isfied with what is known as the "run of mines" supply. The result of experiments made in 1887 with coal from three widely separated mines indicated a higher evaporative efficiency in favor of the screened coal by as much as 7½ per cent. In these trials one car load from each mine was used as delivered under a "run of mine" contract, as against other cars from which the coal was handpicked. The comparative freedom from smoke and dust seems to point to the desirability of screened coal for passenger train service, and in countries like Canada, whose importations are large, and where the import duty is alike for screened and unscreened coal, it is a question if the balance of advantage is not in favor of the former. Pennsylvania anthracite, or what is usually known as hard coal, has not found favor in Canada as a locomotive coal, owing to its relatively higher first cost. For passenger train service, it cannot be excelled, on account of its freedom from smoke and dirt, but it requires from 12 to 15 per cent. more by weight to equal the duty obtained from bituminous coal, and the greater wear and tear consequent upon its use shortens fire-box life from one to two-fifths. A very careful record made under the supervision of T. N. Ely, chief of motive power of the Pennsylvania Railroad Company, showed that during one month the amount by weight of anthracite required to work the local trains leaving Broad street station, Philadelphia, exceeded by 11 per cent. that of bituminous coal required to perform the same work. On the Reading Railroad, where the use of the Wooten boilers permits of a very large fire grate area, the evaporative efficiency of soft coal was superior by 15 per cent.

*(To be continued.)*

## HYDRAULIC AIR-COMPRESSOR PLANT AT MAGOG.

A description of the Taylor system of hydraulic air-compression was given in THE CANADIAN ENGINEER, vol. 2, pages 343-346. A 150 h.p. compression plant was erected for the Dominion Cotton Mills Co., at Magog, last year, as a test of the system, by the Taylor Hydraulic Air-Compressing Co. of Montreal, and the following account of this plant, which has excited a good deal of interest, was given by the inventor, C. H. Taylor, at the Mining Engineers' Convention in Montreal last month. The construction of the plant consists in sinking a shaft to the necessary depth and erecting the separating tank, compressing pipe, head piece with air inlets, and penstock. The shaft of the Magog plant has been sunk to a depth of 128 feet. The dimensions inside the timbering and rock are 6 feet by 10 feet from the top of the shaft to within 16 feet of the bottom, where it is enlarged to 20 feet in diameter. The timber used in the shaft is 8 x 8-inch hemlock, the sets being placed 4 feet apart, centre to centre. The timbering extends from a point 3 feet below low-water level in the tail-race down a depth of 72 feet, of which the last 20 feet is in the rock. All the timber above the rock is backed with 2-inch hemlock. As each set was put in, each plank was wedged separately, and the space filled up solidly with fine gravel. After timbering was completed, a lining of 2-inch hemlock plank was put in. The space between this lining and the rock was filled with concrete, thus forming a solid base upon which the upper timbers were supported. This careful timbering was necessary because of the nature of the ground, which is composed of layers of running sand. The rock below the timbering consists of a very firm slate. A mud seam, an inch and a half thick, cuts the shaft at the bottom of the timbering, separating the solid rock from rock of a loose nature above. On three sides of the mouth of the shaft a stone wall has been laid in Portland cement. This wall is 3 feet thick at its base, and batters upwards to 2 feet at the top. Its height is 14 feet. It has for its foundation two layers of 10 x 12-inch timbers laid crosswise, bedded in cement, with 10-inch spaces between timbers filled with concrete. The space between the walls forming the tail-race, is 13 feet. The timber in the structure will always remain below water level; consequently, it will be of as permanent a character as the remainder of the plant.

The material of the compressor is ¼-inch steel plate. A penstock of 5 feet 6 inches diameter and 160 feet long conveys the water from the canal, or forebay, to the receiving tank at the head of the compressor. This tank is 12 feet in diameter and 12 feet high, open at the top, and rests upon four 12-inch I-beams spanning the foundation walls. The compressing pipe, 44½ inches in diameter, passes through the centre of the bottom of this tank and projects 3 feet up into it. A 10-foot telescoping pipe is inserted into the upper end of the compressing pipe. On the upper end of this is rivetted a cast iron bell-mouth piece 4 feet 8 inches in diameter, which is part of the head piece. Three lugs are on this casting by which the upper part of the head piece is attached to the telescoping pipe. The upper part of the head piece is a casting in the form of a cylinder 4 feet 8 inches diameter, terminated below by a conoid, of which the surface is concave. Three 1¼-inch bolts attach the lugs on the bell-mouth piece and telescoping pipe to three corresponding lugs on the cylindrical piece above. Two flanges 6 feet 2 inches diameter encircle the cylindrical part of the casting above and below, which served to hold vertically in place thirty 4-feet lengths of 2-inch wrought iron pipe equally distributed around the cylindrical casting. The lower ends of these pipes are flatly welded together. Near the lower extremity of each pipe, five rows of holes are bored to receive thirty-three ⅜-inch pipes, all within 15 inches of the closed end. In each of these holes a pipe 6 inches long is screwed and bent so that they are all directed towards the centre of the compressing pipe. These pipes serve to admit the air and direct it into the water. The combined head piece and telescoping pipe are supported by a 2½-inch square threaded screw, which passes through a timber spanning the top of the tank. A hand wheel, with nut attached, supports the screw and enables the head piece to be raised or lowered as desired. As before mentioned, the compressing pipe starts from a point 3 feet above the bottom of the upper tank and extends down the shaft. Its total length is 136 feet. Its diameter is uniform for 116 feet, but enlarges in the last twenty feet from 44½ inches to 56 inches diameter.

This compressing pipe is constructed with butt joints held together by 4-inch straps rivetted to the sections. All the rivet holes are counter sunk, thus making a perfectly smooth interior. The lower or separating tank is 17 feet in diameter and 12 feet high. The bottom of this tank is open and rests upon eight cast-iron legs which raise it 16 inches above the bottom of the shaft. The top or cover is conical, rising two feet to where it is connected with the compressing pipe. The compressing pipe extends down into the tank 9 feet below the cover, its lower extremity being 8 feet from the bottom of the shaft. Directly under the compressing pipe is placed a circular casting, the upper surface