A MODERN STEEL MILL BUILDING.

One of the largest and most up to date mill buildings in Northern New York was built this season for the Bagley and Sewall Company, of Watertown. This firm is one of the foremost manufacturers of paper making machinery in the world, and their business has increased so rapidly that very frequent additions to the plant have been necessary.

In a recent issue of the Cornell Civil Engineer, Mr. A. W. Harrington, has an article describing the construction of this building. The following is abstracted from the article.

The structure in question is 420 feet x 120 feet in size with a small wing 120 feet x 30 feet. The frame is entirely of steel and the walls concrete, and plaster on Hy Rib. The main structure is carried by the outside 8 inch and 10 inch wall columns and by two rows of 20-inch columns running the length of the building and providing a crane run of 60 feet span, in which operates a Niles fifteen ton electric crane.

A mezzanine floor, for light machinery, 30 feet wide, runs down the north side and across the east end of the building. The south bay, also 30 feet wide, comprises a crane run for a Niles ten ton electric crane.

In the future, finished work can be loaded for shipment directly on the cars, two branch tracks entering the building from the west end, and being served by the 15-ton and 10-ton cranes respectively.

Excavation for the boiler room and coal pocket was begun in January, and some 2,000 yards of rock were taken out and crushed for use on the work. The first concrete was put in the walls of the coal pocket early in March while the weather was still cold. To prevent freezing the water was heated and 5 per cent. of salt added, it not being entirely convenient to heat the sand and crushed stone.

The foundations for the side walls and the piers for the centre columns were next put in. The footings for the side walls were 20 inches wide on top and varied in depth from two to twenty feet, being carried to rock in all cases. The centre piers were 30 inches square. The base plates of all columns were drilled for two anchor bolts, and these bolts were put in when the walls and piers were built. The forms were strongly braced to line and the tops cut off to the floor level and then wooden templets were set to hold the anchor bolts in place while concreting was progressing. It was necessary to locate the anchor bolts very carefully, owing to the large number of columns and the very considerable length of the building, for this purpose a straight edge, or templet was made, in each end of which were two holes, to correspond to the two bolts, and the distance between the two pairs of holes was laid off very carefully. The templets on the forms were laid off with this straight edge and lined in with a transit. In this way the anchor bolts were spaced correctly and uniformly, which might not under all conditions be possible with a steel tape.

As fast as the steel arrived, it was unloaded directly from the cars with a small derrick, and as soon as sufficient steel was on the ground, erection was begun at the east end. A traveler with an 85 foot boom was used, and it was possible with this equipment to reach the entire width of the building and put up the full section of the work at once.

The cost of erection of the 600 odd tons of steel ran about $8.00 per ton. A small air compressor, supplied with steam from the hoisting engine, delivered air for two riveting hammers. Two gangs drove on an average about 275 rivets each per day, and the 12,000 or more rivets cost in place around eleven cents each. The riveters were followed by the painter, and the contract price for this work was 60 cents per ton, a rather high figure for this class of work.

The Detroit Fenestra steel sash was attached directly to the steel window framing. Practically the whole elevation of the building on all four sides is steel sash, and in addition, a row of monitor sash on either side of the main roof furnished light from above.

The next step was the putting up of the Hy Rib for the walls. All walls above the sill of the lower windows were of plaster on this material. The Hy Rib was attached to the window framing and steel work by wire and the standard clips. The cost of the work was high, inasmuch as it was in such small detached pieces, owing to the closeness of the windows, etc.

The plaster on the Hy Rib was about a two to one mixture, and the finished wall was generally about 2½ inches thick. The labor cost of putting this on figured about $1.00 per square yard, exclusive of material. This sort of thing for outside walls is something new in this part of the state, where the winters are very severe, and it is somewhat of a question how this thin wall will compare with brick or concrete of ordinary section as a non-conductor.

Heavy ribbed glass was used on all windows, there being some 20,000 square feet of surface.

While this work was progressing the roofs were being put on, 3 inch x 6 inch nailing strips were fastened directly to the trusses and roof beams with lag screws, and a 2-inch southern pine roof laid on the strips. A Barrett Specification 5 ply roof was then put on. The roof water is carried by gutters to frequent down spouts, by which it is conducted into several drains which lead directly to the river.

Foundations for all the heavy machines were put in as soon as the frame was up. These were invariably of concrete and carried to rock.

The main floor consists of a 6 inch concrete base, with a 2-inch hardwood floor laid on 4-inch x 4-inch treated nailing strips embedded in the concrete.

The larger doors are all Kinnear rolling doors of suitable type.

The building is to be heated by steam furnished by one 200 H.P. and one 50 H.P. boiler. All power is electric, and is furnished from the company's power plant near by.

The cost of the building, exclusive of any equipment, was about $100,000. The work was done by force account, except the steel work and the heating. The structural steel was designed and erected by the National Structural Company of Syracuse.

TESTS OF ROOF BEAMS.

Physical and chemical tests have been made by Messrs. Robert W. Hunt and Company for the investigating committee of the City Council of one of the two collapsed I-beams in the roof of the Home Theatre building, Chicago, the failure of which was reported in the Engineering Record on December 21, page 682. A 4 x 20-in. specimen of steel was cut from the web of one of the ruptured 24-in. I-beams, 8 in. from one end and 3½ in. from the top of the flange. The specimen was machined into a standard-shaped test piece, the central 9-in. portion of which had cross-section dimensions of 1.535 x 0.474 in. After fracture this section was 1.141 x 0.307 in., giving 51.86 per cent. reduction in area. The elongation in 8 in. was 2.22 in., equivalent to 27.75 per cent., and the character of the fracture is described as silky. Under a 180-deg. cold flat-bend test the report states the specimen is "O.K." The elastic limit was 39,240 lb. per square inch and the tensile strength 59,180 lb. per square inch. Chemically, the analysis of the drillings is given in percentages as follows: Carbon by combustion, 0.098; phosphorus, 0.109; manganese, 0.49; sulphur, 0.126; silicon, 0.01.