mittee on subjects is one of the most important which any association can appoint.

In this connection the Southwestern Electrical & Gas Association has established an interesting plan to secure a program of this kind. The secretary, in laying his plans for the annual convention some two months off, has called the attention of the members to the fact that it would be a waste of time "to give up the various sessions to matters full information as to which may be obtained at any time from the secretary or from the technical papers or from text books." In consequence, the members are urged to send in suggestions as to topics of a practical but unfamiliar nature so that the papers and discussions may give information not available elsewhere and where the experience of the members will be most valuable to each other. The plan is a good one in principle and should also be so in practice, as, indeed, it has proved in previous sessions of the Southwestern Association. Progress is being made so rapidly in the electrical field that there should be no dearth of good subjects, and we have no doubt that the Southwestern Association can find this year a sufficient number of them to make a live program for its 1915 meeting.

Why would it not be a good idea for a sectional association in search of a good topic to select one which has been considered at one of the other sectional sessions? The subject could be introduced by the presentation of a summary of the paper as read at the other convention and an abstract of the conclusions reached there. The ELECTRIC RAILWAY JOURNAL believes in the value of sectional associations and has always made a feature of the publication of their proceedings, so that this information is easily available. Starting at this point, those in attendance could give their views without retracing any ground already covered, and in this way a consensus of opinion from all parts of the country would be obtained on different subjects which would be of the greatest value to the industry.

ENERGY REGENERATION IN HEAVY TRACTION

In the steam railway electrifications on lines having grades the possibility of energy regeneration has had a potent influence in the selection of system. Not that the actual saving in energy was necessarily a prime consideration, but the accompanying braking effect, with reduction in brakeshoe wear, has been considered a feature to be secured if possible. Assuming that total resistance would be about the same for a train ascending a grade and descending it while regenerating, it should regenerate all of the power due to the grade in excess of 1 per cent. It should, of course, be capable of holding back when going down any grade that it can climb. Actual data of regeneration on a section of the Italian State Railways were given in an article by G. Pontecorvo which appeared in last week's issue of the ELECTRIC RAILWAY JOURNAL. These showed a regeneration of 50 per cent on a grade of 3 per cent to 3½ per cent and a reduction of two-thirds in brakeshoe wear. There is no doubt, therefore, that practice bears out theory in this case.

One complication of the regenerative systems has been the necessity for taking up surplus power supplied by a train descending a grade when there was not a demand for it from other parts of the line. This has to be provided by rheostats in the power house, as described in the article referred to above, as it would scarcely be practicable to take it up by train brake application.

The three-phase system, which has had some vogue abroad, has made its claim to favor on the basis of its natural or inherent regenerating ability. When one thinks of regeneration this system instinctively comes to mind. But the thinking usually stops there because the imagination immediately conjures up a picture of networks of overhead, entangled wires, at the entrance to some familiar freight yard, for example. As a consequence, we have in this country but one lonely three-phase electrification in full commercial operation to-day, and this is so far away that very little is heard of it. In this Great Northern Cascade tunnel plant, braking qualities were considered of prime importance, but energy saving was not, as the water-power could be used for nothing but the railway and hence had little value after having served its purpose.

The next step in regeneration progress is the single-phase-three-phase electrification now rapidly approaching completion on the Norfolk & Western in West Virginia. In this three-phase power is produced in the locomotive from single-phase in the heretofore little-used phase converter. In this case, also, economical braking was considered more important than energy saving. Unofficial reports from that region indicate that the converters are doing their work in first-class fashion.

In the meantime the regenerative principle is being applied in the designs for the great Chicago, Milwaukee & St. Paul electrification, and details of the regenerative equipment are awaited with great interest. To date the d.c. series motor has not been considered a satisfactory generator although it has been so used with the magnetic brake to a limited extent. The St. Paul plan, whatever it is, will constitute the third important step in the series. To offset the additional complication of equipment, the d.c. regenerative scheme will have an advantage over the a.c. in that the motors become self-exciting generators and do not therefore depend upon the power house for excitation. A three-phase locomotive would, of course, "run away" if it were not held by the brakes if for any reason power went off the line.

These examples show conclusively that for heavy trains on steep grades regeneration is practicable. That to date it should have been used primarily for the sake of a by-product is interesting. On general principles of energy conservation it is gratifying to realize that we shall shortly have in operation three heavy electrifications, all employing different types of equipment and all regenerating energy on down grades. Some valuable data should soon be available for comparison from the regeneration standpoint.