

dustrial plants and by all manufacturers of car dumping machinery. Much has been accomplished in reducing the damage to freight cars by those applying the blocking to their movable platen type machines in accordance with typical design submitted to the 1913 convention, and adopted as recommended practice.

A member of your committee called on the manufacturers of the machines of the solid floor type and suggested that they give some consideration to modifying their hydraulic clamping arrangement to eliminate the damage to cars. It was found that after receipt of the 1913 report they had done some preliminary work along the line suggested and would be prepared to submit drawings and estimates of changes in existing machines of the solid floor type, and further that no more machines of that type would be built and that future machines would be of the movable platen type. It was also found that the steel manufacturers and industrial plants are taking a keen interest

in the matter and had a committee of thoroughly competent members going over the individual machines, and were having blocking applied as per our recommended practice to movable platen type machines and corrections made to those of the solid floor type.

There are a number of new car dumping machines being installed this year with cradles of increased length to accommodate the larger cars, and after this year's experience with them is analyzed, some modification in our recommended practice may be necessary for these machines. For existing machines we have no modifications of our report of 1913 to recommend, but would impress on all the need of properly spotting cars in cradle, the importance of maintaining blocking by renewing face, the absolute necessity of maintaining extension clamps at all times and to properly supervise machines at industrial plants to insure their carrying out the recommendations of this association.

Report of Committee on Fuel Economy.

The American Railway Master Mechanics' Committee, W. Schlafke, General Mechanical Superintendent, Erie Rd., chairman, reported in part as follows:—

Seventeen questions were sent out to the mechanical department heads of the railways; a digest of the answers is given herewith.

Clean boilers contribute largely to fuel economy; scale formation leads to broken staybolts, leaky tubes, seams and mud rings, with the consequent loss of boiler efficiency and increased fuel consumption for a given amount of evaporation. Experiments show that every 1-16 in. of scale requires 15% more fuel. In some localities, the water used for locomotive boiler feed contains a certain amount of decayed vegetable matter, and the scale is somewhat soft and porous. The loss of fuel is very much less, with this sort of scale, than with hard scale. Good boiler feed-water, together with thorough cleaning of boilers by washing out, keeps the amount of scale formed down to a minimum.

Keeping the valve gear in good condition, in order to obtain correct steam distribution, and by proper lubrication, to prevent hot bearings, the friction or internal losses in the locomotive will be reduced to a minimum.

Tests of superheater locomotives in both passenger and freight service have shown a saving in fuel, as much as 25%; somewhat less than this must be expected in regular service. Superheaters make it possible to get a higher sustained tractive power out of a locomotive. The savings resulting from their use, therefore, would not show upon a locomotive mileage basis, but would appear when figured on a ton mile basis, which is, to a certain extent, proportional to the work done.

Experience has not yet justified the application to locomotives generally of preheaters and feed water heaters.

Outside valve gear holds its adjustment and gives a better steam distribution, resulting in more or less indeterminate economies.

About 10% fuel economy can be obtained from the brick arch. It also affords considerable protection to the flues by keeping them at a nearly constant temperature and thus prevents certain losses due to leaks, and the arch tubes give increased heating surface of the most valuable kind.

It is doubtful whether savings can be claimed for the mechanical stoker. Its chief merit is its capacity for firing larger quantities of coal than can be handled by a fireman.

Special appliances, such as automatic fire doors, power reverse gears, rectangular and variable exhaust nozzles, and smoke consuming devices all have a tendency to produce economy. An efficient set of draft appliances assists in producing a saving of fuel. A special recording device attached to the safety valve will show how long it has been open during any stated period. A 3 in. valve carrying 200 lbs. will waste about 20 lbs. of coal per min. To promote the greatest measures of fuel economy, several roads have organized fuel departments and placed in charge a fuel engineer, or a superintendent of locomotive operation, reporting to the Mechanical Department head. This department has jurisdiction over matters relating to the proper operation of locomotives, economies in fuel, lubricants, other supplies and kindred subjects. On some roads a travelling engineer and a travelling fireman are assigned to each main line division, and in some cases covering side lines as well.

For the instruction and encouragement in locomotive operation, on the Erie Rd., a supervisor of locomotive operation or road foreman of locomotives to every 50 locomotive crews or less is required, each having supervision over one specific class of service. Their duties cover instruction of enginemen in the proper methods of firing, efficient handling of the locomotive, and operation of fuel saving devices, and hold periodic class meetings at the different terminals, where the road instruction is carried further by lectures. When an engineman has a record up to a certain fixed standard, the number plate of his locomotive is painted red. After he has belonged to the order a sufficient length of time to warrant it, his name is placed on the cab of his locomotive in letters of gold.

Class or individual instruction is essential, but the latter is preferred, and should be followed up invariably by practical demonstration. Locomotive class instruction at terminals is growing in favor.

For the instruction of enginemen, firemen, hostlers and locomotive preparers, when first entering the service, on the properties of fuel and the system to be practised to secure the best results, firemen are usually employed by the road foreman or supervisors of locomotive operation, and before going into regular service they are given some preliminary instructions and practice. They are required to make a stated number of trips as a student fireman with an engineman competent to instruct them in the proper methods of firing. Instruction books

treating on combustion and fuel economy are furnished to all enginemen. These books and a set of standard instructions, operating rules, book on good firing, firing charts and other information are given to new firemen. A supervisor or road foreman or fireman instructor generally rides with the new fireman for one or two trips in order to get him properly started and to teach him the fundamentals of the art of firing. Most roads have progressive series of examinations pertaining to firing and operation, which each fireman must pass before he can be promoted to engineman.

The method by which enginemen and firemen co-operate to avoid loss and waste of fuel and unnecessary firing, is usually to hold the engineman responsible and to see that he instructs his fireman. Engineman and fireman should work in harmony. They should examine their records on the performance sheet and be inspired to make a good showing.

In a consideration of whether it is good practice to generally inform enginemen and firemen by circulars or charts of the temperatures that can be obtained in the firebox of a locomotive by the varying degrees of heat and the color of the flame, the majority of the replies indicate that, as an educational measure, it is of value to impart such information to locomotive crews.

Some roads compile data and make up an individual performance sheet, monthly, showing comparison of enginemen in different classes of service on each operating division, based upon the consumption of fuel, lubricating materials and other supplies. Some consider this a good means of checking the results as between individuals, while others take the opposite view, claiming that there is a great lack of accuracy in the data secured and that when figures are not reliable the data are without value.

There seems to be a universal sentiment opposed to a plan of giving money premiums or prizes of any sort as an incentive to enginemen to improve and maintain a good fuel record.

In the preparation of coal for use in making a good fuel record, wherever conditions permit, the bituminous coal should be broken into small convenient sizes, in order to secure the best results from hand or stoker firing, because the smaller lumps burn more readily and tend to produce a greater evaporation per pound of coal. The best sized coal seems to be that which will pass through a 1½ in. and over a ¾ in. screen. For anthracite burning locomotives, egg size, or that which will pass through a 2½ in. and over a 2 in. screen, seems to be generally considered best. For a mixture of anthracite and bituminous coal, a general rule is difficult to state, because so many variables enter into the proposition.

For making the best fuel record, the majority believe that coal run over a ¾ in. screen will make a better record than run of mine coal on a basis of lbs. of coal burned, but if the price is considered, run of mine coal containing not above 30% slack will make the best record.

The most valuable essential of fuel economy is good supervision.

Of devices or appliances for use on locomotives or tenders to prevent waste en route and at coaling stations, the following materially assist: Iron or wooden coal gates of good design; fenders on tender platforms and inside of gangways to keep coal from falling off; movable covers over shaker bar openings, or collars around same; and prevention of overloading of tenders.

Some roads have experimented with various types of mechanical coal pushers, but the results are not, as yet, conclusive.