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tiers of cross bracing which interfered with the lateral movement of the pile driver leads; instead, therefore, of lifting the entire 65-foot leads out of the excavation whenever the progress of the pile-driving made it necessary to cross a longitudinal or transverse bracing timber, the following expedient was resorted to: The lower 30 feet of the pile-driver leads was made detachable, according to the sketch herewith, and by merely taking out eight bolts the hoisting engine lifted this lower section above the upper tier of cross bracing, and the engine was pushed over into the next shaftway, where the lower section was again dropped into place and the pile-driving resumed, a change requiring little over five minutes time to consummate.

ENGINEERING SOCIETIES.

CANADIAN RAILWAY CLUB.—President, W. D. Robb, G.T.R.; secretary, James Powell, P.O. Box 7, St. Lambert, near Montreal, P.Q.

CANADIAN STREET RAILWAY ASSOCIATION.—President, E. A. Evans, Quebec; secretary, Acton Burrows, 33 Melinda Street, Toronto.

CANADIAN INDEPENDENT TELEPHONE ASSOCIATION.—President, J. F. Demers, M.D., Levis, Que.; secretary, F. Page Wilson, Toronto.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—413 Dorchester Street West, Montreal. President, W. McLea Walbank; secretary, Prof. C. H. McLeod. Meetings will be held at Society Rooms each Thursday until May 1st, 1908. January 16, 1908, monthly business meeting. Toronto Branch of Canadian Society of Civil Engineers, 96 King Street West, Toronto. President, E. H. Keating; secretary, T. C. Irving, Jr., Traders Bank Building.

ENGINEERS' CLUB OF TORONTO.—96 King Street West. President, C. B. Smith; secretary, C. M. Canniff, 100 King Street West. Meetings held every Thursday during fall and winter months. January 16, 1908, 8 p.m., paper by Mr. C. R. Young, B.A.Sc., "Historical Development of Bridge Design." Illustrated by lantern slides.

CANADIAN ELECTRICAL ASSOCIATION.—President, R. S. Kelsch, Montreal; secretary, T. S. Young, Canadian Electrical News, Toronto.

CANADIAN MINING INSTITUTE.—413 Dorchester Street West, Montreal. President, Frederick Keffer, Greenwood, B.C.; secretary, H. Mortimer-Lamb.

NOVA SCOTIA SOCIETY OF ENGINEERS, HALIFAX.—President, R. McColl.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, TORONTO BRANCH:—Louis W. Pratt, Secretary, 123 Bay Street, Toronto

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—29 West 39th Street, New York. President, Frederick R. Hutton; secretary, Calvin W. Rice.

SOCIETY NOTES.

The regular monthly business meeting of the Engineers' Club, Toronto, was held on 2nd inst., Mr. C. B. Smith, president, presiding. The most important discussion of the evening was as to the possibility of securing new quarters for the club. Of members present a large majority favored securing rooms in the vicinity of College Street at the expiration of the present lease. A committee was appointed to report on available property.

CORES, CORE SAND AND CORE-MAKING MACHINERY.*

By C. H. Wadsworth.

A common fallacy among foundrymen is to think that one core mixture will suit a wide range of foundry conditions. Now, the facts of the case are that in a single foundry it may be profitable to have a number of separate and distinct core mixtures, using entirely different grades of core sand and binders. From this it is clear that each class of cores must receive separate consideration; and this consideration must cover the core-room, the foundry, and the finishing department portions of the problem. It is necessary on the one hand to take account of what we have to deal with, and on the other, what the results are which we hope to achieve.

A CORE DEFINED.

The term core, as it is used by the foundryman, has been defined as a body of sand projecting into an opening left in the mould so as to form a hollow in the casting. Later, however, the term has come to have a broader significance, and the portion of it which we have to deal with covers only such cores as are made by the core-maker and delivered to the moulder for insertion in the mould. In accordance with this we may define a core as a body of sand which is made and baked and then introduced into a mould, either to form a hollow in the casting or to form one face in the mould, as in the case of covering cores.

CORE CONSTITUENTS.

A core must be porous as to provide a ready passage for the gases as they escape when the metal is being poured about the core. At the same time it must have sufficient strength to resist the wash of the metal. The composition of the core must be such that it will burn brittle when exposed to the metal, so as to crush as the metal shrinks about it, thus relieving the casting from unnecessary strains. This is especially true in the case of cores used for brass and aluminum castings. The core must also burn brittle enough so that it will clean from the casting easily, and in some cases it is important that the surface be of such a nature that it will give a perfectly true, clean, parallel hole, free from rough scale. One great objection to many core mixtures is that they contain material which, when exposed to the heat of the metal, gives off gases which are injurious, or if not, at least troublesome to the moulders, and no matter what advantage binders of this kind may posses, the foundryman will always try to supplant a binder giving trouble from gas by one giving a practically odorless gas. Another point which must be considered is that the core mixture must be cheap; but a cheap mixture may mean a dear casting, and, as stated above, not only the core-room, but the foundry, cleaning-room and machining department should all be taken into consideration when selecting core-room materials. In all core mixtures which come under the scope of this paper sharp sand forms the principal portion of the body of the core, the remainder of the material being known as the bond. Water in a core mixture only plays the part of an agent for rendering the bond active previous to the baking of the core.

BONDS.

Bonds may be divided into two classes, natural and artificial. The natural bonds practically all belong to the clay class; that is, they are some alumina product. Sand frequently contains a certain amount of alumina or clay, which is frequently known as loam. For some classes of work this forms an efficient core bond, but in the case of brass, aluminum or grey iron work it often burns so hard during casting as to make it very difficult to remove the core when the clay is present in large quantities. Some of the modern dry core compounds have pitch for a base, and they also contain powdered coke or other material to cut down the sticky nature of the pitch. Such binders will be found exceedingly useful in the case of large cores, but for machine-made cores dry binders have not proved very successful. The machine-made cores fill the gap between the exceedingly small and delicate cores and the very large cores.

The large cores are rarely wanted in such quantity as to warrant the use of a machine in their production, while the very small cores, and particularly those which are of irregular shape, require special treatment, and when wanted in quantities must be made in metal boxes, and frequently provided with carefully fitted core wires.

(To be Continued.)

*Extracts from a paper read at the Lewis Institute, Chicago.