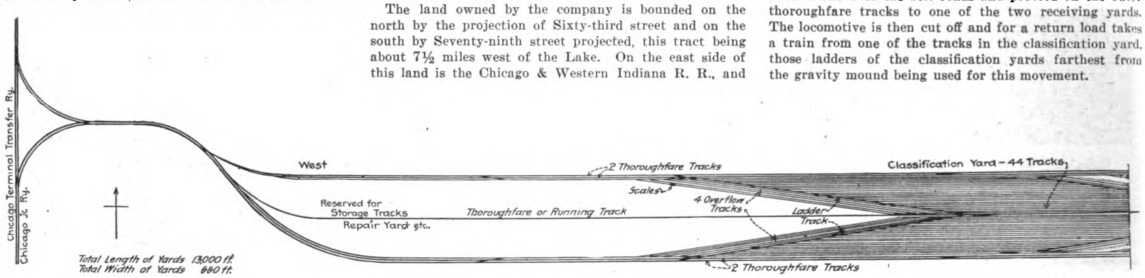
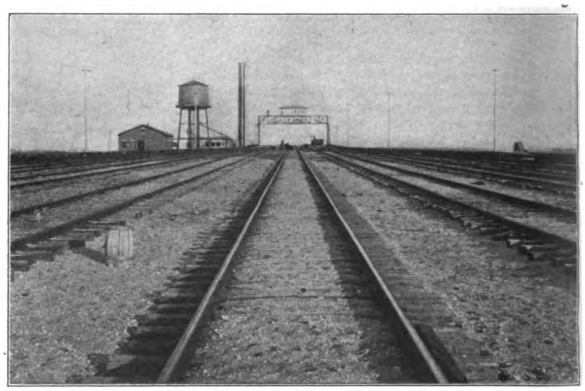


Fig. 2.—Arrangement of Tracks

Trains are taken from the receiving tracks by the regular yard engines, backing up on the inner thoroughfare track until the switch to one of the drilling tracks is cleared; then the train is pushed up a drilling track, outside and parallel to the double classification ladders. It will be seen from Fig. 2 that leaders from two of the drilling tracks cross all five tracks on the gravity mound and are connected to these tracks by slip switches. By means of these leaders and the cross-overs, a train can be switched to the east and one to the west over the gravity mound without interference. The couplers between cuts of cars are unlocked upon approaching the summit and as they go over the summit the cuts separate from the train and run into the middle mound track, then into one of the two classification ladders and then into one of the classification tracks. The poling track just outside each classification ladder is provided so that when cars stop short in bad weather they can be assisted by poling.

It is intended that at the most two switching movements over the mound will classify trains for the various roads so that the cars will be in any desired order; such as loads and empties, coal and merchandise, or division order. The train as received will be first pushed over the mound in one direction, and all cars going out over the switching road at that end of the yard will be classified in their final order. All cars going out over the switching

From West End, South Receiving Yard.



View of Hump, Looking East.

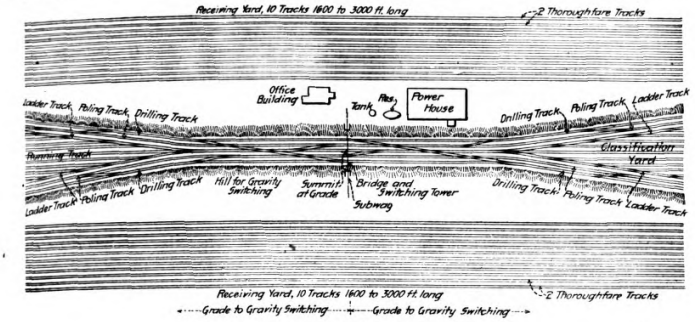


Fig. 1.—Top of Gravity Mound in Center of Yard.

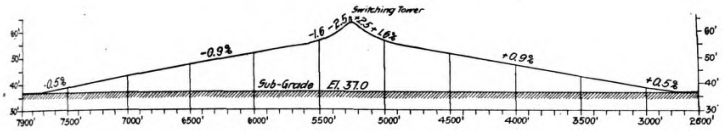


Fig. 3.—Plan and Profile of Gravity Mound.

(The grades are the same both sides of the summit.)

road at the opposite end of the yard will be dropped in one or more tracks until a string of cars accumulates. This string of cars will then be pushed over the mound in the opposite direction and classified in final order.

For returning the brakemen to the summit of the mound a light locomotive will be used running on the middle thoroughfare track or on the outer tracks at the sides of the classification yards. On the tracks near the middle of the yard, it is expected to stop cars in the upper part of the classification yards, and then drop the cars down from time to time as they accumulate, the grades on these tracks being sufficient to start cars simply by releasing the brakes. This will shorten the trip of the men who brake cars down from the summit of the mound and enable them to get back quickly. On the outer classification tracks where there is a long stretch of level track, the men stationed at the lower end of the yard will doubtless be able to catch the cars, so they will not have to be ridden the whole length of the yard.

Six switching locomotives are now building for regular use in the yard, four consolidation and two six-wheel engines. The consolidations will weigh about 185,000 lbs. with 170,000 lbs. on the drivers, and the six-wheelers will weigh about 120,000 lbs.

The grades on the gravity mound are clearly shown by the plan and profile in Fig. 3.

Of about 422 switches in the whole yard, 120 switches along the ladders of the classification tracks are operated from the signal tower above the gravity mound. The electro-pneumatic system of the Union Switch & Signal Co. has been used, the 120 switches being operated by 10 push-button machines. The buttons are arranged in two rows, the upper row being the "normal" and the lower the "reverse," corresponding to the positions taken by the switches when the buttons are pushed. Above the push-buttons is a row of indicators electrically connected with the several switches and the insulated track sections embraced within the clearance limits of each switch. Normally, or when the ladder is clear, the indicator shows white, but when there is a car within the block section or the switch has not completed its stroke the indicator shows red. These indicators guide the operator in the working of the switches and show him the location of cars on the ladders.

Drainage and Track.—The ground where the yard is located is 35 ft. above Chicago datum, but, being perfectly level, the first work was to build a sewer system draining the whole tract into the Illinois & Michigan Canal. The main sewer begins at the extreme east end of the yard and runs west along the north side of the yard with 19 lateral sewers, one every 660 ft. It starts with 18-in. vitrified pipe and is enlarged until the last mile and a half is a 7½-ft. concrete sewer, with a 1-ft. circular shell. The cement for this work was furnished by the Illinois Steel Co. In its length of 4½ miles the fall is 22 ft. There are about 12 miles of drain pipe laterals varying from 8 to 15 in. in diam.

The yards are raised 2 ft. above the surrounding level with sand, about 1,200,000 cu. yds. of sand being used for this filling. Above this is a layer of slag from 6 to 8 in. thick, upon which the ties are laid and ballasted with gravel and cinders. The gravity mound required 400,000 cu. ft. of sand filling. New 75-lb. rails of standard A. S. C. E. section are used throughout. Oak ties are used in the thoroughfare and gravity tracks, but in the receiving tracks and level portions of the classification tracks the ties are cedar, laid 2,800 to the mile. All the switches have reinforced points and are made unusually strong to stand heavy service, being especially designed by the Chief Engineer of the Company, Mr. A. W. Swanitz and built by the Cleveland Frog & Crossing Co.

Power House.—The power house is a fine fire-proof building, handsomely finished inside and well equipped. The walls are brick with stone trimmings. Steel trusses, extending from wall to wall, support the tile roof and leave the floor unobstructed by posts. A brick wall divides the engine room from the boiler room.

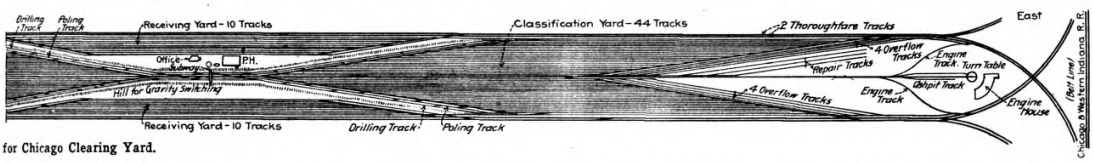
The engine room is 67 x 74 ft. floored with hard red tile. The walls have a wainscoting of white enamel brick, above which they are plastered with cement, smooth finished and painted. The boiler room is also 67 x 74 ft. and contains a battery of three 300-h.p. Babcock & Wilcox water-tube boilers with pressed brick settings. Room is provided for future extension of the boiler plant. Beneath the engine room there is a basement, 8 ft. high, finished with cement floors, in one end of which are elaborate toilet rooms and bath rooms for the men.

In the engine room are two 150-k.w. General Electric three-phase generators, direct-connected to Ideal engines. The voltage at the generators is 2,300 volts and current is transmitted at this pressure to various points in the yard, where it is reduced by transformers to 110 volts for lighting and power circuits. In addition to lighting the buildings, the gravity tracks will be lighted by arc lamps and about 425 switch lamps in the yard will be lighted by 8 candle-power incandescent lamps. The arc lamps along the classification ladders are mounted on poles spaced 300 ft. apart, and these lights are shaded on the side toward the signal tower to protect the eyes of the tower men and the brakemen riding cars. The switch lamps are in four circuits from the power house, and instruments are installed on each circuit for indicating whether any of the lamps are burned out.

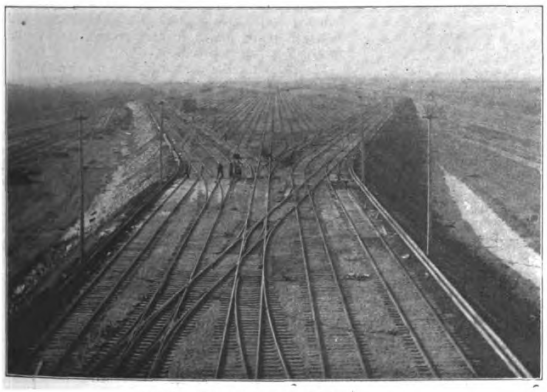
There are three Rand air compressors. A cross-compound compressor with a capacity for 1,196 cu. ft. of free air a minute will deliver air at 100 lbs. pressure for lifting water from artesian wells, working the electro-pneumatic switches, and supplying the roundhouse. A second compressor of 950 cu. ft. capacity is for use when it is necessary to shut down the first compressor. A third compressor has a capacity of 800 cu. ft. a minute and will deliver air at 800 lbs. pressure for operating air trucks and other machinery in a transfer house to be built later. There are also pumps for raising water into the large storage tank, and for use in case of fire.

The water for the power house and yard mains comes from three artesian wells about 1,600 ft. deep. These wells upon test have yielded 1,400 gals. of water a minute. The water is brought to the surface by compressed air and flows into a reservoir beneath the elevated tank. Pumps lift the water to this tank, which has a capacity of 100,000 gals., and the bottom is a little over 60 ft. from the ground. A system of water mains runs throughout the yard, there being in all about 12 miles of pipe varying from 8 to 12 in. in diam. When required the tank valve can be closed and direct pressure put on the mains by the fire pumps.

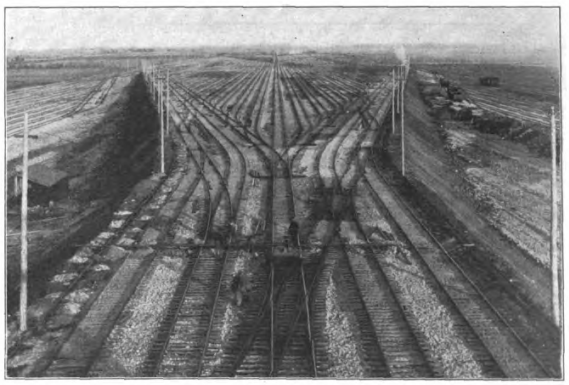
Roundhouse and Terminal Facilities.—The roundhouse and facilities for caring for locomotives are at the east end of the yard. The roundhouse now building will be one-fourth of a circle and have nine stalls, facing a 70-ft. turntable. The design of the house and its equipment is very modern. The roof is supported at the front on cast-iron posts, mounted on concrete foundations. The pits and roundhouse floors are concrete and the house is equipped with water and the Sturtevant sys-



for Chicago Clearing Yard.



Looking West from Signal Tower.



Looking East from Signal Tower.

tem of heating by hot air. The turntable pit and walls are also concrete.

The coaling station was built by Fairbanks, Morse & Co. and has two 40-ton pockets, with a storage bin under each capable of holding about 50 tons of coal. Each pocket has a weighing device which shows the amount of coal in the pocket, from which readings the amount of coal taken by an engine is determined. The coal is dumped or shoveled from cars into a receiving pit and is elevated by a chain belt, carrying steel buckets, to the coal pockets or to the storage bins. A 10-h.p. electric motor drives the elevator and conveying machinery. The coal is delivered to tenders by gravity, the gate controlling the flow of coal being operated by the man on the tender.

In addition to the drawings to which special reference is made, a number of photographic views of the yard are shown which probably give the best idea of its great size and general appearance. The engineering and construction work has been done under the direction of Mr. A. W. Swanitz, the Chief Engineer of the Company, and we are indebted to him for much in the preparation of this article.

Highway Bridges on the Pennsylvania Railroad.

The engravings show two standard highway bridges of the Pennsylvania Railroad and these engravings explain themselves. We publish them as examples which may be suggestive and useful to those who are charged with the design of such structures, they being the fruit of a great deal of experience.

The Hudson River Tunnel.

The New York & Jersey Railroad Company was incorporated a few weeks ago to take over and complete the old Hudson River Tunnel. A prospectus has been quietly circulated, from which we take the following information:

According to the prospectus, the officers of the company are: William G. McAdoo, President; Walter G. Oakman, President of the Guaranty Trust Company, and Edmund C. Converse, former President of the National Tube Company, Vice-Presidents; Henry A. Murray, Treasurer; Charles W. King, Secretary, and Charles M. Jacobs, Chief Engineer. The directors, besides Mr. Oakman, Mr. Converse and Mr. McAdoo, are: Elbert H. Gary, chairman of the Executive Committee of the United States Steel Corporation; John Skelton Williams, President of the Seaboard Air Line Railway; Anthony N. Brady, chairman of the Board of the Brooklyn Rapid Transit Company; E. F. C. Young, President of the North Jersey Street Railway Company; David Young, President of the Jersey City, Hoboken & Paterson Street Railway Company; John G. McCullough, of Vermont, Director of the Erie Railroad Company; Frederic B. Jennings, of the law firm of Stetson, Jennings and Russell; G. Tracy Rogers, President of the Street Railway Association of the State of New York.

The capital stock of the company is $8,500,000, divided into $3,500,000 of 6 per cent. non-cumulative preferred stock (now issued) and $5,000,000 common stock, also issued. Besides the stock, the company is authorized to issue $7,000,000 of 5 per cent. bonds. Of this amount $4,500,000 5 per cent., first mortgage, 30-year gold bonds, of $1,000 each, bearing interest on Feb. 1 and Aug. 1 and redeemable at 110, at any interest period, have been issued. Of the rest of the authorized bonds, $2,000,000 are reserved for purchase of additional property and $500,000 are reserved for other corporate purposes. The prospectus states that the $4,500,000 of the bonds now issued and all of the preferred and common stock will be used for the acquisition of the property of the Hudson Tunnel Railway Company, and for the completion of the North Tunnel and the approaches on the New Jersey and New York sides, and the equipment of the same with electricity. The mortgage, which secures the bonds already issued, is held by the Guaranty Trust Company as trustee, and the prospectus states that the mortgage will be the first and only lien on all the property of the company.

The Jersey terminal will be in the block in Jersey City bounded by Thirteenth, Fourteenth, Henderson and Provost streets, while the New York terminal will be the west half of the block bounded by Christopher, Tenth, Greenwich and Hudson streets. Connection will be made at grade at these terminals with the cars of the Metropolitan Street Railway and the cars of the North Jersey Street Railway Company and the Jersey City, Hoboken and Paterson Street Railway Company, but those cars cannot be run through; the tunnel is not big enough.

It is the purpose of the company to complete first the North Tunnel. This is to have two tracks. The cars will be of special design.

New Chicago Terminal for Lake Shore & Michigan Southern and Chicago, Rock Island & Pacific.

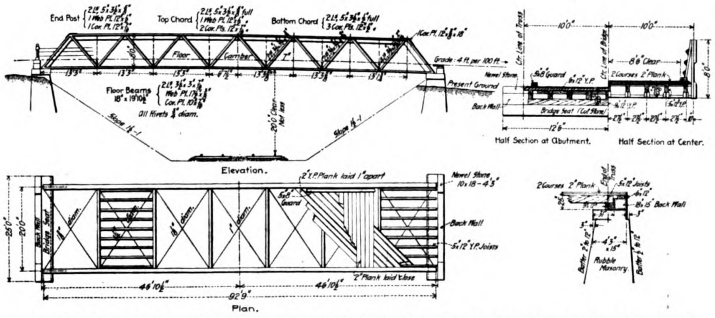
The erection of a fine, new passenger station in Chicago by the Lake Shore & Michigan Southern and Chicago, Rock Island & Pacific will be begun shortly. The new structure is to be upon the site of the old station long used by these roads, and work will commence as soon as the razing of the old building, now well under way, has been completed and the ground cleared. The contractors are the Grace & Hyde Co., Chicago.

New Chicago Terminal Station of the Lake Shore & Michigan Southern and the Chicago, Rock Island & Pacific.

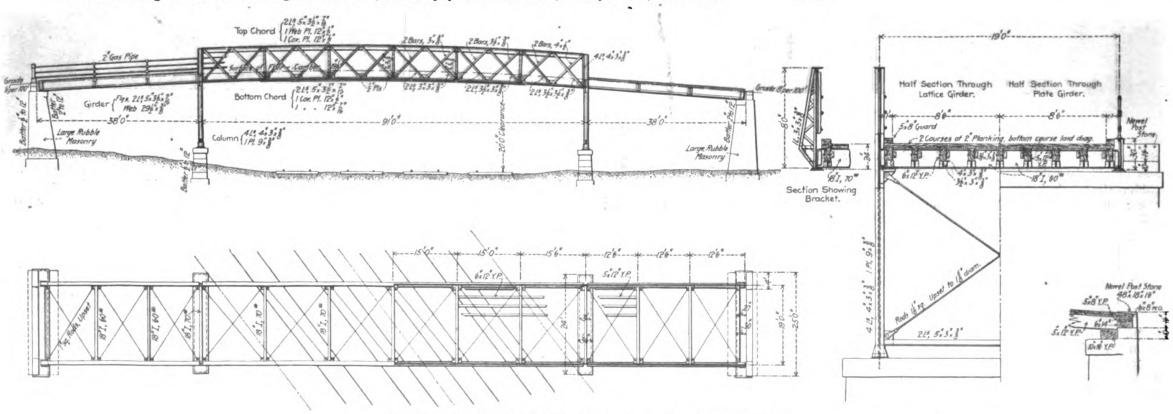
The perspective of the building, which is shown, is from the plans of the architects, Frost & Granger, Chicago. It is to front 215 ft. on Van Buren street, with a depth of 156 ft. 10 in. on La Salle and Sherman (parallel) streets, and will be 10 stories high. The first two stories are to be of granite, and the remaining eight of red paving brick. All trimmings, except the window sills, which will be of terra-cotta, are also to be granite. The building is to have a steel grillage foundation, resting on 50-ft. piling driven to hard ground, the piles being spaced 3 ft. between centers.

The plans for the station include the elevation of the 11 tracks entering the train shed. The first floor is at the level of the street and the second at the track level, plans of both floors being shown.

In general, the first floor consists of a main lobby, 96 ft. x 118 ft., occupying the central space, to the west of which is a large dining room, 48 ft. x 72 ft., with the kitchen to the rear, and on the east side the general ticket office, 35 ft. x 58 ft. The entrance hall to the office building is on Van Buren street, just beside and east of the main vestibule. Correspondingly situated, on the opposite side of the main vestibule, is an entrance and stairway leading to the main waiting room on the second floor.



Overhead Bridge on the Harrisburg, Portsmouth, Mount Joy & Lancaster (Pennsylvania) Railroad.



Overhead Bridge, Old Eagle Road—Pennsylvania Railroad.

The space under the elevated tracks will be occupied by the baggage room, the express companies' rooms, and a cab stand. The baggage room will occupy the entire length on the Sherman street side, and the arrangement for checking baggage is made very convenient for passengers, the baggage checking counter being separated from the main lobby only by swinging doors and the necessary space for the accommodation of the public. The cab stand will be on the La Salle street side, next to the building, and from which entrance may be had direct to the main lobby. The comfort of the cab drivers was not overlooked, a waiting room, 20 ft. x 20 ft., opening on to the cab stand, being provided for them.

When passengers desire to pass to the main waiting room on the second floor they may do so, either by the broad staircase at the rear of the main lobby, or by one of the two large elevators which will run between these two floors.

On the second floor, besides the main waiting room, 106 ft. x 108 ft., there will be a separate waiting room for women, 48 ft. x. 62 ft., back of which will be a small women's retiring room, and to the rear of this the women's toilet room. The rest of the space on this side will be occupied by a lunch room. On the opposite side will be a smoking room for men, men's toilet room, parcel checking room, news stand, and a small ticket office for the accommodation of such passengers as may not have baggage to look after, and will not therefore be under the necessity of descending to the lower floor. Between the main waiting room and the tracks, separated from the latter by the usual iron fencing, will be the concourse, 46 ft. x 200 ft., with a steel and glass roof. At the east, or La Salle street, end of the concourse a stairway leads direct to a street entrance, so that suburban passengers may pass to and from their trains without going through the station, if they so desire. Passengers from the elevated trains on Van Buren street will have a passage way from the elevated station at the northeast corner of the building direct to the main waiting room.

The intention is to finish the main lobby in enamel brick, and the main waiting room in marble. The smaller rooms on the first and second floors will probably be finished in mahogany and all of the offices in the building in oak. The offices on the eight upper floors will be occupied by the two roads owning the station.

The train shed will be 578 ft. long and 210 ft. wide. The roof trusses will be a single arch, spanning the entire width of the shed. The tracks are to be elevated 16 ft. above the street, and the train floor will be carried on steel plate girders resting on steel columns, spaced 30 ft. apart in the cab stand area, and 15 ft. elsewhere. The train shed foundations will rest upon piles; those for the columns supporting the train floor will be a spread foundation of concrete, having a depth of 14 ft. E. C. and R. M. Shankland, Civil Engineers, Chicago, have the steel work of the train shed and the foundation work in charge.

Kimball's Composite Concrete and Steel Tie.

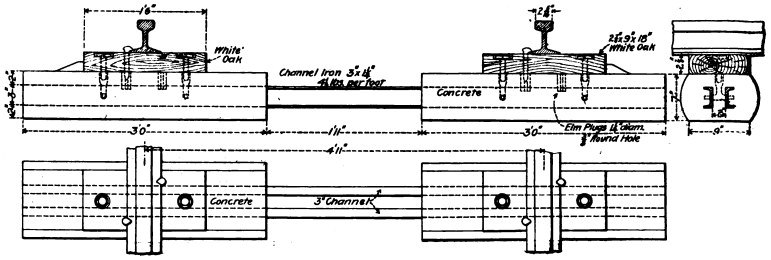
The engraving shows a cross tie, designed by Mr. G. H. Kimball, Chief Engineer of the Pere Marquette Railroad Company, which was put in track last autumn for experimental use. Late in January Mr. Kimball informed us that the company was then preparing to lay three-quarters of a mile with this tie at the entrance to Bay City, where the track must be maintained under the pavement. The performance of the experimental tie up to that time had been entirely satisfactory.

The main members are two channels, 1¼ in. x 3 in., weighing 4 lbs. per ft., spaced about 2 in. back to back, and secured to each other by rivets and thimbles. Around each end of these is moulded a concrete block 7 in. thick, 9 in. wide on the face, and 3 ft. long, the curve of the side being 5.7 in. radius. On these concrete blocks are white oak blocks to carry the rails, although, of course, these blocks may be of any other wood that the local engineer prefers to use.

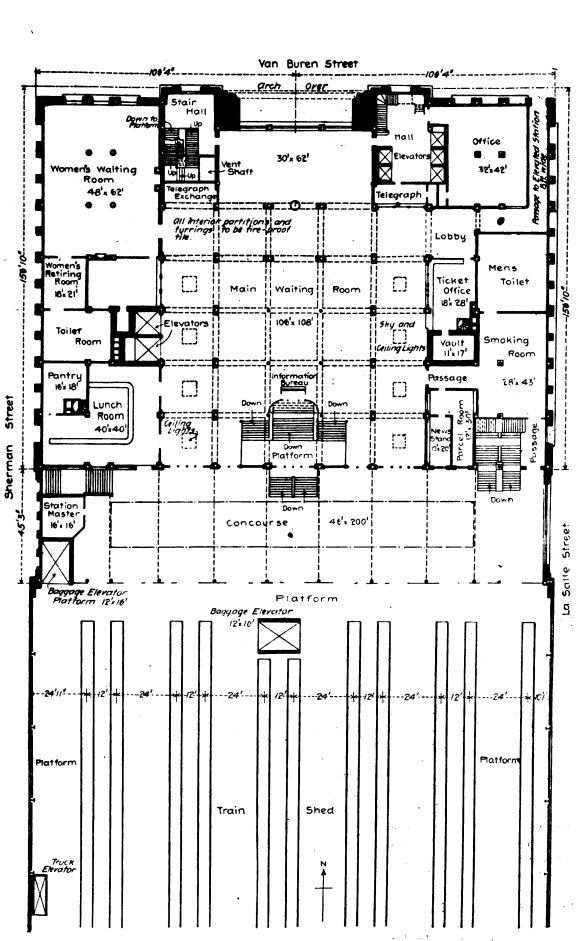
The attachment of these wooden blocks to the concrete is shown in the engraving. Hangers or sockets are moulded into the concrete and into these bolts are screwed which are countersunk in the wooden block. These hangers also serve to space and hold the channels as they enter with a driving fit and have shoulders. Each concrete block has a lug moulded across it as a further support against lateral motion, for the wooden block. Small grooves are made across the concrete under the ends of the wooden blocks to prevent water working in. Plugs of wood are moulded in place in the concrete to receive and guide the points of the spikes, but if the wooden block is thick enough these plugs may be omitted.

The channels are first coated with a wash of pure Portland cement of the best quality to prevent corrosion. The concrete may be made of any material, either sharp sand, gravel or fine stone, and cement. It is suggested that Avenarius Carbolineum be used to preserve the wooden blocks.

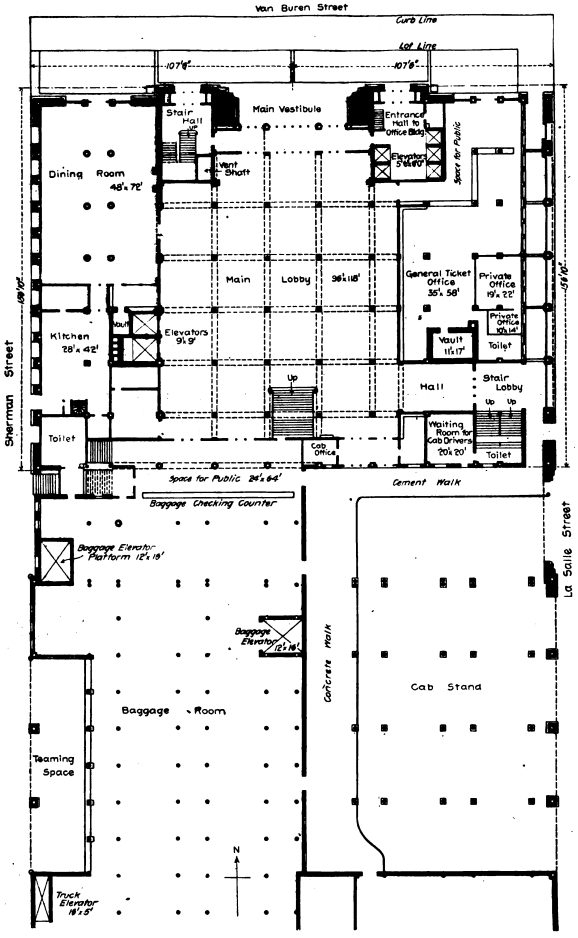
The object of the designer has been to secure a permanent tie that can be uniformly tamped without becoming center-bound. Other advantages are, the saving in cost of renewals, and the longer life of the rail due to better surface, particularly at the joints. It is believed that as



Kimball's Composite Concrete and Steel Tie.



Track Floor.



Ground Floor.

Plans of New Van Buren Street Passenger Station, Chicago—C., R. I. & P. and L. S. & M. S.