THE CHICAGO & WESTERN INDIANA POWER HOUSE.

Early in 1904, in connection with the Chicago & Western Indiana Railroad coach yards, described in The Railway Age of February 17, 1905, Messrs. Stephens & Tyler, consulting engineers, were retained to prepare plans for a proposed power station for furnishing steam heat, compressed air and water supply to the coach yards and adjacent buildings, and for generating electricity for distribution from Dearborn station to Eighty-third street, for lighting passenger stations, freight houses, yards and subways, charging storage batteries, and furnishing power wherever required.

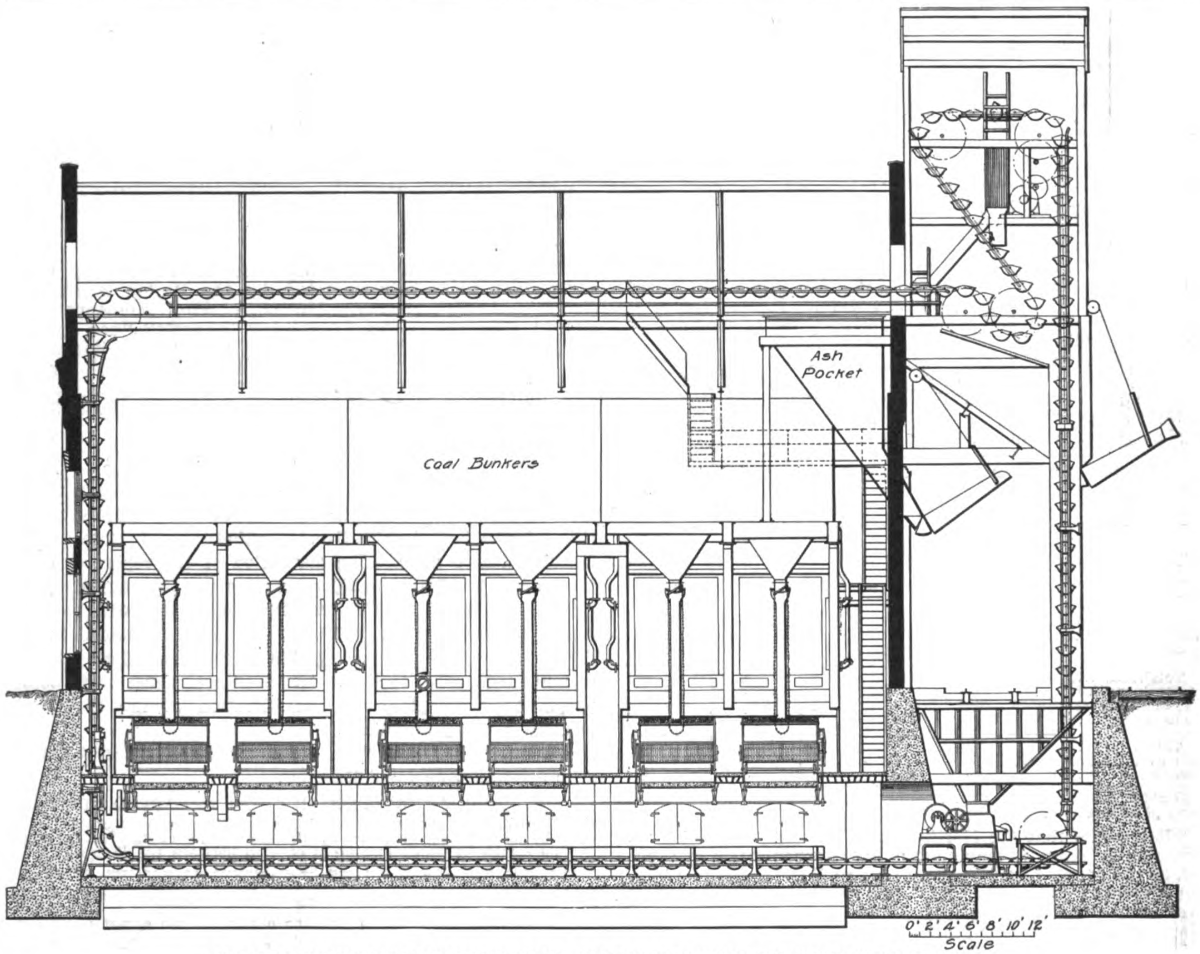
After a thorough inspection of the properties of the Chicago & Western Indiana Railroad and tenant lines, the engineers reported to Mr. E. H. Lee, chief engineer, outlining a plant to care for the present needs and foreseeing, as far as possible, future requirements.

In March, 1904, the engineers were instructed to proceed with the detail plans and specifications and the purchase of equipment along the lines above reported. The foundations, which are of reoinforced concrete throughout, and act as retaining walls for the track elevation filling, were constructed by the railway company and turned over to the contractor for the superstructure in August of the same year.

The power station is located just south of Forty-seventh street, and occupies ground dimensions of 82 by 150 feet, exclusive of locomotive coaling hoppers, the boiler house being 50 by 82 feet, and the engine, pump and heater room, together with the offices, 82 by 100 feet.

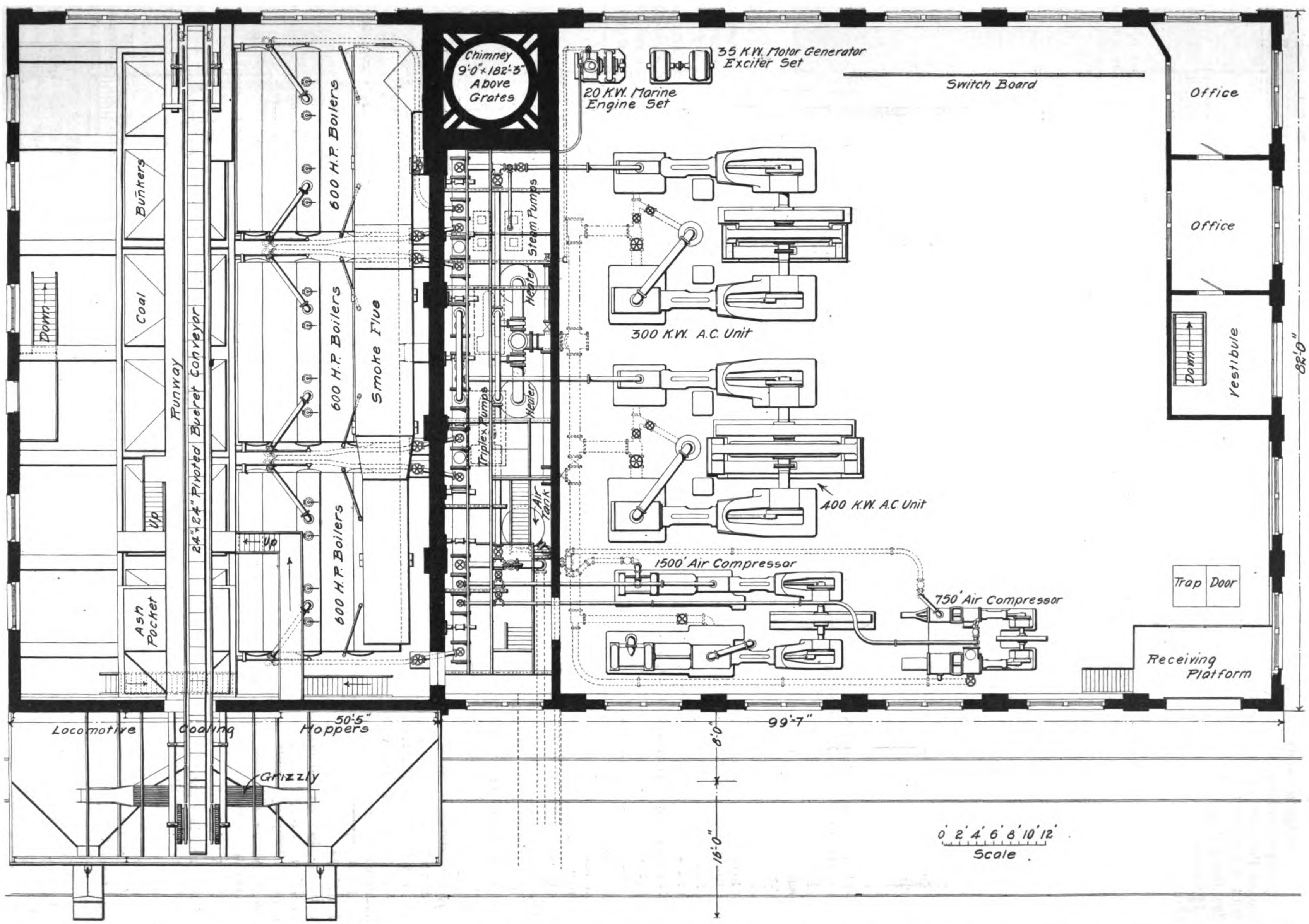
The engine and boiler room floor level is at 20 feet above city datum. The boiler house roof rises to elevation 80 at the highest point and the engine room roof to approximately 55.

The walls of the superstructure are of brick, supporting steel roof trusses, roofed with book tile, laid in tee irons and covered with 5-ply tar and gravel. The exterior of the building is faced with dark red sand mold brick and the interior of the engine room above the foundations is faced with "Gloniger" buff impervious brick. The pump and heater room is partitioned off from the engine room by a 12-inch tile wall rising from the engine room floor level to the roof. This wall is carried on I beams and cast iron columns, which leaves the basement open. The pump and heater room is thoroughly lighted and ventilated by ample skylight and one of the large side windows. The floors of the engine and boiler house are constructed of flat tile arches carried on I beam construction, covered with 3½ inches of concrete floor. The basement of the entire plant has a 6-inch concrete floor.



CHICAGO & WESTERN INDIANA POWER HOUSE—SECTION THROUGH BOILER HOUSE AND COAL CHUTE.

A supply and coaling track extends along the east side of the building, terminating with a bumping post at the north end, where there is located a large steel rolling shutter receiving door, where material may be received on the platform, which is at car floor level. A trolley and hoist are provided for the removal of material from this platform to the engine room floor or on into the basement through a pair of trap doors, as shown on the plan. In the north end of the engine room, at track level, are located the vestibule, main entrance and two offices for the plant operatives' use. Under these offices are provided toilet and dressing room, with lockers for the operatives, together with store room. The toilet and dressing room is fitted with modern open plumbing, spray bath, lavatory and lockers.



CHICAGO & WESTERN INDIANA POWER HOUSE—GENERAL PLAN. STEPHENS AND TYLER, CONSULTING ENGINEERS.

On the east side of the boiler house a steel constructed locomotive coal chute, 17 by 50 feet, with a capacity of 200 tons, rises to elevation 94 feet 8 inches. The cupola over the locomotive coaling hoppers contains the driving mechanism of the pivoted bucket conveyor, which supplies coal to both the locomotive coaling hoppers and the bunkers supplying the boilers.

Mine run coal will be used and unloaded into the receiving hopper under the first track. By reference to the section through the boiler house and coal chute, it will be noted that the coal passes from this hopper directly through a motor driven, self contained crusher, which is capable of adjustment to pass coal of 5-inch cubes and less, or to reduce all the coal to 1-inch cubes, if necessary, for stoker use.

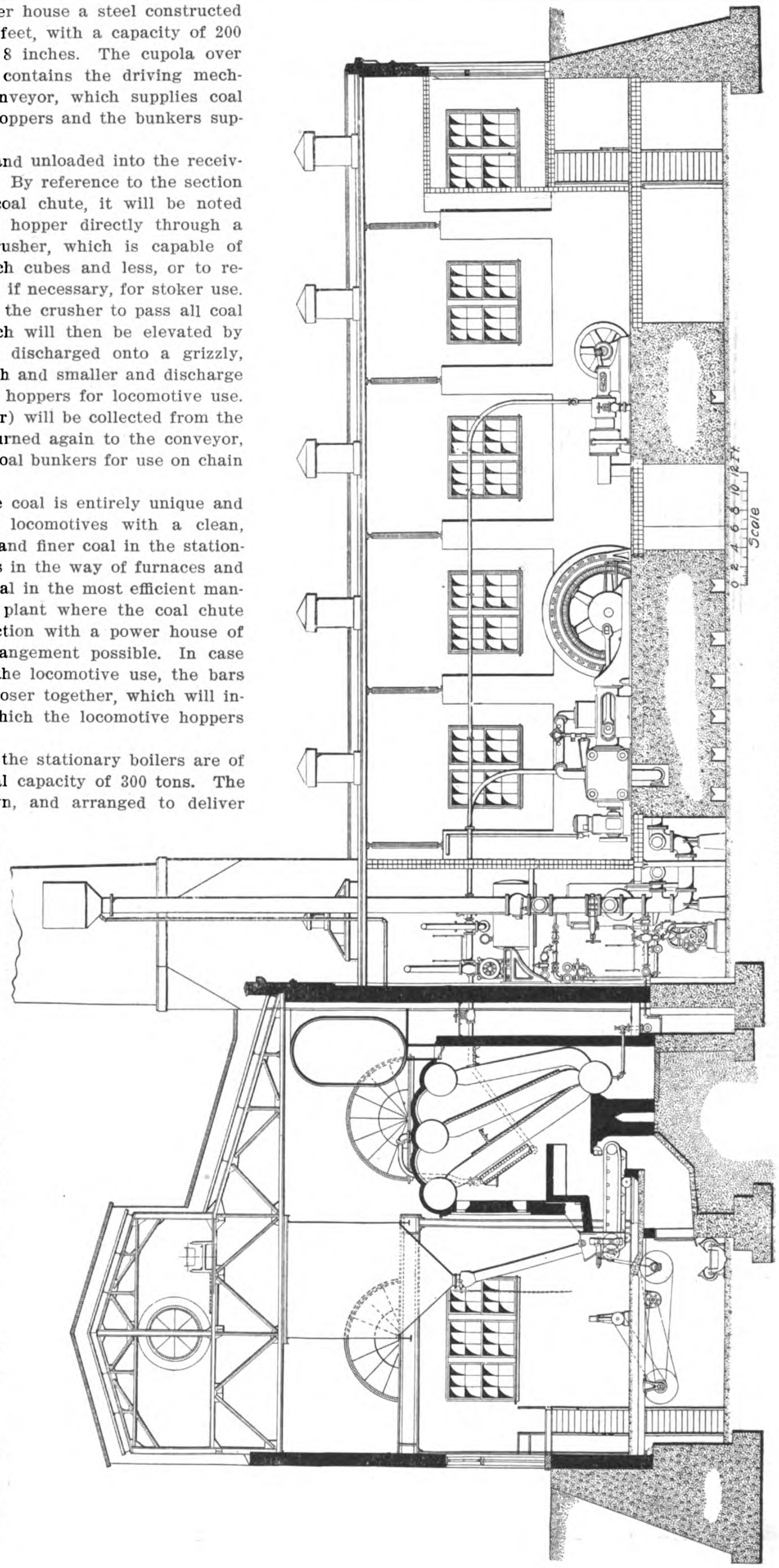
The plan, however, is to set the crusher to pass all coal of 5-inch cubes or smaller, which will then be elevated by the pivoted bucket carrier and discharged onto a grizzly, which will remove the coal 1 inch and smaller and discharge coal from 1¼ to 5 inches to the hoppers for locomotive use. The fine coal (1 inch and smaller) will be collected from the grizzly through a spout and returned again to the conveyor, which delivers it in turn to the coal bunkers for use on chain grates under stationary boilers.

This method of handling the coal is entirely unique and affords facilities for furnishing locomotives with a clean, uniform coal, burning the slack and finer coal in the stationary plant, where proper facilities in the way of furnaces and draught enable the use of the coal in the most efficient manner. This is probably the first plant where the coal chute has been constructed in conjunction with a power house of this size which makes this arrangement possible. In case there is not sufficient coal for the locomotive use, the bars on the grizzly may be spaced closer together, which will increase the proportion of coal which the locomotive hoppers will receive.

The coal bunkers supplying the stationary boilers are of steel construction, having a total capacity of 300 tons. The ash hopper is located as shown, and arranged to deliver ashes to car on the first track. The locomotives will receive coal on the second track.

The water drainage of the entire plant is run to a sump in the pump and heater room, from which it will be pumped to a yard catch basin overflowing through the tunnel to the Fifty-first street sewer.

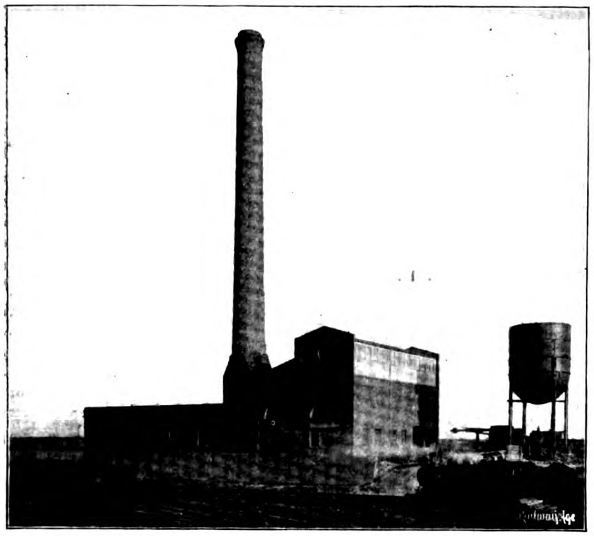
The chimney is 9 feet inside diameter at the top, and rises to a height of 182 feet 3 inches above the grates. The building contractor constructed the 16-foot square brick base laid entirely in cement mortar, terminated in an octagonal form. The Steinl Chimney Construction Company built the shaft, which is 136 feet high above the brick base.



CHICAGO & WESTERN INDIANA POWER PLANT—LONGITUDINAL SECTION.

Equipment.

The plant is equipped with six 300-horsepower Stirling water tube boilers, built for a working pressure of 150 pounds. These boilers are equipped with Green traveling chain grates, the ratio of heating surface to grate surface being approximately 50 : 1. The hoppers of the Green grates will be charged by the spouts from the coal bunkers. Below the grates are ample ash hoppers, provided with spray pipes for cooling the ashes. These spraying devices are controlled from the boiler room floor level. The stokers are operated from a line shaft in the basement, which is driven by a small stoker engine, and also a 5-horsepower induction motor. A 24 by 24 inch pivoted bucket conveyor handles all the coal and ashes in the plant and is driven by a 15-horsepower induction motor.



CHICAGO & WESTERN INDIANA POWER HOUSE—GENERAL VIEW.

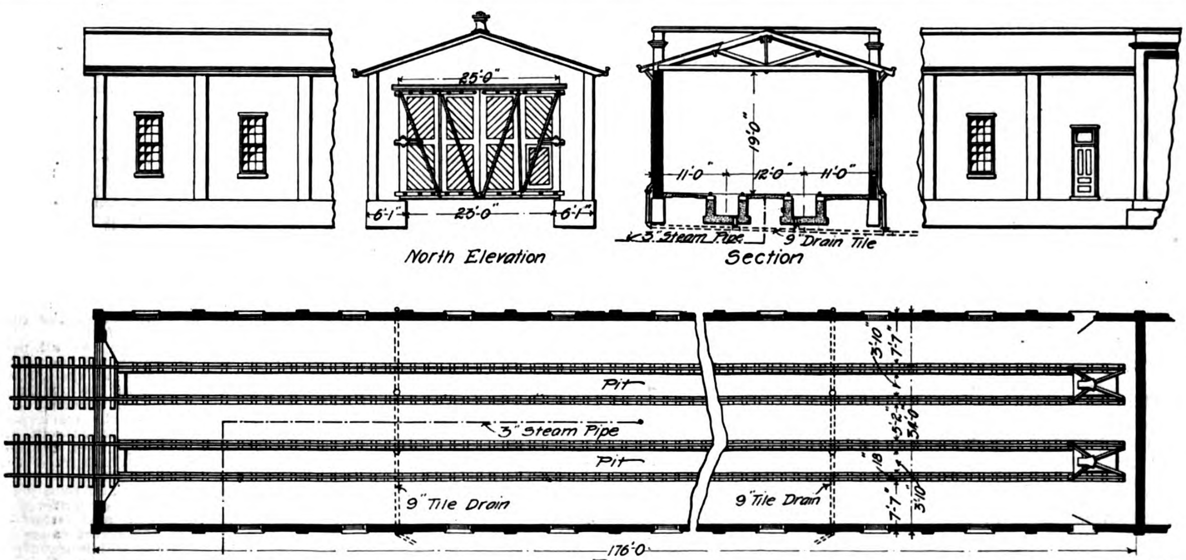
The breeching is built up of steel plate suspended from the roof trusses and is insulated with 1½-inch air cell blocks jacketed with canvas and covered with fireproof paint. The boilers are equipped with Foster superheaters, which are carried in cast iron wall frames in the position shown on the engraving. A thermometer is located on the pipe running from the superheater to the main header, which is in plain sight of the fireman, so that the temperature of the steam at all times may be observed and controlled. The main steam header is located in the pump and heater room, and is supported on wall brackets. This header is divided into two parts, connected by a U bend. The steam runs from the boilers to the header are equipped with Crane automatic stop and check valves, located in the boiler room, and controlled by Crosby angle valves on the header. There is an auxiliary header so arranged that, if either half of the main header is out of service, steam may be delivered to any of the steam consuming units in the plant from three of the boilers.

The pumping equipment of the plant consists of two 10 by 6 by 12 inch Marsh steam pumps, one 5½ by 8 inch and one 7 by 8 inch Stilwell-Bierce & Smith-Vaile motor driven triplex pumps. These pumps are arranged to receive either hot or cold water, and the discharges are connected to a hot and a cold water header line. The city water is received in a storage tank through a 6-inch main through the tunnel from Fifty-first street. The station is also supplied with a 6-inch line from the yard service tank, and is so connected by a pressure regulating valve that, if the city pressure fails, the tank pressure immediately becomes operative on the storage tank. The yard tank is supplied by any one of the four pumps in the plant.

CHICAGO & WESTERN INDIANA POWER HOUSE—INTERIOR VIEW OF ENGINE ROOM, SHOWING FOUNDATIONS.

The sump is equipped with two 3-inch submerged, centrifugal pumps operated by two 3-horsepower vertical induction motors automatically controlled.

Steam is delivered to the tunnel through a 10-inch pipe controlled by a Foster reducing pressure valve, which is capable of adjustment from 20 to 80 pounds. This 10-inch yard steam line may be served from either the main or auxiliary headers. The main steam header, together with the auxiliary header, are reached by an iron stairway and



CHICAGO & WESTERN INDIANA PASSENGER YARD—THAWING-OUT HOUSE.

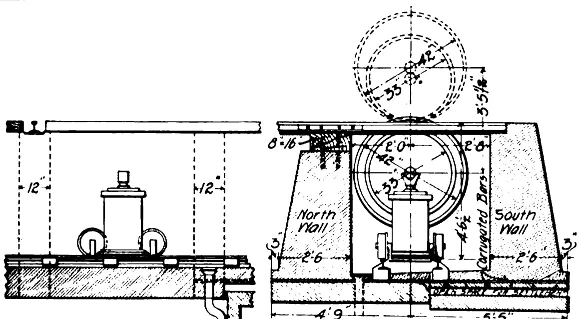
gangway running the entire length of the pump and heater room.

The floor of the pump and heater room at elevation 20 is also made up of iron gangways. From these gangways, which are at boiler room and engine room floor level, and equally accessible from both, the entire water, steam and air distribution of the plant may be controlled.

The power units in the plant consist of one 300-kilowatt 3-phase alternating current generator, direct connected to one 16 and 28 by 42 inch cross compound, noncondensing Cosliss engine, also, one 400-kilowatt, 3-phase, alternating current generator, direct connected to one 18 and 32 by 42 inch cross compound, noncondensing Corliss engine. The engines were built by the Fulton Iron Works of Saint Louis, Mo. The generators were built by the General Electric Company.

The exciter equipment consists of one 20-kilowatt, 125-volt, direct current generator, direct connected to one vertical marine type automatic engine, and one 35-kilowatt, 125-volt, direct current generator, coupled to one 40-horsepower induction motor.

The air compressor equipment consists of one horizontal, cross compound steam, 2-stage air compressor, having steam cylinders 14 and 26 by 30 inches, coupled in tandem to 16 and 26 by 30 inch air cylinders, having a capacity of 1,500 cubic feet of free air per minute, at 85 revolutions per minute,



THE RAILWAY AGE

CHICAGO & WESTERN INDIANA PASSENGER YARD—PNEUMATIC JACK IN WHEEL PIT.

built by the Fulton Iron Works, Saint Louis, Mo., and one horizontal, cross compound, steam, 2-stage air compressor, having steam cylinders 13 and 25 by 14 inches, coupled in tandem to 14¼ and 22¼ by 14 inch air cylinders, having a capacity of 750 cubic feet of free air per minute, at 110 revolutions per minute, of the Ingersoll-Sergeant Drill Company's piston valve type, with Meyer cutoffs on the steam cylinders. These compressors deliver air to a receiver located in the pump and heater room, to which the yard supply line is connected.

Each of the steam consuming units in the plant is connected to the exhaust system, which is suspended in the basement from the floor beams and terminates in a 20-inch exhaust main, capped with a Wright exhaust head. The exhaust main is connected to two 1,200-horsepower Vater open heaters, situated in the pump and heater room. These heaters are so connected that they may be operated by induction, straightaway or by-passed, as the operator may desire. The switchboard will occupy the position shown on the plan. The south wall of the boiler house is a curtain wall which may be removed and an extension wing built, which will provide room for six more boilers facing the present ones, there being room between the present boiler house and turntable for this extension, including a new chimney.

The entire plant is thoroughly fireproofed throughout, the only wood used in the construction being in the window frames, office flooring and a plank runway along the coal conveyor in the cupola of the boiler house.

The plant has been designed with a view to doubling the boiler capacity if future demands make it necessary and there is room in the engine room for two additional engine units or three or four turbines. All of these additions may be made, or the plant turned into a condensing plant, without interruption of service.

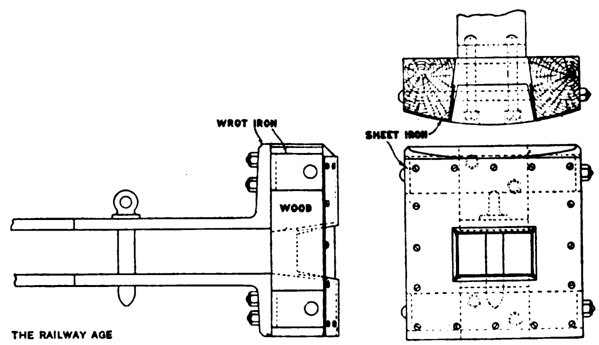
W. M. Crilly is the general contractor for the superstructure, and all steel work for the building, coal chute and coal bunkers was manufactured and erected by the Morava Construction Company. The pivoted bucket conveyor, together with undercut gates and chutes, was furnished by the Link Belt Machinery Company.

AUTOMATIC COUPLERS.*

BY A. W. GIBBS, GENERAL SUPERINTENDENT OF MOTIVE POWER PENNSYLVANIA RAILROAD.

The history of the automatic car coupler in this country will be, for the purposes of this paper, confined practically to the development of the vertical plane hook type. This because of its universal adoption, brought about partly by legal enactment and partly by the initiative of the roads. As its introduction was brought about only after a contest between different types, it is proper to preface that part of the paper relating to the present form of coupler by showing the steps which have led to it. As the number of patents directly relating to car couplers is somewhere in the neighborhood of 8,000 it will suffice for us to confine ourselves to a few of the types which have been brought into prominence, either as forming links in the chain or being the subject of legal enactment, and finally considering a very few of the types now in extensive use, these few being selected to illustrate principles, but not as an indication of preference for those illustrated.

From the early days of railroading in America the mechanism for connecting car to car seems to have been developed on two distinct lines, the first consisting of a vertical hook attached to the end of the car, this hook being connected to that of the neighboring car by means of one or more links thrown over the hooks. Obviously, as this device was adapted to resisting tensile strains only, it became necessary to introduce buffing blocks between the ends of the cars to take up the buffing shock. This construction survived, to a limited extent, until quite a recent period—in fact, it was not entirely abolished until the general introduction of the vertical plane coupler. The other line of development consisted of the link and pin coupler, which always embodied the feature of a bar attached at one end to the car and at the outer end having an opening for the reception of a link, and with a vertical hole for the insertion of a pin securing the link. The material of which these couplers were made ranged from the composite wood and iron construction of the cars of the "thirties" (Fig. 1) to those made entirely of cast iron, followed by those made of wrought or malleable iron. As this bar possessed the quality of



THE RAILWAY AGE

FIG. 1. PRIMITIVE TYPE OF COUPLER.

receiving both tensile and buffing strains, the dead block became of secondary importance, but on many cars it was retained, so as to relieve the bars, as much as possible, of the shock of buffing.

The entire lack of uniformity in the length, the spacing and even in the height of these buffer blocks resulted in their failure to protect the cars to which they were secured. Of still greater importance was the fact that this very lack of uniformity was a distinct menace to the men performing the operations of coupling and uncoupling. With some of these dead blocks the coupling operation could be performed only from above. With others the operator must, of necessity, stoop to guide the link into the opposing coupler, holding his arm entirely below the dead blocks. The lack of uniformity caused this operation to be so dangerous that these blocks were generally known as "mankillers." The gradual improvement in the attachment of the coupler to the car minimized the importance of the dead blocks as a buffing device, so that on one road after another they fell into disuse, and, while not yet entirely abolished, it is apparently a question of but a short time until they entirely disappear from American freight car equipment.

The development of the fixed vertical hook calls for no special comment, and it will suffice to consider the development of the link and pin type, with its final supersession by the present form.

While, as we have indicated, the link and pin couplers all possessed the common feature of an open pocket in the end of bar, with means for securing the link, there was no uniformity in the width, height or depth of the pocket, the position and size of the pin hole, the size and length of the bar and in the means of securing the coupler to the car. The height of the coupler above the track was also subject to considerable variation, so that the ordinary straight link could not be universally used, requiring, in many cases, the use of special bent links. These bent links, of necessity, subjected the ends of the cars to severe and unnecessary vertical strains.

When the interchange of freight cars between road and road grew in importance the intolerable delays due to the lack of uniformity of equipment called attention to the necessity for an association of the mechanical men caring for the cars and was the direct cause of the formation of the Master Car Builders' Association, which organized in 1867, and it is interesting to note that at the second meeting of that association the importance of regulating the height of drawbars was considered, and at the fifth meeting the height of 33 inches from top of rail to center of drawhead was adopted. This has remained to the present day, but it was found necessary to allow a variation of 3 inches between loaded and empty cars, which has fixed the standard or maximum height of drawbars at 34½ inches, as now prescribed by law.

At this period the automatic coupler had made no progress whatever on freight equipment, but on passenger equipment the Miller coupler and platform, patented in 1863, had made very definite

*Report to be presented at the seventh session of the International Railway Congress, to be held in Washington in May, 1905, and published in the Bulletin of the congress, January, 1905. A report on the same subject for England, by Mr. W. F. Pettigrew, Furness Railway, was published in The Railway Age of July 29, 1904, page 114.