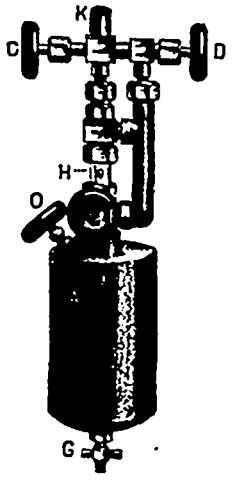
Society's rooms, paper upon the construction of the new Victoria bridge prepared under the direction of Joseph Hobson, chief engineer, Grand Trunk Railway, illustrated by lantern projections. Wednesday, January 11th.—Excursion of the Society to visit the works of the Laurentide Pulp Company, Grand Mere, for which a courteous invitation has been extended by the company. Thursday, January 12th.—10 a.m. and 2 p.m., technical meetings in the Society's rooms, at which the following illustrated papers will be read: The Soulanges Canal, by Thos. Monro, past president, Can. Soc. C.E.; the Trent Canal by R. B. Rogers, M. Can. Soc. C.E.; the Georgian Bay and Ottawa Ship Canal by H. K. Wicksteed, M. Can. Soc. C.E.; 8 p.m., members' annual dinner, at the Windsor hotel. Friday, January 13th.—10 a.m. and 2 p.m., business meeting and an address by the retiring president, W. G. McN. Thompson.

THE PREVENTION OF SCALE IN BOILERS.

In an article in the November issue of The Home Study Magazine, in answer to the question, "Will carbonate of soda or plain soda remove hard sulphate of lime scale?" the expert replies, "I have never found it to be much good for that purpose. I can tell you, however, what will remove it pretty effectually—very cheaply too—and that is ordinary kerosene. If this is fed to the boiler at the rate of about one-quart per day per 100 h.p., the benefit to the boiler will soon be apparent. It has also been found to prevent, to quite an appreciable extent, the formation of hard scale. Its action upon the sulphate of lime does not seem to be a chemical one, however, but rather a mechanical action. In my opinion, the minute particles of sulphate of lime precipitated by the action of heat, are first carried to the surface of the water by the boiling and bubbling of the water. There they become coated over with the kerosene, which prevents them from uniting into a solid mass when deposited on the plates." This may be accepted as the opinion of one of the most advanced United States engineers it is claimed. In order to get the benefit of the scale removing properties of kerosene, it is necessary to introduce it into the boiler drop by drop, and for this purpose a special device has been constructed. One of the best known and most widely



used of these is that shown in the accompanying cut, made by the Detroit Lubricator Co., of Detroit, Mich., and known as the Detroit Kerosene Oil Injector. Besides being extensively used in the United States, several thousand of them have been sold in Europe. For more than two years past the Vienna Dampfkessel untersuchungs und Versicherungs-Gesellschaft have been conducting a series of experiments with these Detroit kerosene oil injectors, and their report has recently been published. It agrees with the American opinion cited above, but it is more detailed and specific. It states, for instance, that "kerosene injected by way of drops with the feed water comes into the boiler as an emulsion, and remains waving in the water. The evaporating process separates the pulverized scale, which gets covered with a thin hide of oil, whereby the sticking to the wall is diminished." In regard to its action on the scale already formed, a very interesting explanation is given. On account of its peculiar nature, the kerosene penetrates into the scale, which being a very bad conductor of heat, is much hotter at the shell than on the water side. As the minute penetrating particles of kerosene get deeper into the scale they become hotter and hotter, till finally they become changed into a gas, and the resulting expansion bursts off pieces of the scale, just as dynamite does in a mine, and this process continues until all the scale is removed. As scale is one of the most annoying troubles of steam plants everywhere, this method of disposing of it, being both cheap and effective, will doubtless be very generally taken advantage of.

ELECTRICAL POWER TRANSMISSIONS.*

BY R. A. ROSS, E.E., M. CAN. SOC. C.E.

(Concluded).

Having sketched in a general way the points to be considered and determined upon the general features of the transmission, we may take up the figuring of lines, efficiencies and horse-powers to be generated. To do this, certain assumptions must be made as to the allowable efficiencies of the line and apparatus at various loads, which has been done in the tables below. As regards the apparatus, commercial efficiencies have been assumed, which are usual for this class of work, and will be guaranteed by the manufacturers. The line efficiencies are what would be usually allowed, considering the copper as designed for those efficiencies at maximum demand.

	Loads.			
Transmission (generator to sub-station)	100%	75%	50%	25%
Generators	96	95	94	90
Line	90	92.5	95	97.5
Raising and lowering transformers.	96	95	94	90
Total efficiency of transmission	83	83	84	79
Incandescent (distribution to lamps).				
Primary distribution at 2,000 volts.	96	97	98	99
Large reducing transformers	97	97.5	97	95
Secondary distribution to lamps	97	98	98.5	99
Total efficiency of distribution.	91	92.5	93.5	93
Arc Lighting (distribution to lamps).				
Efficiency of motor	92			
Efficiency of arc machine	86			
Efficiency of line distribution to lamps	93			
Total efficiency of distribution	72.6			
Power Circuit (distribution to motors).				
Efficiency of lines	90	92.5	95	97.5
Efficiency of transformers	96	95	94	92
Total efficiency of distribution	86.4	88	87	89.7
Railway Power (distribution to motors).				
Efficiency of rotary transformers.	96	96	95	90
Efficiency of distributing lines to motors	80	85	90	95
Total efficiency of distribution.	76.8	81.6	85.5	85.5

From these efficiencies of line and apparatus the whole power necessary for all the maximum demands may be transmitted at an efficiency of 80% from the generator shaft to the distributing lines in the city. The total efficiency at full load from the generator shaft to the lamps, railway and stationary motors, is 68%, and under the average running conditions would not be less than 70%.

These figures illustrate the remarkable efficiency of electrical transmission even on such a mixed and varying load. It will be noticed that at varying loads the efficiencies are not very different, owing to the fact that, while the apparatus falls off, the line increases in efficiency, thus maintaining a balance. In fact, under light loads the efficiency is higher than under heavy, and is actually higher than given in the totals, because the tables consider the whole plant as operating at fractional load, while in actual running the apparatus would be kept at full load by shutting down units as the load dropped, thus raising the efficiency. The figure of 68% therefore may be safely taken as the lowest to be met with during the course of the year, and as it holds only for the peak of the load will not affect the average efficiency materially. The date assumed or calculated for the transmission is given below. The power is that