

16.—*Placing Concrete.*—The concrete shall be deposited in a layer on the sub-grade in such quantities that, after being thoroughly rammed in place, it will be of the required thickness, and the upper surface shall be true and uniform.

In conveying the concrete from the place of mixing to the place of deposit, the operation must be conducted in such a manner that no mortar will be lost and the concrete must be so handled that it will be of uniform composition throughout, showing no excess nor lack of mortar in any place.

17.—*Thickness.*—The thickness of the pavement shall be . . . inches, with its upper surface on the finished grade.

#### Forms

18.—*Materials.*—Either wooden or metal forms shall be used. They shall be free from warp and of sufficient strength to resist springing out of shape when properly staked.

19.—*Setting.*—The forms shall be well staked or otherwise held to the established lines and elevations, and their upper edges shall conform to the established grade of the roadways.

20.—*Treatment.*—All wooden forms shall be thoroughly wetted or oiled and metal forms oiled before any material is deposited against them. All mortar and dirt shall be removed from forms which have been previously used.

21.—*Finishing.*—The pavement shall be finished by thorough hand tamping, until the mortar flushes freely to the surface, then lightly tamped with a template made of 2-in. plank shaped to conform to the curvature of the surface of the finished pavement and having a length of not less than one-half with width of the roadway, to give the uniform surface with the slight markings thus made transverse to the street.

#### Expansion Joints

22.—*Location.*—When a curb or combination curb and gutter is used, an expansion joint shall be left between it and the roadway. The said joint shall not be more than one-half inch wide and shall extend entirely through the concrete.

23.—*Filler.*—Expansion joints shall be filled with 3-ply tarred paper or a manufactured bituminous filler. This filler shall be of such consistency that it will not become hard and brittle and chip out in cold weather or become soft and run out in hot weather.

24.—*Location.*—Expansion joints shall be made not more than thirty-six feet apart, at right angles to the centre line of the roadway, and care shall be exercised to have the joints vertical. If the curb or combination curb and gutter is built at the same time as the roadway the contraction joint shall be made continuous through all.

26.—*Crown.*—The roadway shall be given a rise or crown, at the centre, of 1/100 of the width of the pavement.

27.—*Protection.*—At the end of each day's work, or in case of rain, the concrete shall be covered with canvas tarpaulins. These shall be removed at the end of twenty-four hours and the surface covered with a layer of two inches of sand or earth, which shall be left on for at least fourteen days, shall be sprinkled daily to keep the concrete from drying out too rapidly. At the end of this period the covering shall be removed; but no traffic shall be allowed on the concrete until it is at least sixteen days old.

28.—*Reinforcement.*—Reinforcing mesh of standard type and approved by the engineer shall be laid two inches from the surface of the pavement, and shall weigh from 25 lbs. to 30 lbs. per 100 sq. ft.

## BUCKWHEAT FOR WATERWORKS BOILERS\*

Philadelphia Has Installed Twenty Coxe Stokers, Utilizing the Smaller Sizes of Anthracite Coal

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MANY years ago the late Eckley B. Coxe, the noted mining engineer and coal operator, saw the approach of much higher costs of production in the anthracite fields. He also saw the enormous waste of coal through failure to develop practical methods of burning the small sizes which were then rarely used. For many years he worked over this problem and finally developed a practicable furnace and grate for burning these small sizes, but as the time was not then ripe for its use, it was forgotten by most power plant specialists.

Recently the high price of larger sizes and the difficulty of securing deliveries of them have made the use of small sizes highly desirable, and this old invention has again come into prominence. The Philadelphia Water Bureau has been one of the pioneers in this new practice, which is of real significance as a matter of national economy. From the best data available the use in Eastern Pennsylvania of these small sizes of anthracite commercially known as No. 3 and No. 4 buckwheat, has doubled in the last four years. In other words about 2,000,000 tons annually of fuel which formerly went to waste is now being used in power plants.

The Philadelphia Water Bureau has installed twenty Coxe stokers in the past four years under boilers aggregating in rated capacity 8,400 horsepower. A combined efficiency of 70 per cent. at 125 per cent. of boiler rating has been obtained in all tests with No. 3 buckwheat coal having a heat value of 11,000 B.t.u. and carrying approximately 23 per cent. of ash. Operating results have approached test conditions in a way that demonstrates the dependability of the stoker and the fact that it can be considered as beyond the experimental stage.

Conditions in the fuel market dictated the original choice of a stoker which could burn anthracite screenings. Pre-war prices for No. 3 buckwheat averaged approximately \$2 a long ton, or rather more than \$1 a ton less than for bituminous with a heat value of 13,000 B.t.u. and 13 per cent. of ash. Broad economic conditions created by the war have more than justified the choice of this stoker, entirely apart from the artificial prices created under the present abnormal situation.

Conditions after the war apparently open a still wider field for stokers of this type in the use of low grade fuels which must be largely developed in the future. For instance, Rhode Island lignite has already been successfully burned in an experimental way. The near future will certainly bring radical and permanent changes in all our boiler room practices and methods. While freight charges will doubtless limit the areas beyond which low grade fuel cannot be economically transported, the chain grate stoker of the Coxe type apparently opens one practical line of investigation for many waterworks superintendents.

\*From the Journal of the American Water Works Association.

Burns and Roberts, of Toronto, announce the opening of an office in Havana, Cuba, through which they expect to sell lumber, steel plate work, machinery and supplies.

George Mountain, engineer of the Dominion Railway Board; Naulon Cauchon, of Ottawa; J. H. Gordon, Hamilton Superintendent of the Grand Trunk Railway; R. L. Latham, engineer of the Toronto, Hamilton and Buffalo Railway; E. R. Gray, City Engineer, of Hamilton, and others, recently inspected the proposed Red Hill cut-off at Hamilton. This proposed line, with a 1% grade, was designed as a common entrance to the city of Hamilton for all steam and electric railroads.

The War Trade Board of the United States has announced that the restriction upon the importation of asphalt has been removed and that applications for licenses to import this commodity will now be considered.