

Canadian Railway and Marine World

August, 1920

Locomotive Fuel Economy and Smoke Prevention.

The committee on fuel economy and smoke prevention, appointed by the American Railroad Association, Section 3, Mechanical, and of which Wm. Schlafge Mechanical Manager, Erie Rd., was chairman; W. H. Flynn, Superintendent, Motive Power, Michigan Central Rd., being also a member, presented the following report at the Association's convention at Atlantic City recently:—In its 1919 report your committee endeavored to emphasize the growing importance of fuel economy to the railways, arising from increasing consumption and increasing cost of production. Both of these factors are likely to result in the largest fuel bills in railway history during this year. It is certain that there will be substantial increases in the cost of production and only the application of prompt and effective means will prevent an increased consumption out of proportion to any probable expansion in traffic. It is therefore urged that every railway check its current consumption with previous records with a view to the adoption of such measures as the situation may require.

With the return of the U.S. railways to corporate control and operation, the Fuel Conservation Section ceased to exist. The work of this important branch of the Railroad Administration was of unquestioned value in promoting economy in the purchase, distribution and use of fuel for railway purposes. The methods employed were substantially those advocated by your committee in previous reports, and they must have continued intensive application, if the cost of fuel is not to exceed even its present ratio to total operating expense. The publications of the Fuel Conservation Section no longer bear an official status and may, therefore, fail to serve their most useful purpose unless incorporated in the official publications of the American Railroad Association. This is particularly true of the pamphlet on "The Economical Use of Railroad Fuel" most recently issued. While this incorporates many features contained in the present official publication of this association issued under the title of "Fuel Economy on Locomotives," there is some additional material gathered as a result of greater experience in the application of the principles of fuel economy to locomotive operation as well as some subject matter not treated in the association pamphlet, that it is believed should be incorporated and accordingly a revision of the text of Fuel Economy on Locomotives is submitted with the recommendation that suitable action be taken to place it before the general committee for adoption as standard practice. In the original preparation of this pamphlet, your committee considered that brevity was not only desirable, but essential, and, therefore, much descriptive and explanatory matter was omitted. The same policy has been pursued in the revision, which accounts for the omission of much interesting material incorporated in the publication of the Fuel Conservation Section, which, while of value in emphasizing the importance of certain rules or recommendations, may be

sacrificed to practical requirements under well trained supervision.

Locomotive Fuel Economy.—Introduction.—The object of these instructions is to bring about the economical use of fuel, to promote good practice in the operation of locomotives, and to improve the methods of firing. As the locomotive man is in charge of the locomotive, his instructions must be followed, and both he and the fireman should work together to bring about the desired results. The best fireman cannot make a good showing with a locomotive man who does not co-operate with him in the proper handling of the injector, throttle and reverse lever. The fireman is not alone responsible for the saving in coal, as a great deal depends on the locomotive man in his proper operation of the locomotive, and the latter should give instructions and suggestions to the fireman, based on his experience, to bring about the best results. An efficient fireman is one having the skill and knowledge which enables him to make the fuel supplied to the fire box, evaporate into steam as much water as possible, or, in other words, he makes the fuel perform its full duty. There are other qualities which increase the value of a fireman, but the ability to keep up steam is the first consideration. Good judgment is an aid to success in every calling, but it seems especially essential in a fireman. Economy in the use of fuel is required, because the fuel used on locomotives is one of the largest items of expense to all railways. As the greatest portion of the fuel passes through the fireman's hands, he can use it economically (depending on his ability, skill and good judgment, coupled with the co-operation of the locomotive man in handling the locomotive), or he can waste it through lack of knowledge on inattention to his duties. Furthermore, by burning no more coal than is absolutely necessary, the labor of firing is lightened, and by taking an intelligent interest in the condition and operation of the locomotive, the fireman is a very important factor in the saving of coal and water. By explaining to the new fireman the reasons why certain methods should be pursued in handling his work to bring about the best results, and by directing attention, if necessary, to improper methods on the part of the experienced fireman who may not use good judgment, the operation of the locomotive can be handled to the best advantage and the greatest saving of fuel effected.

Bituminous and Anthracite Coal.—1. Bituminous coals are usually composed of about 60% carbon, 30% gaseous or volatile matter, which burns as flame, and 10% earthy matter, which remains on the grates as ash or clinker. Good anthracite coal contains about 85% carbon, 5% gaseous or volatile, and 10% earthy matter.

2. The burning of coal in a locomotive requires air, which must be admitted through the ash pan, grates and fire door. Smoke means imperfect combustion and waste of coal, and must be avoided as far as possible.

3. When bituminous coal is applied to the fire, the volatile or gaseous matter is expelled, and, if properly mixed with air and heated to a sufficient temperature in the fire box, the mixture will ignite, be consumed and passed from the fire box through the tubes and stack as colorless vapor, leaving the solid matter on the grates in the form of coke, which burns more slowly. If, however, the gases are unconsumed, they will produce smoke.

4. Anthracite coal burns more slowly than bituminous, and, consequently, a larger grate area has to be provided in order that sufficient coal may be burned to give the required amount of steam. In other words, means must be provided to make a hard-coal-burning locomotive of given proportions consume as much coal per hour as a bituminous burner of the same proportions, and no better way has been found than by designing this kind of locomotive with a large fire box and a liberal grate area. Anthracite coal has to be fired to suit the size of the lumps used. If the coal is in large lumps, a heavy fire must be carried, because the lumps lie so open that the air would pass too freely through the fire if it were light. The smaller the size of the coal the thinner the fire can be. The fire should be started considerably in advance of leaving time from locomotive house, in order that a good fire will be on the grates when the start is made with the train.

5. The method of light and level firing, outlined in the instructions which follow, applies to firing both bituminous and anthracite coal.

Inspection of the Locomotive.—6. The locomotive man and fireman should be on hand in ample time before departure from the locomotive house to thoroughly inspect and lubricate the locomotive, in order to make sure that it is in proper condition and fully equipped for making the run. Any matters which, in the judgment of the locomotive man, should receive attention before departure, must be promptly reported. The fire, grates and ash pan, as well as flue sheet, must be examined, to see that they are in suitable condition for making the run. The condition of the fire should be such that it will make steam freely from the start. The shaker rigging should be operated to see that it is in good working order. The damper rigging (where provided) should also be operated, to make sure of its condition. The ash pan and rigging should be examined, to see that the doors or slides are properly secured and in a condition to prevent hot coals dropping along the road, which are liable to start fires.

7. When locomotives are equipped with mechanically operated fire doors, grate shakers, or coal pushers, the same should be known to be in good working order before starting.

Preparing the Fire for the Start.—8. In preparing the fire for the start (but not before it is known the foundation or kindling fire is in good shape from corner to corner) it must be built up gradually to the proper depth for the service