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Modern Locomotive Management.

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Although three-fourths of a century has elapsed since the inception of the locomotive in a practical form, yet for many years thereafter slow progress appears to have been made in regard to its development. In this paper it is intended to briefly refer more directly to the period between the year 1890 and the present time.

Within the last 20 years tremendous progress has been made in regard to the increased capacities of American locomotives. It would appear, however, according to recent experiments made on one of the important systems, that the limit had now been reached in regard to size for practical purposes, except, possibly, for some special service. While considerable change has been made in regard to increasing the sizes and types of the modern locomotives, very little improvement has been made in the locomotive itself, as practically the same methods are now followed as was the experience many years ago. Many different types have been brought out; compounding has developed to a considerable extent and some other special features have been adopted; but, without taking into consideration the increased sizes, very little change has been made during the last half century. The steam distributing gear has remained in about the same form, at all events with American locomotive practices.

Prior to 1870 the locomotives in this and other countries were not equipped with any special appliances, as has now become the general practice. While the locomotives 30 years ago did not have any special equipment, the introduction of the Westinghouse atmospheric brake for railway train service about that period was made absolutely necessary by the accelerated speed of passenger trains, and the frequent accidents resulting, attributed to not being able to stop in time, demonstrating that some system of power brakes were badly needed, which would bring the speed of the trains under the immediate control of the engineers. This brought out the air brake, it being the first of the special appliances which have, during recent years, become so generally used, and attached to the locomotives. You are all, I believe, familiar with the improvements which have been made on the air-brake equipment from time to time, as have been suggested and found essential by the prevailing conditions of the period, and

the requirements of the railway service. Great improvement has been made in the development of the air-brake mechanism to bring it to the high standard now prevailing; it is really amazing the improvement which has been made on the air brake mechanism since its inception, as has also been the experience with all modern innovations, which are now so generally applied to the locomotives, and in common use on all our railway systems.



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A superficial examination of one of the modern locomotives convinces the casual observer that they are becoming literally covered with the various special appliances which are now found necessary by the modern train service requirements. In fact, this matter has grown to such an extent that locomotive designers and builders are commencing to experience some difficulty in finding a suitable location on the locomotives for all the apparatus required, viz., air pumps, speed governors, air and steam reservoirs (varied sizes), air cylinders, pressure-reducing valves, tri-

ple valves, train signal valves, speed recorders, pneumatic bell ringers and sanding devices, electric (arc) head light and incandescent system to the cab and signal lamps, turbine engine and dynamo for generating the current, train steam-heating equipment, etc., and while entering the cabs of locomotives a similar condition prevails, we find engineers' brake valves, pressure-reducing valves (steam and compressed air), steam and air pressure recording gauges, sight feed lubricators, inspirators, etc., with a network of pipe lines in connection with the different parts of each system, all of which have some particular duty.

Considering the fact that the modern locomotives have been greatly increased in size, and with the numerous appliances attached to the same, the management has changed to some extent to conform to the change in the conditions; as, in addition to the care of the locomotive itself, all of the special equipments require attention, and engineers must also have a proper knowledge of the construction and operation of the special mechanism so that they may intelligently handle the same. The engineers of the present day, however, possess many advantages not enjoyed by the engineers during former years in the matter of acquiring information pertaining to their work, as prior to 1873 no very good literature had been issued regarding American locomotive practices and experiences; but since that period, and during recent years, abundance of instructive matter has been published, devoted almost exclusively to this particular work in all its details, and it is gratifying to know that the practice of reading good literature in regard to their profession has now become universal among the railway men of this country, and in this way they obtain information from the recorded experiences of others, and are enabled to make a practical application of the knowledge thus obtained, qualifying them for rendering good service or assuming positions with increased responsibility.

Railway companies and manufacturers of special appliances have annually expended large sums of money for the educating of the men engaged in conducting transportation and providing a better knowledge of locomotive engine management, and the proper methods for handling the special equipment. Educational institutions, clubs, etc., have also contributed much in the same direction so that individual effort alone seems all that now remains to attain a high standard among this class of railway men. While perhaps the im-