Storehouse, Havelock Shops.

FIRE PROTECTION FEATURE IN CONSTRUCTION OF THE PENNSYLVANIA STATION IN NEW YORK.

A firewall stretching across Manhattan Island from Ninth to Fifth Avenues has been completed by the construction of the Pennsylvania station and adjacent buildings. The full fire protection system of the station has just been put into operation and insurance engineers say a conflagration such as was experienced in Baltimore and San Francisco is now an impossibility in Manhattan. Some idea of the extent of the modern fire protection system in the Pennsylvania station may be had from the fact that the area covered is something over twenty-eight acres, with three levels below the main floor, the lowest being thirty-six feet below the street line. Approximately three miles of piping, weighing four hundred and twenty-five tons were required, while there are in all one hundred and seventeen hose connections, twenty-four roof hydrants and twelve flush hydrants.

A study of the fire protection arrangements of the new Pennsylvania station shows that this system received the same care and attention that has characterized the entire undertaking. While upon first consideration it may seem that the requirements for fire protection for a building of the type and character of the station do not call for any elaborate system, the nature of the business of a transportation company requires that more than ordinary precaution be taken to safeguard its operation against interruption.

It was necessary, in providing for fire protection at the new station, to secure a continuous and uninterrupted supply of water that would meet all the demands for domestic service and at the same time insure a surplus sufficient to maintain not less than twelve standard fire streams or 3,000 gallons per minute. With due regard for variation and uncertainties in the city supply, a careful study was made of the city's distribution system for the station district and it was found that by tapping the street mains in 7th and 9th Avenues, 20 ins. and 24 ins. respectively, and cross connecting the supply with a private 12-in. main in 31st Street between the two avenues, the possibility of serious failure would be reduced to a minimum, likewise there would be no appreciable effect on the station in

Erecting Shop, Showing Two 75-Ton Girder Cranes and Three Traveling Wall Cranes, Havelock Shops.

the event of heavy drafting by city fire steamers on one or the other of the two streets. In addition to the connection with the private 12-in. main in 31st Street there is a 6-in. connection with a 12-in. public main.

Connections from the above mains are carried directly to two 1,500-gallon "Blake" pumps of the Underwriter pattern in addition to the 16-in. suction from two storage tanks having a total capacity of 75,000 gallons. The pumps and tanks are installed in the station service plant, a separate building used for furnishing power for various purposes for the operation of the station, located on the south side of 31st Street between 7th and 8th Avenues. These pumps are cross-connected and can be operated singly or in battery. Ordinarily the pumps work under "Ford" regulators set to maintain constant pressure of 90 lbs. There is a 12-in. discharge union to the fire line distribution, provided with approved gate and check valves.

The fire system distribution is divided into two loops or sections, one section supplying sixteen 4-in. standpipes inside of the station building, the other consisting of a 10-in. "grid-ironed" loop system encircling the track level between 7th and 9th Avenues. West of 9th Avenue there is a 5-in. extension connecting back of a 10-in. cross main, with both sides of the main loop and running to 10th Avenue. There are also two 6-in. tie connections near 33rd Street and 8th Avenue between the 10-in. loop supplying the track level area and the 6-in. discharge to the standpipe system. The supply pipes throughout are carried in pipe subways which encircle the entire station area. The pipes are carried on transverse cast-iron hangers supported from steel girders, and together with the main shut-off valves are readily accessible for inspection or repairs. With the exception of a short section of the loop system which has been laid underground along the 34th Street side, all of the pipe is wrought steel with the interior risers of the standpipe system galvanized steel, the underground pipe being cast iron, hub and spigot pattern.

Six siamese hose connections have been located on the four street fronts of the station building to enable city fire engines to pump into the standpipe system. This service, however, would only be required in the event of failure of the fire pumps, as the latter would supply the maximum discharge necessary for interior protection and maintain 100 lbs. pressure. The pipe-runs from steamer connections are controlled inside of the building by independent gate valves, with an automatic check valve in each of the siamese inlets closing against the building supply.

In the station building there are in all sixteen 4-in. risers with 83 hose connections thereon directly connected with a 6-in. loop line in the pipe galleries. These connections are located about eighty feet apart and are provided with "Nelson" angle globe valves and equipped with 100 ft. of 2½-in. linen hose suspended from hose racks. A smooth tapering nozzle 18 ins. in length with 1-in. discharge is attached to the hose at each connection. The use of an angle globe valve for hose outlets on the standpipe system was determined upon because of the greater freedom from leakage of these valves as compared with the gate type and as the water pressure available would be more than sufficient to meet all the requirements for interior protection the additional friction loss in the angle globe valves would be more than offset by the advantages of a tight connection.

In the track level area there are 23 hose connections on train platforms and 12 hydrants in the yard west of the station building. These latter hydrants are of the flush type, as operating conditions in the yard precluded the use of the ordinary standard fire hydrant; these hydrants are covered by metal hydrant traps. The hose equipment for these hydrants will be stowed in convenient form for quick handling in various yard buildings as the space between the tracks is not sufficient to permit of placing the hose over the hydrants. For the hose connections on the platforms 100 ft. of 2½-in. linen hose is provided at each connection and for the roof hydrants 100 ft. of multiple woven cotton rubber lined hose which is stowed in two centrally located hose houses.

Hand chemical extinguishers have been provided in the corridors of the upper floors and at other points throughout the station, comprising in all 75 three-gallon extinguishers. In addition, there will be 33 extinguishers of the non-freezing type placed in column recesses on the track level floor, where freezing conditions may exist.

For the station building there will be in addition to the equipment specified a 500-ft. reel hose carriage and a 60-gallon chemical engine. The total equipment of 2½-in. fire hose for the station exceeds 15,000 ft. The fire protection for the station would be incomplete without some reference to the equipment provided for the station service plant. For this building there is a 4-in. loop supplying five 3-in. and one 4-in. risers having eleven 2½-in. hose connections for use on which 100 ft. of linen hose is provided suspended from approved hose racks. In all minor details the equipment is similar to that of the station building.

In order to protect against the exposure from adjacent buildings in the rear of the service plant, five monitor nozzles are installed on the roof, each having 1½-in. discharge. There is also a three-way roof hydrant for which 250 ft. of 2½-in. cotton rubber lined hose is provided, in addition to 23 hand chemical extinguishers.

A complete closed circuit fire alarm system covers the entire station and service plant. There are in all 20 boxes of the non-interfering successive type, wired in loops of 10 stations each, recording on three gongs, located under main concourse, yardmaster's office and station service plant. There are a number of "punch" registers and tap bells in the office of the various station officials. City fire alarm boxes are also located on the premises.

The fire brigade organization comprises twenty-five men, divided into three companies, viz.: Hose wagon company, chemical engine company and standpipe company. In addition, five men, who are expected to report at all fires in advance of the regular companies, are especially designated for hand fire extinguishers. Special provision is made for plumbers and electricians to report at all fires, being subject to the orders of the fire marshal, and certain of the elevator lifts are designated for transporting the apparatus when required on upper floors.

The standpipe service company is a distinctive feature of the fire brigade organization. The men of this company respond to all alarms and have exclusive control of the standpipe service and in handling the hose equipment in track level area for use on flush hydrants.

A unique feature of the alarm system for the station is found in the tunnel alarms for transmitting signals indicating fire and for cutting off current to the power rails. Their are 116 boxes on this system divided into six circuits, each box having two levers, one marked "Power" and the other "Fire," the "Power" lever automatically cutting off all power current in the section directly affected. This signal consists of two rounds of the box number. The "Fire" lever also automatically cuts off the power current and is indicated by four rounds of the box number. All alarms are recorded on a 6-in. gong in the main power house at Long Island City and on gongs in each of the sub-stations and station service plant. There are also a number of "punch" registers and tap bells in the signal cabins and train dispatcher's office. This system is not directly connected with the gongs or indicating apparatus of the station fire alarm system. The watchmen's service is recorded on two portable watchman's clocks from 38 stations and provides for hourly tours. At the present time there are two watchmen covering this service.

The fire protection system of the Pennsylvania station em-

bodies every modern contrivance for fire fighting. The system was installed after exhaustive inquiry as to the needs in Manhattan, and it is thought by insurance engineers to render impossible any fire of consequence in the station area.

PROTECTION OF METAL EQUIPMENT.

(Continued from Page 345, December, 1910.)

The answers to question No. 3 are apparently in favor of metal. In regard to general appearance, the writer's observation has been that the exterior of metal cars look better than wood, but he is under the impression that up to the present time more care and regularity has been taken in cleaning them. During the rush of business over Labor Day a number of metal cars were seen that had evidently missed their regular cleaning, and they certainly looked as dingy and unattractive as the wooden cars.

Several correspondents remarked on the appearance of a metal car because of rivets, laps, etc. The best the writer has seen are some of the more recent Pullman cars. The entire side, under the windows is pressed up or molded to resemble the wooden battens. The under row of rivets are not seen, being placed under the car and fastened to a rigid strip of angle iron; the upper row of rivets are so close up under the windows as scarcely to be noticed. But while this may be said of the exterior of Pullman cars, it must be admitted that the interior does not present the same elagance and taste that we have become accustomed to in the beautiful and artistic finish of the wooden cars.

Concerning remarks of (A) in regard to the opening of joints and entrance of moisture, it would seem that the remedy for stopping the spread of rust is better than any known remedy to prevent spread of moisture in a wooden car, when from any cause the varnish and paint have been bruised down to the wood, the sand blast can on a metal car reach it ordinarily. But as one master painter remarked on this subject:—"We already have the acetylene gas flame, which cuts part and welds metal without removing from the structure, does it speedily and without the usual hammering and sledging to injure surrounding parts, as in the old way. Other methods and devices will be forthcoming when necessity demands it to take care of the different operations in the most speedy and economical manner." And he concludes by saying "America for inventions."

Question No. 4.

Do metal cars clean at terminals as well as wood?

(A) "From all I can learn at the terminals, metal cars clean up a little harder than wood."

(B) "..... The inconvenience encountered with rivets is probably counterbalanced by the numerous beads, which have to receive attention on nine-tenths of the wooden cars met with today."

(C) "I find no great difference in cleaning metal cars at terminals as compared with wood."

(D) "Metal cars in our judgment clean at terminals as well as wood."

The answers to question No. 4 vary a little. It should be explained that terminal cleaning does not generally come under the supervision of the master painter, but the one in charge of that department should be one of his selection, or, at least, one who has a practical knowledge of what is injurious to varnish and paint. Much harm can be done, great expense involved, and blame be put on the varnish and general work of the paint department by the use of strong solutions (used to save elbow grease). Anything that is strong enough to remove dirt easily will in the nature of things be strong enough to remove a portion of the varnish film each time it is applied. Cleaning solutions of medium strength may be used when quickly applied and quickly rinsed off with clean cold water, but this requires both skill and expedition. A cleaner that is not soluble in water and cannot be rinsed off will embed itself in all interstices and gradually eat the varnish and paint away, and do it more thoroughly and quickly than surface exposure to rain and sunshine, heat and cold, or sulphuric acid gases encountered in tunnels.

Question No. 5.

On their return to the shop, do you find problems in touching up, repairing and revarnishing different from the wooden car?

(A) "The touching up, cutting-in and revarnishing the exterior is about the same with steel as with wood cars. With the interior parts there is a difference, as the natural wood must be scraped and refinished where it has been bruised, while the steel car can be forced up with putty and repainted."

(B) "There are problems presented by the steel car that do not exist on the wooden car. For instance, take the button or rivet heads. In every case it was found that the varnish and paint had been worn off, exposing the metal. This also applies to the edge of metal plates. In my opinion this was due to repeated terminal cleaning; a really unavoidable result of a necessary practice. In a number of cases these exposed parts had begun to rust. These hundreds of rivets must be freed of this rust and carefully repainted before the car is cut in. The flat surface of a car may be in such condition as to require only a coat of varnish, but the touching up of these innumerable rivets with a color so difficult to match as ..... would produce an effect at once objectionable, and cutting-in the entire car would be the only course to pursue. In other words, a steel car, on account of its construction, cannot receive the same treatment that is acocrded to a wooden car."

(C) "In touching up and revarnishing metal cars we find many joints to be corroded, which must be scraped and cleaned down to the bright metal, then primed and re-surfaced the same as new. Of course, we have none of this to do in touching up and revarnishing a wooden car."

(D) "Where care has been given at terminals, it (metal car) should come back each time with the surface in good state of preservation to permit of cleaning, recoloring or varnishing without cracks or fissures, which are so often found on a wooden car."

(E) "Aside from the possibility of the paint chipping off the edges of metal battens, I do not think there will be any difference in the problems of touching up, but I do think there will be considerable less repairing to be done to the average car."

(F) "On the return to shops, problems of touching up, repairing and revarnishing are entirely different. We advocate cutting sheets in preference to touching up. If a sheet is scarred it is better to clean the whole sheet with one of the paint solvents than to touch up, though the tendency on wood cars is to putty and touch up."

It will be noted that the replies to question No. 5 requires some experience and as many railroads have not yet adopted metal passenger cars, only a few could answer from actual experience, but the answers given are both opinion and experience.

Question No. 6.

Does your present experience or does your opinion, based on present experience, lead you to believe that there will be any greater trouble in future years in making repairs to metal cars by reason of side-swipes, collisions and wrecks? In other words, do you anticipate repairs will be harder to make?