THE BRIERLEY FOG-SIGNALING APPARATUS FOR RAILROADS.

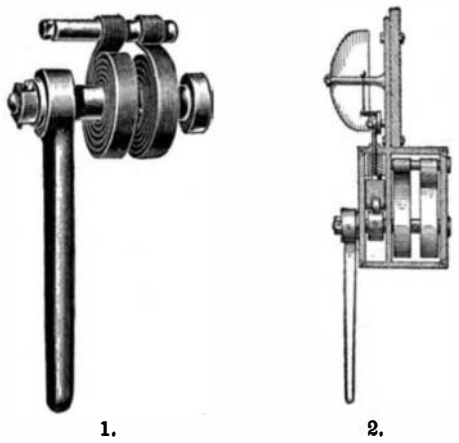
BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

Railroad engineers in Great Britain are following with great interest the experiments that are being carried out upon the Great Northern Railroad with a new signaling apparatus for operation in foggy weather. The system now used on this British railroad has been in service for the past three years, though its devices have been preserved a secret until their utility and certain action was conclusively demonstrated. The invention of Mr. Wynford Brierley, an experienced railroad engineer, who is consequently fully cognizant of the various problems that have to be surmounted in devising such an apparatus, the system is so designed that a failure would be sufficient to arouse the locomotive engineer's suspicions and cause him to come to a stop as soon as possible.

The Brierley apparatus is extremely simple, both in design and operation, and comprises a minimum of integral moving parts. The general character of the invention is plainly shown in the accompanying illustrations. Beside the track and close to the rails is a rocking arm carrying on either end a heavy head. The axis of this rocker is connected at one end with a lever, to which is attached the cable operating in communication with the semaphore with which the apparatus acts. The movement of the side lever, owing to its rigid fixation on the rocker, raises the one or the other of the two weighted ends to a horizontal position, according to the setting of the semaphore arm. When the latter is set to danger the weight nearest the track is horizontal — its normal position. The signalman in the cabin, when he lowers the semaphore arm, at the same time actuates the rocking arm of the apparatus, since a single cable operates both, and the weight at the opposite end is swung up to the horizontal, the other weight being naturally lowered out of the way.

On the engine is a small box from which extend two vertical triggers one behind the other as shown in the illustration. As the locomotive passes the apparatus on the track, one or other of these triggers according to the setting of the semaphore strikes the rocker, is forced backward, and at the same time rings a gong on the engine. This gong has an indicator the dial of which placed in the cab shows whether the road is clear or otherwise, and the engineer is able to act accordingly. When the trigger has passed over the rocker it returns instantly to its former position.

The mechanism on the engine is carried out upon novel and ingenious lines, especially that part which acts with the trigger and serves to return it to the vertical position after passing the rocker contact. Upon the horizontal shaft carrying the trigger is fixed a new type of coiled spring. There are two coils placed opposite one another, i.e., one has a left-hand coil and the other a right-hand coil. These are keyed to the axial shaft so as to become an integral part and



1. 2.

Fig. 1.—Double coiled spring fitted on lever stud showing trigger fitted on engine. Fig. 2.—Side section view of box showing general arrangement with gong actuated by oscillations of trigger after passing over contact, and reverse coiled spring.

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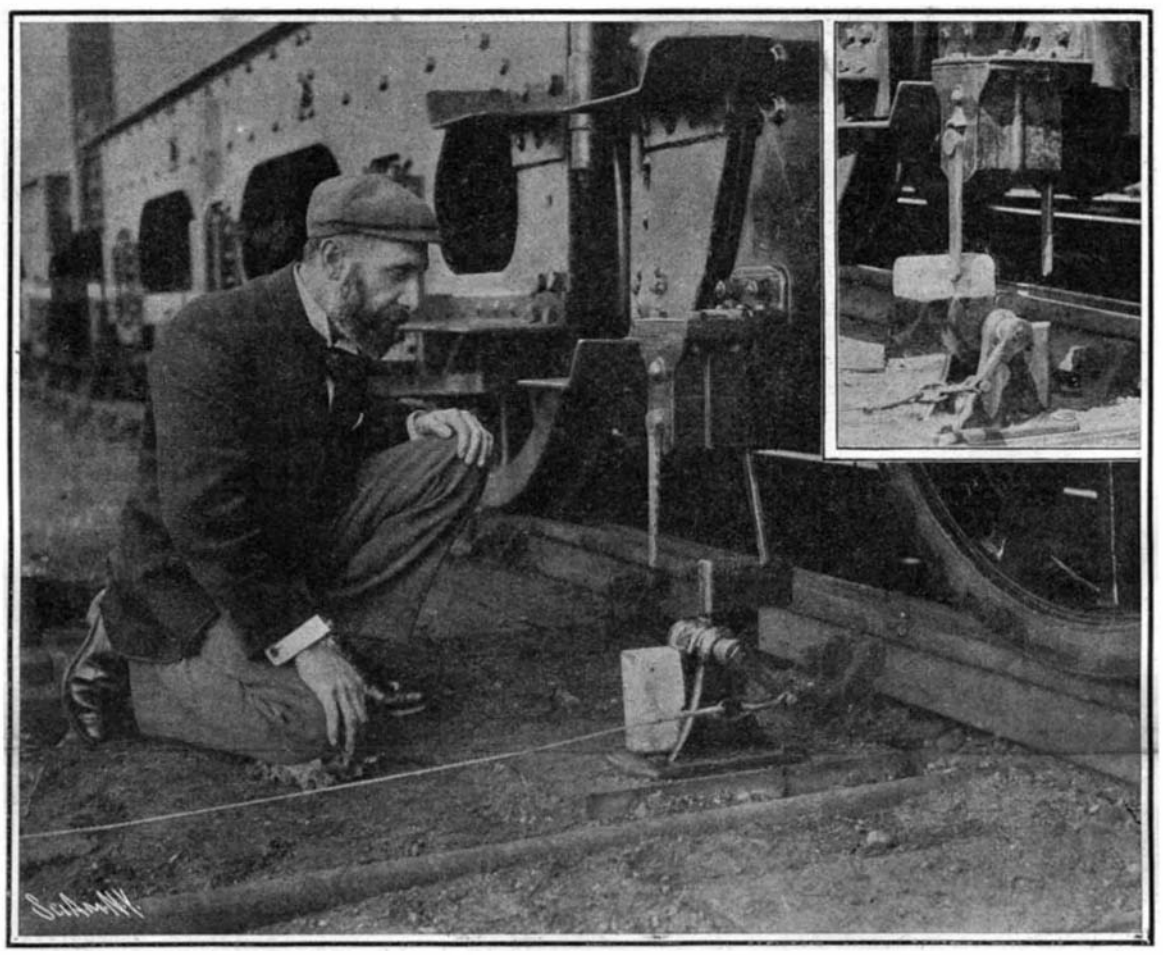
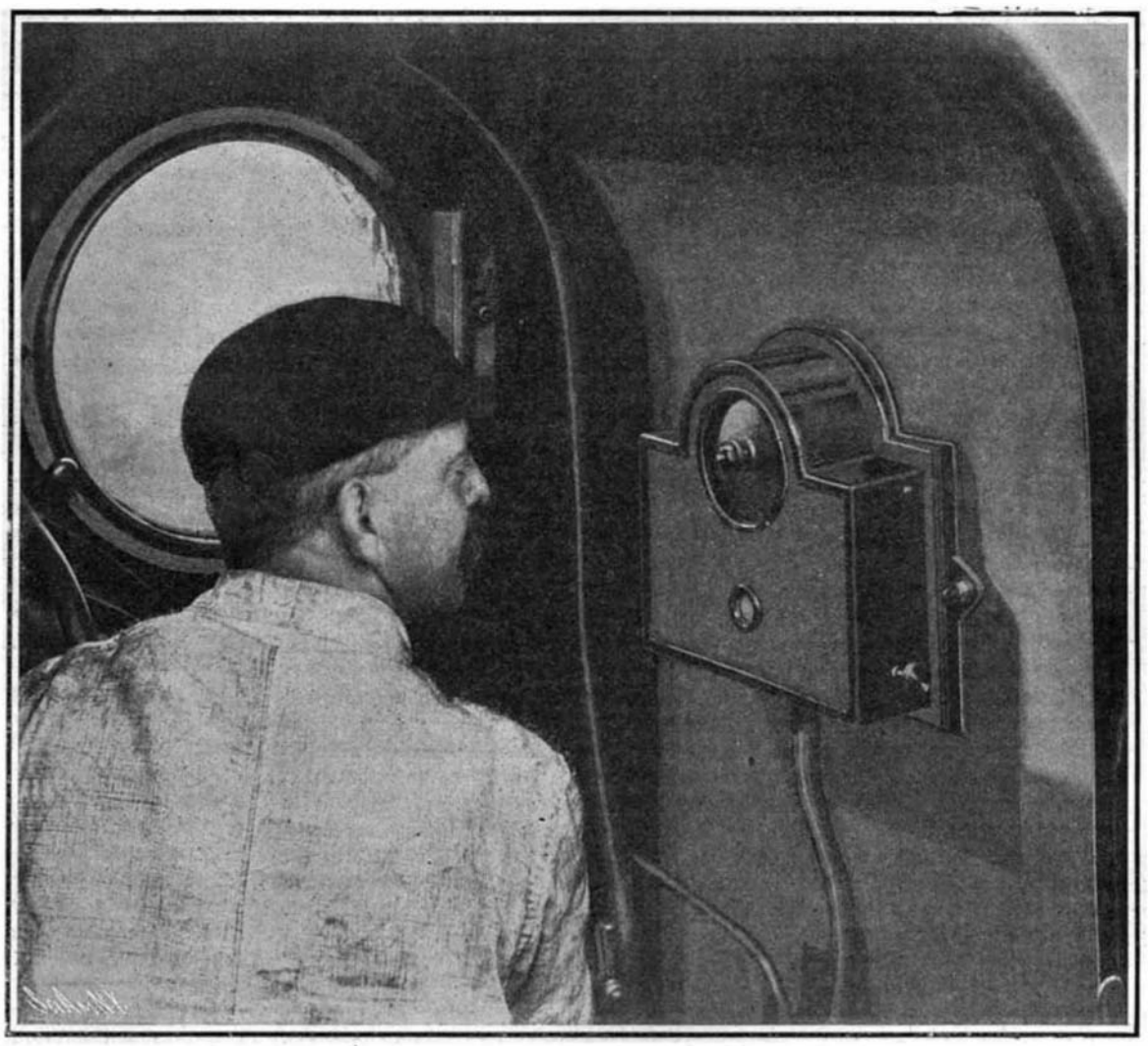


The Large View Pictures the Rocker When the Semaphore is at Danger, Showing the Danger Trigger Passing Over and Making the Contact Which Rings the Bell in the Engine Cab. The Small View Shows the Contact for Signaling "Road Clear."



The Indicator and Bell in the Engine Cab Show the Position of the Semaphore Arm.

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are of great strength and ease. In passing over the rocker contact, the trigger is forced backward until its angle is sufficient to ride over the obstacle. In so doing one spring is necessarily uncoiled, but simultaneously the other spring is coiled tighter. Consequently the moment the trigger has passed over the contact the trigger is brought sharply back to the normal vertical position, mainly by the action of the part of the spring which has been coiled tightly. This ingenious arrangement enables the apparatus to work equally well when the engine returns over the same road, the reverse action of the springs taking place. The value of this device is that the trigger is always brought back to the dead center, not violently, but slightly oscillating. If only a single coil spring were used, continual action of the trigger in one direction would tend to release the tension of the spring, so that the trigger would not always return to the dead center, and in a short time the spring would be so weakened that the trigger would not touch the contact at all. By using a reverse coil such as this, positive action under all and varying circumstances is insured, and the trigger is always brought to the same normal point. At the same time the mechanism constitutes an efficient cushion for absorbing the tremendous shock of the impact that results when the trigger strikes the contact when the train is traveling at express speed. The majority of such mechanical devices have failed at this point. The terrific force with which the moving part has been brought into contact with the stationary section breaks the apparatus. Three years' constant use upon the Great Northern Railroad, however, has shown that with the Brierley apparatus no such apprehensions need be entertained. The apparatus is placed on the section of the track where both north and south-bound trains pass, and even with trains traveling at 80 miles per hour no failure of action has yet been recorded, nor has the apparatus shown any signs of breaking under the enormous strains imposed upon it.

In the first type of apparatus the inventor relied upon electrical connections between the rocker and the trigger to ring the gong, but he has since simplified the invention, and arranged for this operation to be carried out mechanically. Not that the electrical system proved unreliable, but purely in the interests of the locomotive engineers. It was found that in the event of the electric bell failing through a broken or loosened connection or expended batteries the engineer was not possessed of sufficient electrical knowledge to locate the fault and remedy the defect. On the other hand, with a mechanical appliance, in the event of the gong not ringing he is able to more readily and easily ascertain the cause and unless there is a broken part, to set it right on the engine. The gong in this instance is wound up with a spring in the same manner as an alarm clock and is held thus by a catch. When the trigger makes contact, this catch is released by a cam and the bell set ringing, continuing until the driver either stops it, or it

has run down. Both types have been in use upon the railroad in Great Britain with equal success, though the mechanical form is considered the most suitable to ordinary working.

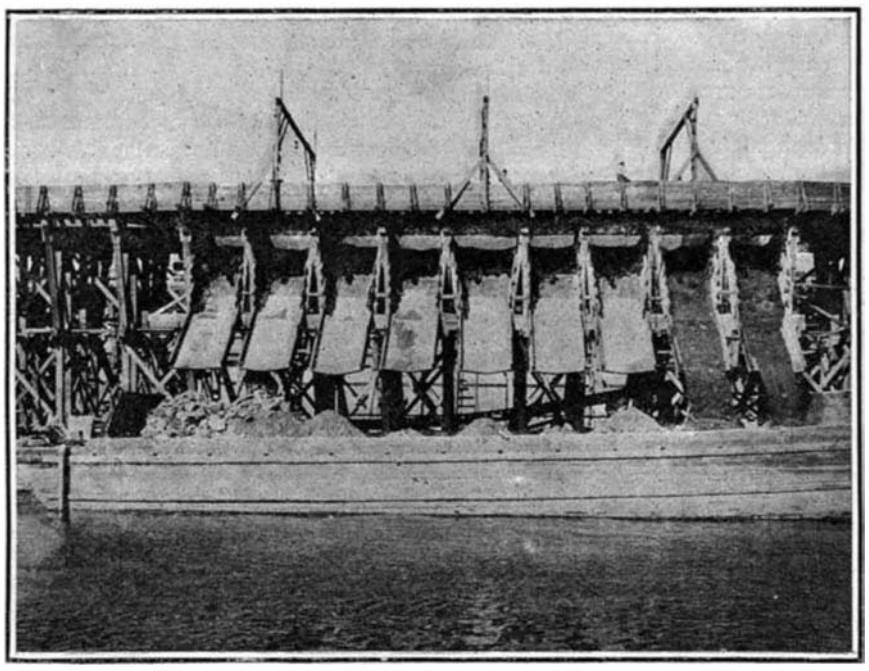
The gong can be carried on any part of the engine though the most preferable position is in the cab, where it is close beside the engineer, and the signals can be easily distinguished.

Each trigger and its accompanying spring constitute one unit, so that in the case of a locomotive carrying an installation to denote both "on" and "off" actions of the semaphore, two sets are required, but owing to the small space occupied by the mechanism they are carried in one box or casing. It will be observed that owing to the small number of parts and the comparative immunity from frictional action, the possibility of wear is considerably reduced. The triggers are held in sufficient tension by the spring to prevent them shaking with the oscillation set up by the train, and thus possibly giving a false alarm on the gong.

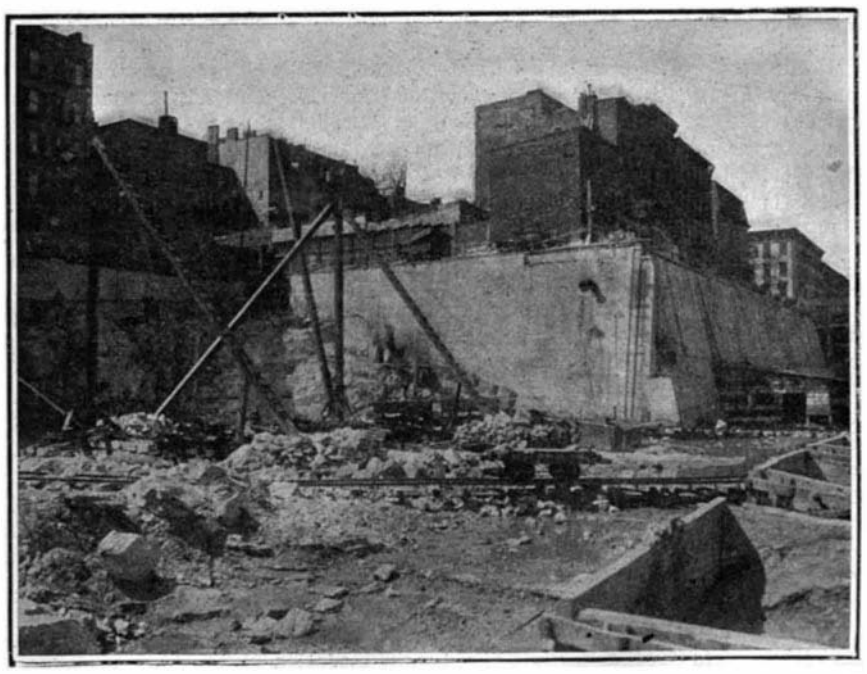
It will be observed that this apparatus does not supersede the present semaphore system, but rather supplements it, giving greater certainty and security, and enabling locomotive engineers to maintain high speeds in foggy or dirty weather with a greater degree of safety than is possible with the existing auxiliary signaling systems.

THE EXCAVATION FOR THE PENNSYLVANIA RAILROAD STATION, NEW YORK.

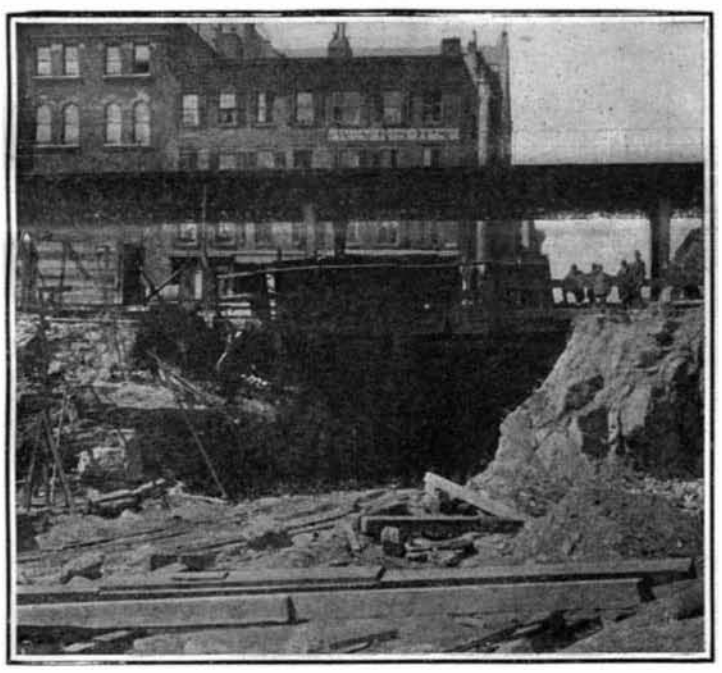
In our previous issue we gave illustrations of the noble building which will form the above-ground portion of the new terminal station of the Pennsylvania



Dock Built on 32d Street and North River for Unloading the Material from Cars to Scows.

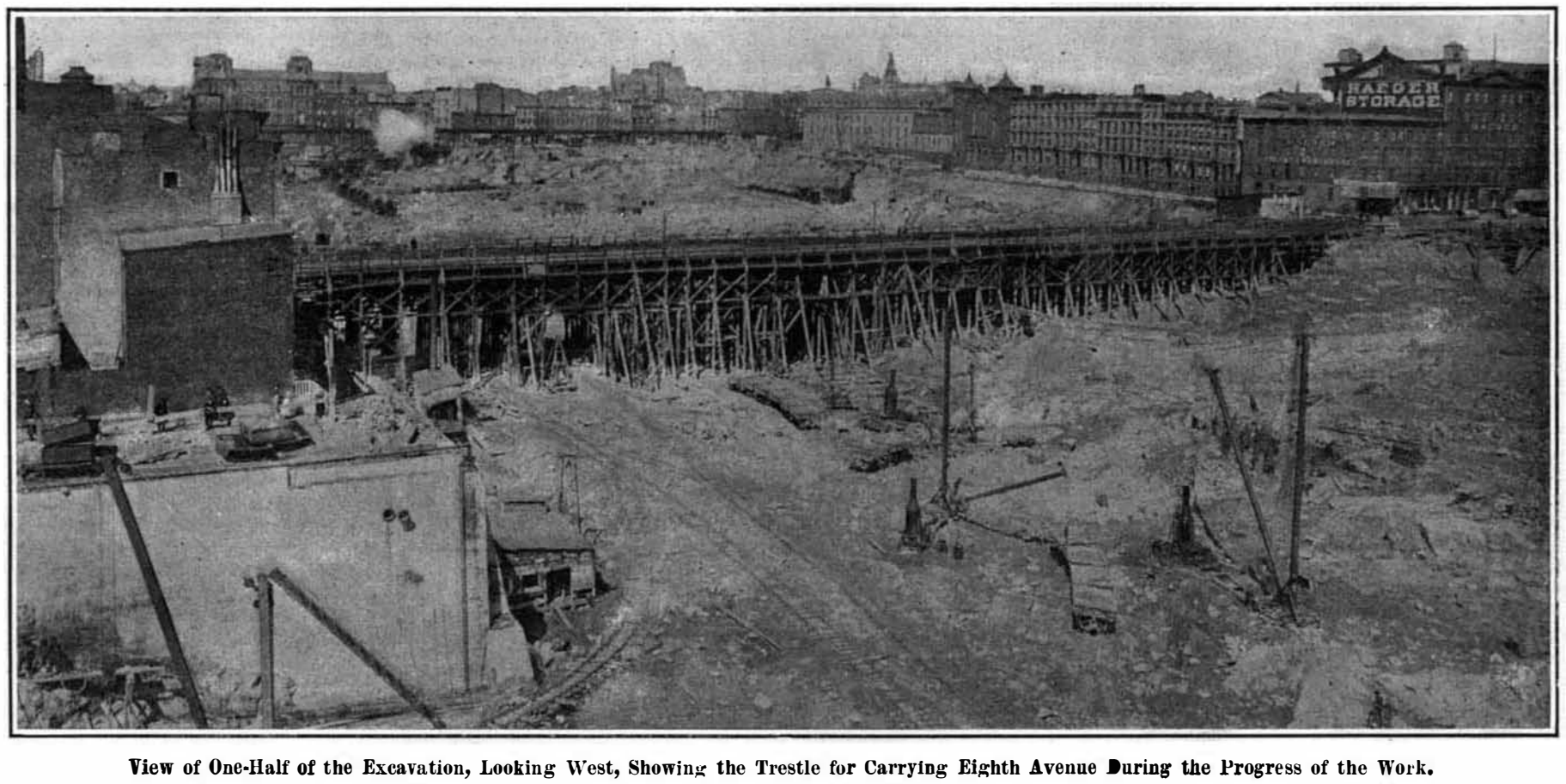


Site of Station Power House, Showing Massive Concrete Retaining Wall 50 Feet Deep by 25 Feet Thick at Base, Which Incloses Entire Excavation.



The Cut Below Ninth Avenue Through Which the Excavated Material is Hauled to the North River.

Seventy-Ton Steam Shovel Working on Northerly Side of Excavation at 33d Street.



View of One-Half of the Excavation, Looking West, Showing the Trestle for Carrying Eighth Avenue During the Progress of the Work.

EXCAVATING FOR THE PENNSYLVANIA RAILROAD STATION, NEW YORK.