

The piles were of pine, spruce and tamarac, 40 to 50 feet in length, 12 inches in diameter, three feet from the butt and eight inches at top inside of bark. They were driven to a solid bearing or until the penetrations did not exceed 1 inch to a blow of a 2,000-lb. hammer dropping 30 feet, or its equivalent if other weights of hammers were used, and so arranged that the load on the piles should not exceed 350 lbs. per square inch of bearing area under bark at cut off. The weight of hammers used was about 3,600 lbs., and the equivalent drop was made 20 feet after the piles were driven and cut off about 18 inches below water by a circular saw working in a traversing frame secured to the piles themselves to ensure their being cut off true and level; they were then capped with two courses of maple timber each four inches thick and fastened to the piles by $\frac{1}{2}$ by 10-in. boat spikes. Directly upon this grillage, the concrete foundation walls were started. The concrete was composed of one part of Portland cement and three parts of clean, sharp sand and five parts clean gravel, ranging in size from that of a pea to that which would pass through a $2\frac{1}{2}$ ring. The gravel was obtained from Isle Royal by dredging in about 15 feet of water and was a clean, flinty stone and very hard. Tests of the concrete from specimens therefrom showed broken that the stone broke instead of separating from the cement. The forms for the concrete coming below the water were made tight enough to ensure that the action of the waves did not wash out the cement. The concrete floors were constructed of the thickness shown in the drawings and re-inforced with metal rods of sufficient number and weight to carry the full loads imposed upon them without excessive strain, and a steel girder was placed each side spout openings to support the concentrated load. The walls of the tanks were constructed of a special hollow semi-porous tile and of the same quality as those used in the City of Minneapolis in the construction of the St. Anthony and Gt. Eastern elevators. The main wall tiles were 12-in. by 12-in. in size by 5-in. thick, alternately, with courses of channel tile 12-in. long by 3-in. deep and of the same thickness as the main wall tile. The main wall tile was laid with hollows running vertically, and the channel tile was laid horizontally. These tiles were of sound, hard, burnt, unglazed tile.

The exterior surface of the outer row of tanks was covered with a facing tile 12-in. by 12-in., 2-in. thick, and was hard burnt, semi-glazed tile. The openings in upper end of main wall tile was covered with wire netting three meshes to the inch to permit of a full mortar bed to receive the channel tile. In the channel tile were placed steel bands, not less than two bands in each channel, the weight of these bands decreasing from bottom to the top. The facing tiles were securely anchored to each other and to the main wall tile in every fourth course where the joints come even with the inner tile with a piece of 3-in. by 4-in. galvanized wire netting four meshes to the inch, one anchor to each tile. All the tiles were laid in Portland cement mortar composed of three parts clean, sharp, screened sand well mixed and tempered with lime mortar. All mortar used to imbed the steel bands in the channel tile consisted of one part Portland cement and three parts sharp, screened sand. No lime was used in this mortar, it being made sufficiently thin to run in around the steel bands readily and fill all spaces between them. The tiles in cupola walls were of a thickness of 3-in. hollow tile, the outer courses glazed in the same manner as the facing tile in main walls, and were anchored together with wall chips and wire netting, and laid in Portland cement mortar same as for main building. All the roof surfaces, except the bridges and tunnels, were 12-in. by 18-in. by 3-in. hollow book tile resting upon the irons. These tiles were laid in a bed of Portland cement mortar on the flanges of the tee irons, and the upper surface pointed and smoothed with cement mortar to receive the gravel roof. The tile floors along belt galleries consisted of book tiles laid on tee and angle irons, the same as in the roof, the top surface being finished with a layer of Portland cement 1-in. thick. The floors in the walls between the belt galleries consisted of corrugated iron and concrete finished in the same manner as in the belt galleries.

The standard steel work in cupola of upper story of building consists of a skeleton steel frame work of standard

sections arranged, as shown on plans, and put together on the work with suitable bolts, the pitch of bolt holes not exceeding 6-in. or sixteen times the thinnest outside plate or less than three diameters of the bolt.

The bridges for the fire belt conveyor, of which there is one to each conveyor, consisted of two steel trusses, as shown on plans, the floor of book tiles and concrete resting on tees and angles, the same as in upper belt conveyor galleries. The walls of the bridges were wire covered with No. 22, and the roof with No. 20 galvanized corrugated steel, and nailed to strips of wood bolted to the steel trusses. The bridges were provided with telescope joints at each end, so that the change in level of walls in working elevator would not have any injurious effect on either structure. There are two fire cut-off doors to each bridge and tunnel consisting of 2 by 4 studding covered with 1 by 6 D. & M. fencing closely fitted to all sides and around the belts, the sides next the working house being covered with tin, and the doors made to swing with a self-closing device. The cupola window frames were made of 2-in. pine with brick mould and inside casing fitted with $1\frac{3}{8}$ -in. check rail. All woodwork was covered with crimped galvanized iron. There are no windows inside next to the working elevator. The fifteen galvanized iron frame skylights in the roof were glazed with $\frac{1}{4}$ -in. unpolished glass and the cornices and flashings were of No. 26 plain galvanized iron. The bin ladders were made of iron bars built into tile walls, one ladder to each, and every bin extending from top to bottom. There are also two fire-escape ladders, one on the south wall made of $2\frac{1}{2}$ by $\frac{3}{8}$ -in. bars for the sides with ring of $\frac{5}{8}$ -in. round iron placed 16-in. centre to centre.

The entire main roof was covered with four-ply composition felt and gravel roofing, the tarred felt used being the Dominion brand manufactured by Lockerby & McComb, of Montreal. The exposed edges of each part were cemented down with hot pitch, and the entire surface covered with straight rim medium soft domestic coal tar roofing pitch 100 lbs. to the square. The gravel screened through a $\frac{3}{4}$ -in. wire mesh screen one-fifth of a cubic yard to the square. Each and every bin coming over the tunnels or conveyors was provided with a cut-off spout with an extension of the same arranged to load the grain on to the belts, made of No. 14 steel. In the upper part of the building, no spouts are needed, except for the intermediate bins, and for these suitable spouts of No. 14 sheet steel were provided so as to take the grain from the tripper spouts.

There are five belt conveyors running from the working house out over the tanks. The width of the conveyor belts in the upper part is 36-in. supported by disc rolls 5 ft. 3 in. apart. The return belt carried on straight rollers 15 ft. 9 in. centre to centre. The shafts for these rolls were 1 3-16 with standard oscillating bearings attached to the wood supports resting on the steel frame work, and the wood support being covered with No. 26 plain sheet steel. The conveyor belts in the basement are 30-in. wide carried on straight rolls, similarly disposed as in upper belt conveyors. In the upper conveyor belt, there is one 2-pulley tripper for each belt. These trippers being provided with self-propelling devices, platforms, levers, etc., and provided with spouts discharging to either side so that the circular bins can be filled without any other spout than that provided on the tripper. These spouts are provided with cut-off gates and arranged to connect with the spouts from the intermediate bins already mentioned. All the trippers are carried on 16-lb. tee rails attached to the wood support mentioned for the roller bearings.

The shafting in working house required to work the belts is of steel, the couplings of the safety pattern standard flanged forced, bored true and forced on to the shafting under pressure of the collars for shafting, are provided with set screws protected by being counter-sunk and with protecting flange so as to make them flush on their outer circumference. The length of all bearings is three diameters of the shaft on which they are placed the friction clutches and pulleys of cast iron. The friction clutches were supplied by Messrs. Skillin & Richards, of Chicago. The conveyors' head pulleys were covered with four-ply rubber belting. The tension carriages were of approved design, and the rope drives