View of the upstream side of the main dam at Rat Rapids development on the Albany river taken in February before construction was completed. This dam is across the northerly outlet.

the outdoor step-up transformer bank is controlled by a 600-ampere, 7,500-volt manually-operated oil circuit-breaker, equipped with a 24-volt d.c. trip.

A 12-cell, 24-volt battery is the source of energy for the tripping circuits. The battery is kept continuously under charge by a suitable rectifier.

The relay protective system consists of both balanced voltage and over-voltage type relays, also excess current relays. Either the oil circuit-breaker handling the 6,600-volt output from the generator, or the carbon circuit-breaker in the generator field circuit, is tripped out by these relays, depending upon the character of the fault.

The station output is recorded on a graphic wattmeter, and also on a watthour meter. The indicating instruments, comprising ammeters, voltmeter, frequency indicator and wattmeter, together with the recording meters and relays, are mounted on ebony asbestos panels.

Power for such purposes as cottage, station and outside lighting, and service to the radio equipment, is obtained from two 7.5 kv.a., 6,600/110-220 volt outdoor type transformers. These transformers are mounted on a pole structure close to the generating station.

The main transformer station consists of a pole type structure. An overhead line from the generating station supplies power to the transformer bank, consisting of three Packard 333 kv.a., single-phase, 60-cycle, o.i.s.c. transformers having a transformation ratio of 6,600/22,000 volts. No high-voltage oil breaker has been provided. The transmission line can be disconnected from the transformer station and grounded when necessary by means of suitable clamps. Lightning arresters and co-ordinating gaps are provided and connected to the high-voltage side of the transformers. Lightning arresters have also been provided and installed at the generating station on the 6,600-volt mains.

A grounding system for all electrical apparatus at the development was secured by radiating No. 4/0 bare copper cables through a muskeg area located in the forebay about 500 feet in a south-westerly direction from the powerhouse, which was the only suitable area available for grounding purposes. All generating and transformer station equipment is connected to these grounds by cables laid in the forebay channel.

The power is transmitted at approximately 22,000 volts to the Central Patricia and Pickle Crow gold mines, over a transmission line erected on wood poles which were cut locally.

Downstream view of the north channel dam at the Cedars Channel which is the southerly outlet. There is also another dam on the south channel of this outlet.

131605

Selecting Overhead Construction for MINE TROLLEY WIRE

For Greatest Economy Select Type of Overhead Construction Best Suited to Roof Conditions. Numerous Methods of Suspension and Kinds of Material Available to Meet Individual Requirements.

WITH the present equipment which is available, there is nothing very complicated about the construction of mine trolley wire overhead. The only problem is to select the type of construction and material which is best suited to the kind of mine roof or roof support on the individual property. Only by making this proper selection will it be possible to secure the most efficient overhead at the least cost.

Three Roof Types

For all practical purposes it is possible to divide the types of roof into three classifications, namely: first, natural top or roof composed of slate, coal, or some other natural material; second, timber roofs or where the point of attachment of trolley support is on a timber cross-member; and third, steel I-beams, the naturel roof being more common than either of the other two types, it offers more possibilities for a choice of construction. First, let us consider the method for attaching the trolley support to this kind of roof. The usual method employs an expansion bolt. These bolts generally come in two lengths, 4 and 6 inches. The 4-inch length gives sufficient hold on hard, firm roofs, while the 6-inch length is used in roofs that are softer and require a greater depth of hole to gain the required holding power to support the load.

Type of Hanger

To this expansion bolt is screwed an insulated hanger. These hangers vary for different conditions. They should have ample bearing surface on the top to prevent their being "cocked" over on curves due to side pull. Many hangers are made with this broad, flat surface on the top. If it is desirable to conserve head room, the hanger is usually made with a boss on the top which projects into the expansion bolt hole and the bearing is secured on the collar surrounding the base as it fits up to roof. These two types of construction are illustrated in Fig. 1.

Hangers are usually made in various diameters to meet local conditions and have one or two petticoats to provide adequate leakage surface over the installation. Size of hanger is dependent upon voltage and moisture conditions, greater leakage surface being needed in wet mines than in dry.

The hangers discussed above are satisfactory where the roof is practically even, but where falls have caused unevenness and it is necessary to extend the support, there are several different types from which to choose. Often if the extension is only a matter of a few inches or so, it can be made easily in the stud of the expansion bolt. If, however, the extension is greater, pipe is the usual means.

There are devices available which use ¾-in. pipe, among them being the type that consists of an expansion shell which is inserted in a drilled hole and ¾-in. pipe driven into place and securely clamped. An adapter is placed on lower end to attach the insulated hanger. The advantage of this particular type is that pipe need not be threaded; simply cut to proper length and install. The assembly and trolley wire can easily be maintained at the same elevation above the rails.

When the recesses in the roof are of considerable height, and it is felt that ¾-in. pipe does not offer sufficient strength, the size can be increased to 1¼-in. Other adapters may then be used with hangers which attach to this pipe.

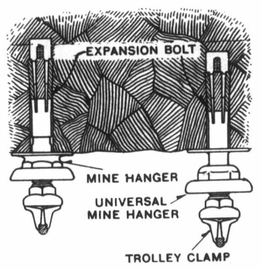

Fig. 1—Here are two of the most commonly used methods of suspending trolley wire from natural roof. When headroom is at a premium the use of the type of hanger at the left, is suggested.

Timber Hangers

Timber hangers are generally installed by means of lag screws. If a hanger has a flat top, it can easily be attached to timber by means of lag screw supports. This permits the same hanger to be used on both natural roof and timbers. If head room is im-

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