

important step in the progress of the art of track construction. With this question apparently settled, the next step will probably involve the gradual elimination of one or two of the types of welds now in use and, perhaps, the general adoption of one or more others which have some vogue today. It is quite possible that we may continue to have more than one type of welds to select from as the needs of the work indicate.

It is to be hoped that in our search for perfection in welded joints we shall not be too hasty in the extensive adoption of types which must still be classed as in the experimental stage. Some of the older types of welded joints which are now enjoying a great degree of success are the result of many expensive experimental installations undertaken without definite information as to performance over a period of years under service. The cost to the railway companies of the information thus gained is incalculable. The information contained in the article on rail joints in another part of this issue and covering the details of progress in several older types of welded joints should at least serve to caution engineers against too extensive experimentation with newer types until more is known as to service results extending over five years or more with the older types.

### Electric Locomotives Prove Sturdy Under Strenuous Circumstances

AFTER several years of uneventful but eminently satisfactory service on the Rocky Mountain section of the Milwaukee electrification, three of the ten General Electric locomotives which were some months ago transferred to the Pacific Coast section, from passenger to freight duty, were soon thereafter given some jolts which severely tested their ruggedness. The story was told in last week's issue of this paper. Within a few weeks of each other two wrecks occurred in which these locomotives figured, but for neither of these were they in any way responsible. Minimizing the risk of repetition of the accidents will consist simply in increasing the preventive measures against man-failure and landslides, dangers which are necessarily incident to the railroad business.

The most remarkable thing about these wrecks is the way in which all three locomotives came through the ordeal. On the runaway train the main stress was on the motor armatures, geared as they were for a reasonable freight train speed. As the centrifugal forces vary as the square of the speed this inadvertent overspeed test involved forces which may be assumed at four times the normal value. Under these forces only one armature burst. The bars of several commutators "started," but the motor damage, as well as that in other parts of the machine, was insignificant compared with the wreckage as a whole. And the way this locomotive "hugged" the track was most remarkable of all.

This accident furnishes an ocular demonstration of the forces which are present when heavy trains are operating on steep grades. That of Beverly Hill is 2.2 per cent. Allowing 8 lb. per ton for friction, each ton on this grade produces a force of 36 lb. along the track, or a force of 100,800 lb. for a train weighing 2,800 tons, about the weight of the ill-fated wrecked train in question. It is easy to imagine what damage such a force, acting unrestrained upon even so ponderous a mass, could inflict. It inflicted it, all right, but of course the track curves must be credited with much of the damage.

And then, those locomotives that rolled down the bank; they proved themselves rugged even more surely. Locomotives must be designed for overspeed but hardly for overturn, at least not to this extent. The cabs were of course badly damaged, necessitating rebuilding, with straightening of some plates and replacing of others. There were also some minor breakages; but on the whole the damage was smaller than would be imagined possible and the reasonableness of the actual salvaging cost surprised the experts. That electric locomotives can be successfully salvaged after rolling down an embankment was proved years ago when four Great Northern machines were unceremoniously upset in this manner by an avalanche near the Cascade tunnel within a hundred miles of the scene of the Milwaukee accident. It is idle to speculate on the cost of salvaging Mallets under the same circumstances, but one cannot help but give this speculation a passing thought.

### The Millennium Is Not Yet

WE RISE to remark that the statement that the motor bus will prove a panacea for all transportation ills can now at least be questioned. The news, as noted in this issue, of the strike of nearly 1,000 motor bus drivers in California indicates that labor will still be a factor in any system of transportation.

### The Public, Too, Was Represented

SUPPOSE a judge in a case at law, after gravely hearing each side, should call the opposing attorneys to him and proceed to decide the case not on its merits, but on the basis of the minimum which each side would be willing to accept. Suppose that this was his general practice in deciding suits. How long would such a judge hold his place?

Yet it has been freely said that many of the wage awards of the past two years have been more than all the facts, if ascertained, would warrant, and that the figures arrived at have too often been mere compromises to which the third arbitrator would agree, have been dictated by political expediency, or have been forced grants, either as one necessary step in obtaining higher fares or as a means of preventing unbearable strikes or other serious troubles.

But in the Cincinnati case, mentioned last week, if we are correctly informed, no suggestion of a compromise or a forced solution received consideration. Upon assumption that the third arbitrator largely controls the spirit of an arbitration, real credit is due Prof. Alonzo Tuttle for his attitude and action in the case. And, further, it appears that, judging from the method of his appointment, the public was also represented in this arbitration. It is to be hoped that this arbitration is but the forerunner of others on the same policy.

As to the actual figures, we have no proof that 59 cents is the correct answer, but we presume it will be sure to be so when the record of the case is studied. The fact that a rate of 75 cents or 67 cents or 52 cents is in effect in some other city has no real relation to the rate in Cincinnati. What is important is that the decision should be as nearly right as possible. It is better for every one concerned to have a figure which can be substantiated than to have one based on false conclusions, only to have readjustments to make later.