RELATIONS OF TEMPERATURE TO TIME OF SET AND STRENGTH OF CONCRETE.

The text books have plenty to say regarding the time required by concrete to set under normal temperatures, but very little indeed as to the conditions when the temperatures vary. In a word, little has been published which bears directly upon the boiler's problem of determining how long to leave centres under concrete.

To assist in providing some definite information regarding this subject the Aberthaw Construction Company of Boston, Mass., through the courtesy of the Quincy Market Cold Storage Warehouse Company and with the assistance of Mr. H. L. Sherman, cement chemist, both also of the same city, have undertaken a series of tests under controllable temperature conditions. Publicity has already been given to some of the results covering a relatively short period. In the following table are given the results at the end of three months.

		Average tensile strength
Temperature of		in lbs. per sq. in.
air and materials.	Mixture.	at end of 3 months.
72 ⁰	Neat	759
	I:3	305
410	Neat	660
	I:3	303
34°	Neat	567
	I:3	249
41° (room—7°)	Neat	29
	I:3	9

It will be noted that at a temperature of 72°, the cement showed a decrease in strength from 7 days to 28 days on the neat tests, while on the mortar tests the strength was the same. On the tests at 41°, there was a good increase between these periods on both sand and neat tests, and at 34°, a better percentage increase on both. In the opinion of the chemist this is an illustration of the importance of water on the early strength of cement. At 72°, the excess water contained in the briquettes was evaporated rather quickly, while at the lower temperatures, the rate of evaporation was very slow. Between 28 days and 3 months, the briquettes at 72° showed a very good increase, those at 41° a less decided increase, and those at 34° still less. Apparently cement at low temperatures (above freezing, however) attains less strength than at a normal temperature, but its increase in strength in short times is greater.

It is interesting to note that the cement kept at the very low temperatures finally set and attained a very little strength. It would be interesting to discover whether there would be an increase in strength at later times.

CONCRETE IN THE WOODS.

A striking example of the possibilities of concrete construction in out of the way or inaccessible places is given in a recent report of Lockwood, Green & Company, architects and engineers, of Boston, on a proposed cotton mill in the South Appalachian districts. They advised locating the mill on a plateau or tableland, some 100 feet above the river, from which the power is to be obtained. Although 14 miles from the nearest railroad, the location for the mill is advantageous, being high and sightly with a desirable exposure, well drained on all sides, and of sufficient size to allow ample extension as need may develop. Sufficient room is also available for the erection of cottages for the help, in a high and healthful location close by the mill. A quotation from the report itself is indicative of the extent Lockwood, Green & Company were influenced in locating the mill at this point, because there was such a material as reinforced concrete of which the mill could be built.

The type of construction to be used in the mill has received considerable thought. The bricks, which are made locally, are of rather poor quality, and we do not recommend their use, and as all materials, except sand and stone, to be used in the construction, will have to be hauled a distance of 14 miles, the use of timber interior construction is not recommended at this time though more detailed study of this feature may lead to a change of view. There is in the immediate vicinity of the proposed development, a large amount of heavy oak timber, but this is not a desirable material for mill construction, although it could be used in the construction of a timber dam. It, therefore, appears to us that the mill might properly be constructed of reinforced concrete and the estimates have been made upon that basis.

In connection with the hydro-electric power development comparative figures were prepared on the costs of a concrete or a timber dam. The following table gives these costs based on a 25,000 spindle mill, which is the size recommended by the engineers.

	Concrete.	Timber.
Total cost of power plant	\$102,500	\$ 83,700
Cost of power plant per spindle	4.10	3.35
Total cost of entire plant per spindle	27.05	26.10
Total cost of plant	676,300	652,500

Comparing these figures it will be noted that the concrete dam only adds about 3½ per cent. to the total cost of the plant. As there is appreciable depreciation on the timber dam, the reliability and permanence of the concrete dam would more than justify this added expense.

ONTARIO'S MINERAL OUTPUT.

Returns to the Bureau of Mines show that the output of the metalliferous mines and works of Ontario for the nine months ending September 30th, 1910, was as follows:

			Quantity	Value
Gold	oz.		1,300	\$ 28,720
Silver	66		19,701,033	0.702.660
Cobalt (paid for) tons	of 2,000 lbs	275	44.884
Copper	oz.		7,168	1.022.436
Nickel	"		13,005	2.080.651
Iron Ore			120,358	273.006
Iron Pyrites	"		16.454	44.600
Pig Iron	"		310.608	5.030 626
Zinc Ore	"		700	5,760

Shipments from silver mines aggregated 23,824 tons, of which 19,191 tons were of ore and 4,633 tons of concentrates. The former averaged 768 ounces of silver to the ton and the latter 990 ounces. Gowganda, with six shippers, contributed 402 tons of ore, containing 334,210 ounces of silver. Elk Lake contributes 17 tons of ore; South Lorrain 9, and the Lake Superior district a small production, the remainder being from Cobalt proper. The output of metallic silver from the mines of the Cobalt camp is increasing, being 468,887 ounces for the nine months. During the period 7,069 tons of ore (containing nearly 50 per cent. of the total silver yield). were treated by the silver reduction works at Thorold, Trout Mills, Copper Cliff and Deloro.

The production for the corresponding period of 1909 was 18,751,549 ounces of silver, valued at \$9,385,600.