tion, is no longer a matter of conjecture, as standard designs are to be found on the market which are being applied in fairly large orders, as the records show. Still, the manufacturers are working zealously and satisfactorily for higher merit.

Generally speaking, the progress in the stoker designs during the past year has been quite encouraging. Since our last report the Locomotive Stoker Co. has brought out its duplex machine, which has for its object the conservation and efficient utilization of a greater amount of the finer produce in the fuel heretofore subject to more or less loss with any of the scatter type machines.

Much time is being devoted to the study of pushing coal through open and closed ducts and troughs, to ascertain the range of possibility and necessary mechanical conditions, also the effect of grinding and further pulverizing the fuel in its passage from the tank to the fire box through the helicoid screw in the horizontal or vertical planes, as well as the general effect through the pressure zones, the fruits of which it must be realized can only be obtained as developments are carried forward.

The Street Co.'s regular type C stoker, like other machines on the market, continues to do excellent work, and is showing improvement in durability. The Street Co. has recently designed and constructed two machines of a type known as the duplex, one of which has been applied to a Mallet locomotive on the Norfolk & Western, and the other to a locomotive of a similar type on the C. & O. R. The Hanna and Standard companies have both been pushing with much earnestness the introduction of a number of detail improvements in their machines for greater durability of parts, as well as higher efficiency in their operating engine and controlling mechanism, none of which, however, materially alters the original principle upon which the machines are constructed. All of this work requires a great deal of time and experimenting. We are informed that many improvements in detail have been made in the Crawford stoker which forecast substantial progress, efficiency in operation, and lower cost in maintenance.

Your committee, cognizant of what has been done and what is in contemplation, deems it premature at this time to attempt any elaborate efficiency tests, but suggests that the work be deferred until designs and improvements become more permanent, especially since data necessary for all practical purposes have either been reported or are readily obtainable by those who may be seriously considering their use. Furthermore, by the time the present machines reach a more favorable stage for a comparative test the opportunity for such an investigation, which at best is going to be very expensive and require a great deal of time, may be more opportune than at present.

Report of Committee on Car Trucks.

The Master Car Builders' Association committee, J. T. Wallis, General Superintendent Motive Power, Pennsylvania Rd., chairman, and of which L. C. Ord, formerly Assistant Works Manager, Car Shops, C. P. R., Montreal, who is now on active military service, was a member, reported as follows:—On acocunt of the American Railway Association committee on design of standard box car having under consideration some minor changes in the design of truck bolsters, involving probable slight changes in the limiting dimensions of cast steel truck sides, your committee deems it advisable to await the final conclusions of that committee before recommending any changes in the present Recommended Practices.

The committee on brake shoe and brake beam equipment submitted to the car truck committee a proposed design of brake beam hanger and manner of fastening to truck which received the approval of the car truck committee, inasmuch as the hanger conformed in length and location to the limiting dimensions for cast steel truck sides, now a Recommended Practice of the Association. Subsequent to this, criticisms have been made of the manner of securing the brake beam hanger to the truck and of the design of the hanger, involving changes in the hanger where it enters the brake head and modifications of the hanger hole in the brake head. Your committee, therefore, recommends that the design of brake hanger and its fastening to the truck be held over until next year, when the question of truck design for standard box car will be settled by the American Railway Association standard box car committee, and when this is concluded the committee on car trucks will confer further with the committee on brake shoe and brake beam equipment on desirable changes in the tentative design of the brake beam hanger and its fastening to the truck.

Report of Committee on Superheater Locomotives.

The American Railway Master Mechanics' Association committee, W. J. Tollerton, General Mechanical Superintendent, Chicago, Rock Island and Pacific Rd., chairman, reported as follows:—As of Jan. 1, 1916, there were 15,666 superheater locomotives in service in the United States and Canada, practically all of the fire-tube type, as follows:

Superheaters applied at time of construction of locomotive	9,900
Superheaters applied to locomotives already in service	5,766
	15,666

With the exception of one prominent railway, very few locomotives, originally equipped with slide valves, have been changed to piston valve and had superheaters applied. With the exception of 142 Mallet locomotives, equipped with superheaters, having slide valves on the low pressure cylinders, very few superheater locoomtives are equipped with slide valves. The railways on which these Mallet locomotives are operating is experimenting with a view of applying piston valves. Therefore, your committee does not feel this subject can be thoroughly discussed at this time.

Of the railway reporting, 99% of the superheater locomotives were equipped with brick arches. The use of brick arches is specially recommended on superheater locomotives, where practicable, as it causes more perfect combustion, better distribution of heat in the fire box, protects the flues and sheets and effects a reduction in smoke and sparks and cinders in flues and front end. In extreme bad water districts, the application of arches should be determined by local conditions.

It is recommended that a programme be adopted for the application of superheaters to existing power on a monthly schedule. This will enable the railways to place orders in advance for the necessary material and thereby avoid delay to locomotives undergoing repairs, awaiting superheater material.

There is a decided difference of opinion as to the advisability of equipping switching locomotives with superheaters, as follows,—Some railways maintain the same relative economies are effected through superheating switching locomotives as are obtained by superheating road locomotives. Others will not give consideration to superheating switching locomotives until all available road locomotives have been equipped, owing to the greater returns to be obtained. Your committee commends the application of superheaters to switching locomotives, but considers their application to road locomotives as being generally of greater importance.

It is felt no set rule can be formulated covering the application of superheaters to existing locomotives, as age, general condition, capacity and further service to be secured must govern. Several railways reported having superheated locomotives 10 to 15 years old.

From replies received, it is apparent that the superheater will be specified on all road and many switching locomotives purchased in the future.

The return tube, top header, double loop superheater is the type most generally used.

In view of the many complete reports which have already been rendered on tests covering the economies effected through the application of superheater, and superheater and brick arch, your committee does not believe it necessary to publish further data in this report. However, on a conservative basis, it is felt that an economy of 15 to 25% in fuel and 20 to 30% in water consumption can be expected in every-day operation through use of the superheater and brick arch. Numerous tests have shown greater economies. On a number of railways the application of superheaters has reduced the time of freight trains on the road 10 to 15% and eliminated one stop for coal and two stops for water over one freight engine division.

It is generally felt by all, and proved by some careful comparative tests, that the cost of repairs (maintenance of equipment) is greater for locomotives equipped with the superheater and brick arch. However, for the railways as a whole, the reductions effected in the cost of coal and water and the increased general efficiency (conducting transportation), offset this many times over.

As a general proposition, no changes are necessary in the front end arrangement, due to the application of superheater, aside from those made an account of superheater elements, header and damper. Replies received indicate no great variation in the size of exhaust nozzle tip between saturated and superheated locomotives of the same general characteristics.

The committee feels that the best results will be obtained in operating superheater locomotives by carrying about two gauges of water, with full throttle on short cut-offs, so far as operating conditions will permit. The engineers should also be required to crack the throttle when drifting.

The investigation develops that the majority of superheater locomotives are equipped with hydrostatic lubricators without booster, although a considerable number of railways are using the hydrostatic lubricator with the booster attach-