

seasons, yet the work of repairing has been simplified so that it is now possible to weld them in place with Thermit, oil, etc., and what used to be a two weeks' job, when all wheels had to be removed and frame taken to blacksmith shop, can now be repaired in place by dropping one pair of wheels and using oil, etc., and engine returned to service in a few days.

Following are the committee's conclusions and recommendations:—

That frame breakage is even more general and serious than we were at first led to believe, very few roads being free from this trouble. The longer the wheel base of engine, ordinarily, in combination with a roadbed having comparatively short curves, and with frames poorly designed or of inferior metal, or engines not properly kept up, the greater the trouble will be with frames breaking. This latter factor may not be reflected until after the engine has been put in good condition, and then a frame may finally break as a result of the previous poor condition of the engine.

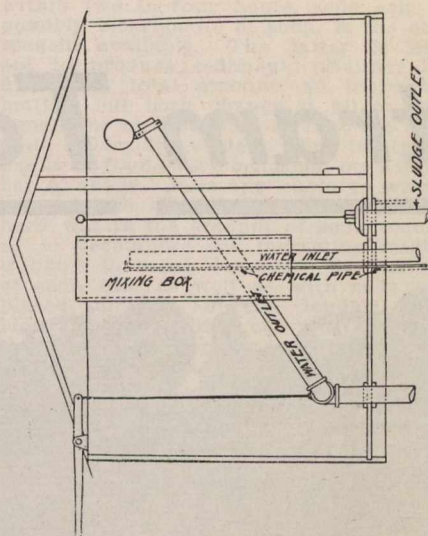
We believe that with frames properly designed, if made of a good quality of cast steel, thoroughly annealed, with suitable cross bracing and engines kept up in reasonably good shape, breakage will practically be overcome.

That a cast-steel, one-piece frame, properly designed, of good material and thoroughly annealed, is better than a wrought-iron frame, because of the difficulty in welding up the large section in a perfectly satisfactory manner, and also because, in a casting, bosses, lugs, etc., can be added without the necessity of bolts and studs.

That a bar frame is better than a plate frame, this being the opinion of people who have used both; the plate frame causing about as much trouble with breakage in Europe as bar frames do in America.

The strap binder appears to be the favorite form of tying frame jaws together, although the cast-steel box binder, with adjustable wedges, has a number of friends, on account of its simplicity and ease with which it can be handled. The toes at base of jaws should be of sufficient depth and size to give plenty of metal to anchor to, whichever binder is used.

Cases have been reported where frame breakage was directly traceable to expansion of boiler not being properly taken care of by the use of sliding shoes; these shoes, if too tightly fitted or cramped in bolting, or if not lubricated,



Treating Water for Locomotives. Fig. 1.

may prove unsatisfactory. Supporting boiler by means of vertical plates, if of sufficient strength, provides a satisfactory means of taking care of expansion

study of locomotive-frame casting, and the proper annealing of same, as a number of roads are using wrought iron, but would prefer steel if they could secure reliable castings.

As a general proposition, frame breakage does not ordinarily occur until engine has been in service two years or more, the older the engine the greater the trouble; we have come across cases, however, where they have broken earlier than this on account of flaws, poor welds, or other defects.

Treating Water for Locomotives.

The Master Mechanics Committee on the best method of treating water for locomotive use, when the density of traffic does not warrant water treating plants, H. E. Smith, Chemist, L.S. and M.S. Ry., Collinwood, Ohio, reported as follows:—Until within a few years, only two methods for the prevention of incrustation in steam boilers have been prominent, namely, boiler compounds and water-softening plants. The former, which include the familiar soda ash, aims to keep the incrusting substances in a soft, pulverulent condition until they can be blown or washed out of the boiler.

In locomotive service one of the difficulties connected with the use of boiler compounds is in applying them proportionally and regularly to all of the water. The plan of putting the matter in the hands of the engine crew was early found to be failure. The next step was to put the dose for a whole trip into the tender tank at the beginning of the run. This method involves a considerable and possibly harmful excess of compound at the beginning, and a corresponding deficiency near the end of the run. The obvious remedy is to transfer the base of operations from the locomotive to the wayside tank. To secure this, as well as some other advantages, separate softening plants have been adopted and have easily proved their usefulness. For small stations their use involves the difficulty of high fixed charges per unit of water treated. The small station must be able to respond to occasional heavy consumption for short periods and a softening plant having sufficient capacity for this purpose becomes expensive during normal times.

A very useful compromise between the two systems of treatment is an apparatus of simple construction which will mix the water uniformly with the proper proportion of some chemical solution which, although it will not actually remove incrusting solids, will act as

Mechanical Editor Wanted

An Associate Editor wanted, to take charge of the Railway and Marine World's Mechanical Department, dealing with railway rolling stock, machinery, shop practice, etc. A graduate in mechanical engineering preferred.

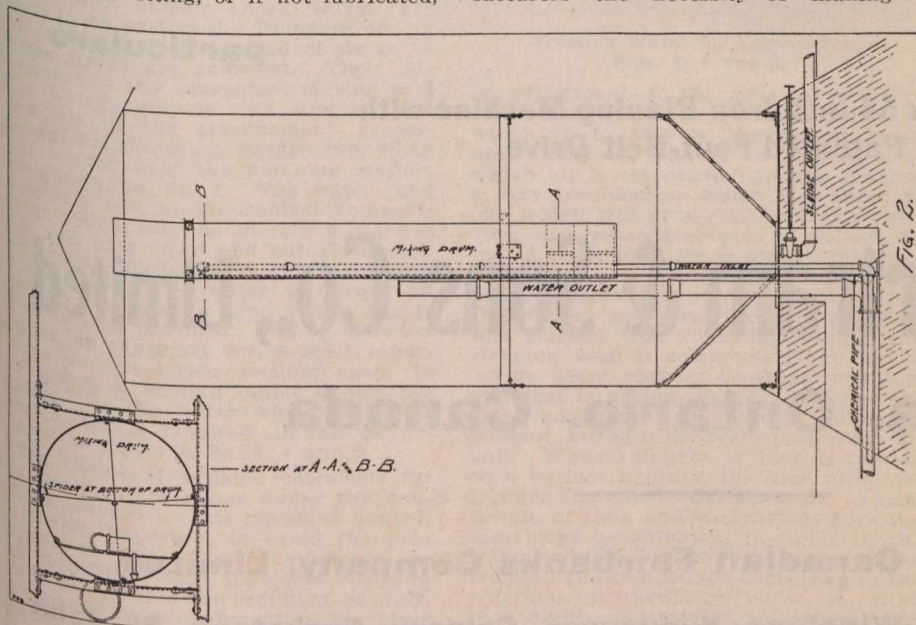
Applicants should give full particulars of educational qualifications, mechanical experience, etc., and state age and salary expected.

Applications will be treated as confidential if so desired.

Address the Secretary,
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without imposing undue strains upon the frames.

We should recommend to steel manufacturers the necessity of making a



Treating Water for Locomotives. Fig. 2.