an average of 443 tons per day, and later on to 600 tons per day, which gave the desired margin of unincumbered ore available for security for the funds required for the proposed improvements, which could now proceed as rapidly as desirable.

The option previously obtained to purchase Breen's interest in the smelter for $\$_{300,000,00}$ was exercised, this sum being borrowed from the bank. This left the company the complete owner of the smelter and all the profits on the smelting operations, which reduced to it the costs of realization to $\$_{13.14}$ per ton, except the deduction for interest on the $\$_{300,000,00}$ borrowed.

The proposition to introduce the contract system in the mine was next tackled. This was vigorously opposed by the Miners' Union, who refused to allow their members to work by contract. The mine was, in consequence, closed down for a period of 66 days. At the end of which time the Union consented to allow their members to work by contract, as proposed, and the mine was re-opened under freedom to utilize this system.

The results proved very satisfactory to the company and to its employees as well. The possibility of earning wages commensurate with skill and experience attracted the best miners from surrounding camps. In the hands of skilful miners, the maximum capacity of the machine drills was soon reached, and with the increase of output came a general lowering of costs, although the miners continued to earn more than the standard scale of wages.

A suitable location for the five-compartment shaft had been selected and its construction commenced. Simultaneously, the excavation for the foundations of the several units of the proposed new plant was begun, as was also the preliminary work for increasing the capacity of the smelter. During the later part of March, or the early part of April, all the necessary preparations were made, and the work of constructing the new plant commenced.

The Mining Plant.—The general arrangement of the several units of the new plant, as completed, is shown in plate —, made from a "winter scene" photograph. This arrangement was suggested by the local topography, the accessibility of the railway spurs and the necessary isolation of the independent units from each other, to minimize the risk of fire communication between the several buildings.

On the plate, 1, is the head works at the combination shaft; 2, the compressor building; 3, the boiler plant; 4, the ore bins at railway; 5, the stores building; 5, the blacksmith shop; 7, the machine shop; 8, the carpenter shop and timber framing shed; 9, the portal of Black Bear tunnel, which connects with the combination shaft at a depth of about 300 feet; 10, the Great Northern Railway; 11, the cooling reservoir; 12, the aerial tramway.

Inasmuch as a detailed description of the several units comprising this plant would be very lengthy and, perhaps, too tedious, I will content myself with the following brief description of them, referring only to their more prominent features.

Boiler Plant.—This plant consists of nine horizontal, return tubular, steel shell, high pressure boilers, set in three batteries of three boilers each; and two Heine Safety Water Tube boilers set in one battery.

In the aggregate, this plant has about 2,000 nominal horse power --sufficient to supply the steam necessary to operate all the machinery connected with the mine and have one of the four batteries out of service. The spure battery is always held ready for steaming when any of the others in service require cleaning or repairs. This plant is modern and complete in all its details, and is equipped with all the most improved devices (except mechanical stokers) to provide for safety and continuity of operation at the lowest cost for attendance and maintenance. The selection of the site chosen for this plant was suggested, (1) by its accessibility from the high line spur of the railway from which the coal is delivered to the storage bunkers behind the building: (2) because of its safe distance from the other units, in the event of fire originating in it; (3) convenience to the large cooling reservoir, where the steam pumps for fire protection and pumping back the water for condensing purposes, are located.

Steam is transmitted from this plant to all the steam engines through a series of insulated steam lines. A 9-inch steam line, carrying steam at 140 pounds pressure, connects with the two air compressors. Two additional steam lines run through the Black Bear tunnel and connect with the hoisting engines at the head works of the combination shaft. One of these is an 8-inch and the other a 6-inch line, the 8-inch line being the one generally used, the 6-inch being held in reserve in case of accident to the 8-inch line.

Each of these lines is insulated by two layers of cellular asbestos covering, and provided with the requisite number of steam traps and expansion joints. This arrangement of concentrating the boilers into one suitable location and transmitting the steam to the separate units of the plant, gives greater economy, satisfaction and security from fire than could be obtained if separate boiler plants were installed adjacent to the engines requiring the steam.

Air Compressing Plant.—This plant consists of two compressors, one having $22 \times 36 \times 48$ inch cross compound condensing steam cylin. ders, with $22 \times 36 \times 48$ inch two stage air cylinders; the other, 22×39 $\times 48$ inch, with cross compound condensing steam cylinders, with $22 \times 38 \times 48$ inch two stage air cylinders. The combined capacity of these two machines is 8,000 cubic feet of free air per minute at sea level, compressed to 95 lbs. gauge pressure.

One of these compressors was installed during my management, and the other installed by the old company in 1896, but this latter was remodelled in some essential details at the time of the newer installation. Both compressors were built by the Canadian Rand Drill Co., and both have given entire satisfaction, although in economy and efficiency there is a very marked difference in favor of the latter installation. It is very interesting to notice the improvements made in the manufacture of this class of machinery in the four years that transpired between the building of the first and second of these machines.

The operation of this plant has proven very economical, a working test extending over a period of thirty days during ordinary working conditions showed a coal consumption of 1.9 pounds per horse power per hour, and that air was being compressed to 95 pounds per s juare inch at the low cost of \$1.59 per each 100,000 cubic feet of free air compressed. This calculation did not include the interest on the investment or depreciation, but all other costs.

The air compressed by this machinery is transmitted into the mine workings through a series of air receivers and two pipe lines. The air receivers consist of boilers rejected from the old steam plant and erected in the open air immediately outside the compressor room. The two pipe lines leading from these receivers extend to the bottom of the mine workings, and consist one of 8-inch and the other of 6 inch pipe, with branch lines leading off, carrying the compressed air to the workings on the various levels.

The extensive cooling surface afforded by the number of tubes in the boilers thus converted into receivers, permits of the condensation of the moisture contained in the condensed airs; besides, the long, ample pipe lines in themselves serve as a second series of receivers, passing through which most of the moisture contained in the air is condensed and precipitated, to be blown off as it accumulates in the receivers placed on every working level in the mine. The air, thus drained of its contained moisture, goes to the drills and the pumps in