Canadian Railway and Marine World

December, 1920

How to Heat Railway Buildings Economically.

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Heating systems in railway buildings often compare unfavorably with those used in buildings owned by private industrial concerns, the reason being that railways usually make their own installations, and the men employed are not always heating tradesmen, but are picked up from other departments and are not primarily interested in heating work. What they know has been learned from actual contact with other railway heating plants so that obsolete practice has a strong tendency to be perpetuated. What is mostly needed is a campaign of education, and any railway contemplating extensive improvement in its heating systems would be well advised to study this problem from the start.

It is sometimes claimed that the use of steam traps and other devices is impracticable, as they need too much care and attention. It will always be found, however, where such has been the case, that the trouble lies in the want of care in choosing the right article or in properly protecting it from dirt and scale, or, more often still, in neglecting to give the very small amount of attention which is needed periodically by all mechanism, no matter how simple. When it is realized that the modern air brake is far more complicated than the most elaborate heating system, it will be conceded that there is no valid reason why the latter should give any trouble in the hands of the mechanics who are available at shops, and locomotive houses, provided they are given the necessary instructions. It is the intention of this paper to recommend a standard practice in designing new heating plants, and in remodelling those that are inefficient or out of date. In so doing it is not sufficient to decide on a system that will be efficient if correctly operated, but to consider what chance it has of being correctly operated, or if it would not be better to make some sacrifices in certain directions rather than take a chance on personal equations that are beyond control. For instance, it is needless to state that it is quite impossible to depend on anyone turning radiators on or off, with a view to economy, unless he is paying for the coal. It simply is not done, and no number of circular letters or printed instructions will ever make any difference. It therefore remains to control the heat at its source, to make one man responsible, to make the system as automatic as may be, or to so arrange it that it is to somebody's personal advantage or comfort that economy be observed. Also to pay the greatest attention to details, particularly in regard to protection from dirt, and external injury, and from being tampered with by unauthorized persons, and to arrange that waste becomes visible. It is with the above ideas in mind that the following recommendations and suggestions are made, being followed out from the beginning and incorporated in the d sign.

The Choice of a New System.—A heating system in its simplest form consists of a series of stoves placed in different rooms, and these are fairly economical, the possibilities of waste lying in the overheating of the premises (usually only occasional) and the throwing out of unburnt fuel with the ashes. This latter may be serious, but can only be due to carelessness on the paart of the attendant and the remedy is obvious. Almost as simple is the Baker heater, which is often available when released from old cars, and works very well in a small building, where not more than one heater is required. These two methods of heating are, everything considered, most economical for the smallest of passenger stations and small buildings, or sheds at a considerable distance from other buildings, and where they can be attended by baggage men, or other employes, in the course of their ordinary duties.

For stations of from 1,500 to 7,500 sq. ft. total floor area, which embrace the majority of ordinary stations, a hot water heating system should be used, with cast iron radiators, and sectional cast iron boiler, burning hard coal and placed perferably in a basement. In the smaller sizes, a hot water heating system is better than a steam system, in many ways, although its first cost is about 35% more. The large volume of water in circulation acts as an ideal heat storage, giving up heat when fire is low and storing heat when the fire is bright, thus preventing to a large extent the losses due to overheating of the rooms, and calling for less aattention to the furnace. Any man with a furnace in his home will know how to run such a system economically and will usually do so, if for no other reason than to save himself trouble.

When we come to a larger station, such as is found at a division point, which is usually of two stories, with offices above, and sometimes a number of buildings arranged in a row, the hot water system may offer increased cost, and construction difficulties which make it advisable to use a steam heating system. In most respects the one pipe gravity steam system with boiler in basement using hard coal or other suitable fuel is the most economical steam heating system that can be adopted, and it is certainly the simplest. There is no possibility of waste of either hot water or steam when the proper air valves are used. Not only the radiators, but the boiler and piping themselves supply heat to the building, and need only be covered when they are likely to give out more heat than is required in the immediate vicinity. Long horizontal mains also need covering to avoid excessive condensation.

The system has the inherent disadvantage that the radiators must be either on or off. However, with the boiler on the premises, and the attendant firing it to suit fluctuating weather conditions, what actually happens is that the radiators are alternately heating and cooling, as not sufficient steam is made to heat them all the time, and this prevents overheating the rooms. To take advantage of this feature it is most important to so arrange the piping that the colder rooms and more exposed portions of the building are given the preference by receiving their steam first. Otherwise, it will be found necessary to overheat one portion of the building in order to adequately heat another. With this attended to, it will be found that the system will work well for two or three buildings which are not more than 100 ft. apart and which have good basements, but under certain circumstances, where there is a great difference in exposure, or in distance from boiler to radiators, it will be necessary to use special air valves on each radiator and connect them all to a small air pump, or ejector through a system of piping, which, however, need only be very small. This is known as the air line system and has many recommendations, but is usually an unnecessary refinement for railway buildings. In designing a one pipe heating system, proper size of piping, proper grading, and provision for expansion, and care in placing the radiators, are the points on which the success of the installation depends.

We now come to the first condition in which there is a really serious opportunity for waste. A station, office, or small shop has to be heated, and as a supply of high pressure steam is available a short distance away at, say, the locomotive house, it is proposed to use this. Now it is usually not economical to do so. To begin with, there is the loss of heat in the underground pipe supplying the building. With the very best construction this will be about 1% per 100 ft., but if the pipe is merely buried in sand, or set in a wooden boxing, the loss may be as much as 10% or more. The condensed steam, instead of draining back to the boiler direct, must be separated by means of a steam trap. Certain of these steam traps will then return the condensation direct to the high pressure boiler with very little loss, but these traps need careful attention, as with a none pipe system, should the trap stop working, the system will rapidly fill with water, and it will take some time to get it working again.

The greatest loss, however, is due to the imperfections of human nature. With an unlimited supply of steam from a distant point it will always be found that the building is overheated, and doors and windows left open, even in very cold weather. In fact, radiators are rarely, and in some cases never, shut off. One has only to imagine what his coal bill would be if he were to keep his furnace at home going full blast, from October to May, to realize what this means. It may be argued that the agent or officer in charge should not permit this condition, but a second thought will show that this is one of all duties that can and will be neglected. The only practical way to control the heating of buildings is at the source of heat, and if the baggage man or other employe has to at-