a three-pulley troughing idler, the return strands being carried on two-pulley straight face idlers. This conveying belt is equipped with an automatic, self-propelling and self-reversing tripper, provided with a brush for cleaning the belt and also a two-way discharge spout for distributing the coal evenly along the storage bunker.

The operator on the tower has his station in the cab, and operates two controllers, two clutch levers and one foot lever to handle and control all the movements of the buckets. Windows are provided in the tower to enable the operator to look in all directions. A single laborer is needed part of the time in the car to clean up the coal that cannot be reached by the grab bucket. The bucket will handle nearly every particle of the coal, and at no time will more than ½ ton remain in the car.

The tower is built of structural steel, weighing approximately 65,000 lbs., towering in height 71 feet. The cantilever truss is a trifle over 30 feet long and is counter-balanced by the machinery house. The method adopted for the removal of the ashes is simple and is explained by referring to the drawing, Figure 1, the ashes coming from the ten fires into the deep steel barrows and are taken to the ash pit, where they are loaded to the railway cars by the grab bucket.

This entire equipment was designed, built and erected by the Jeffrey Mfg. Co., of Columbus, O. The result of the official tests made by the engineers in charge for the Peoria Gas and Electric Co., have also been made known to us and are published here only in a brief way. On May 19th, C. P. & St. L. Car No. 1125, containing 30 tons of fine coal, was unloaded by the grab bucket in 25 trips, averaging 1-2 ton of coal per trip in less than 25 minutes. The total cost of labor and actual power consumed for the entire 30 tons amounted to less than 40c. The cost per ton for handling the coal for a previous 3 months ending March 31st, showed a total net saving of over 16c. per ton, compared with the former methods, when only labor had been used for this same purpose, and an actual saving of over $10,000 for the first year with the use of this modern installation.

GERMAN STANDARDS FOR DELIVERY AND TESTING OF PORTLAND CEMENT.

Prepared by the "Verein Deutscher Portlandzement Fabrikanten," with the collaboration of the Royal Testing Laboratory, at Gross-Lichterfelde, 1909.

(Translated from the German by H. de Miffonis, B.Sc., C.E., M. Soc. du Inginieurs civils de France.)

I.—**Definition:**—Portland cement is a hydraulic cementing material, containing not less than 1.7 parts of lime (CaO) by weight to 1 part of soluble silica (SiO^2), alumina (Al^2O^3), and iron oxide (Fe^2O^3), finely ground, intimately mixed, calcined to incipient fusion and again finely ground.

To this flour, not more than 3 per cent. of other material may be added when required for special purposes.

The proportion of magnesia must not exceed 5 per cent., and that of sulphuric acid anhydride, 2½ per cent. of the burned cement.

Comment:—Portland cement differs from all other hydraulic products by the high percentage of lime it contains; therefore a thorough mixing of the ingredients is necessary, these being proportioned to a given ratio; as a matter of fact, cement rock occurring seldom in nature, an artificial mixture is generally used, which is formed by pulverizing or diluting with water the ingredients and checking the composition of the powder or slurry by chemical analysis.

It is to the customer's interest that similar products obtained by moderate calcination of natural cement rocks be sold as "natural cements."

By calcination to incipient fusion, a material of high apparent density (weight per cubic foot) is produced, this property being a characteristical feature of Portland cement.

A proportion of magnesia less than 5 per cent., as that which occurs when dolomitic limestones are used for the fabrication of Portland cement, has been proved harmless, the proportion of magnesia being taken into account for the calculation of the proportion of limestone.

To lengthen the time of setting of Portland cement, it is the custom to add some gypsum flour (hydrated calcium sulphate), apart from the sulphuric compounds which, in nearly all Portland cement, come either from the raw materials or from the fuel.

The addition of other material for special purposes, especially to regulate the time of setting, is not prohibited, but it must be less than 3 per cent., in order to allow the checking of adulterations for the sole object of increasing the apparent density.

A proportion of sulphuric acid anhydride, not exceeding 3.5 per cent., has been proved to be harmless.

II.—**Packages and Weight:**—Portland cement is sold in sacks or in barrels. On the package must be plainly marked in addition to the gross weight and the mark "Portland Cement," the name of the manufacturer and the brand.

Comment:—As the packages, sacks as well as barrels, have generally different weights, the gross weight must always be given on the label.

Under the designation of "Portland Cement" the buyer must be sure that the material purchased is strictly according to the definition heading these rules.

III.—**Time of Setting:**—Normal Portland cement shall not develop initial set in less than one hour after water being added to cement. For special purposes quicker setting Portland cement may be required, and they must be labelled as such.

Comment:—The rules specify that normal Portland cement shall require at least one hour before developing initial set, because the initial set is very important. On the contrary, the limitation of the time which elapses between the addition of water and the hard set has been taken off the rules, being found of little importance when using Portland cement, if the process of hardening requires more or less time to be complete. Therefore, specifications in connection with the time required for final set should not hereafter be too restrictive.

To test the time of setting of a Portland cement, 100g. (3.5 oz.) of pure cement is mixed with water, for three minutes in the case of a slow setting cement, and for one minute if the cement is quick setting, in such a way that a stiff paste is obtained; this paste is placed on a plate-glass and formed into a circular pat 1.5 c.m. (5/8") thick, tapering to a thin edge. For the preparation of this pat, the necessary consistency of the paste must be such that, placed on plate-glass, it tapers at the edge by some tossing of the plate; this result is generally obtained with the addition of 27 to 30 per cent. of water to the cement. The moment the paste ceases to be fluid and plastic is to be noted.

The determination of the initial set and of the length of time which elapses till the final set is made with a normal cylindrical needle of 1 m.m.^{2} ($\frac{15}{10{,}000}$ sq. inch) section and