Within the past few years have come all sorts of radical improvements in the substation. Automatic control is possibly the most spectacular, but this is only one of many; some at least were partly made neecssary by the advent of automatic control, others not. For example, there is the use of load-limiting resistance. This is a feature of automatic control, but it is useful almost anywhere. In the same category come the devices for preventing flashing at the converter commutator. And the improvements in starting qualities of converters must not be forgotten either.

But the subject is too large to permit here more than the pointing out of the high spots. The articles scattered through this issue give the details. They are worthy of careful study. They indicate that modern substation progress is something to be proud of.

The St. Paul Locomotives and Standardization

IT IS of exceptional interest to compare the locomotives which have been produced by the two electrical concerns manufacturing electric locomotives in the country, both to fit or satisfy the same general specifications and to meet the requirements of the Chicago, Milwaukee & St. Paul Railroad. How, we inquire, can we even expect standardization of design in heavy electric traction when such different machines will satisfy similar requirements and both be based on good engineering? And well may the question be asked. Here are two products, each of them a wonderful conception and accomplishment in itself. In neither of the locomotives is any really new practice present. The designing engineers state that they have followed proved theories of design in new combinations, to be sure, but not departing much from trails already blazed. Yet, on the surface and actually in many major details, the final products differ widely although each will undoubtedly prove thoroughly satisfactory in the service required. It is not unlikely, however, that time will show some weak points as well as the strong points of each type.

But does the fact that it is possible to build two admirable machines, though different, for the same service militate at all against a study of the desirability of standardization? It may be and probably is too early now to settle upon any standards in this line. We are yet in the development stage. But, if we needed an example of duplicate engineering which could be obviated if standardization were effected, this, it appears, is one. Cannot the electric railway industry study the question with a desire to find out if such standardization, not only in locomotives but in other equipment, is not desirable. Who would have said, years ago, that it would be possible to have a standard telephone transmitter and receiver which would be universally useful for communication between any two points on the earth? And yet that goal is almost reached. From the illumination field, take a leaf and with all the different reflectors and fixtures on the market, who would have thought standardization possible? And yet, the R.L.M. standard has been evolved for one field.

On the other hand, it is quite conceivable that these two locomotives are a step toward a realization of certain fundamentals of electrical locomotive design. The fact that these two companies are both producing equipment for one requirement and railway is of significance. The electric railway must look forward to the time when it has realized its every opportunity in the transportation scheme, and when it has there will be much more nearly universal use of electric locomotives and other electric motive power. There will be much interconnection of electric lines and interchange of electric equipment. Now is no time to revive any so-called "battle of systems," but is rather one of opportunity to work ahead toward the solution of the many problems in the realization of electric traction's greatest opportunities.

Should the Electric Railway Brain Workers Organize?

THE great war has produced as many topsy-turvies in our economic as in our political relations. One of the most impressive and depressive reversals is the way the intellectual worker has failed to keep pace with the cost of living in contrast to the manual worker who in some instances has actually outstripped the rise in cost. However, as generalizing on this subject is not new, it may be well to submit some truly startling figures from the monthly records of a large eastern electric railway.

Beginning with "general administration," we find that all the executive officers themselves averaged less than $14.50 per diem and their assistants less than $3.00 per diem. In the way department, all engineers, draftsmen, office employees, etc., below the rank of chief engineer and sub-division executives averaged $4.59 per diem, which princely stipend was just 3 cents more than that of the lyric, though illiterate tenors, who do their tamping, spiking, etc., in death march rather than jazz time. In the electrical department, the insiders, counting from the chief down, did a little better, but at that they were only 47 cents above the $5.40 a day averaged by the overhead linemen and similar workers. In the equipment department, we find that the men who do the planning, directing, testing and recording are stopped from enriching the alumni funds of their one-time universities because they average but $5.23 a day —just 7 cents more than is paid to the graduates of the Horny Hand Elementary School in the repair shop for their more personal researches in the nature of steel, iron, copper, oil, etc., before and after being railroaded. But our *piece de resistance* is in the transportation and traffic department. Dismissing the handful of superintendents and other higher officials with their lobster-diet pay of $7.84 a day, we note that the remaining supervisory officials, such as inspectors and dispatchers and the clerical staff, are an unlucky 13 cents a day below the $4.97 paid to the motormen and conductors.

The real inequality in the pay of brain versus brawn employees is much greater than the foregoing figures indicate. The brawn-worker is paid for an average of nine to ten hours a day. Overtime means more pay and often at a higher rate and he can't take his work home. The brain-worker's hours may nominally be less, but actually they are more for any man who likes his work, and most brain-workers are afflicted that way. Unpaid overtime whether in the office or in his home is a matter of course.

A further point to consider is that any increase in pay to the brain-workers means far less to the payroll than a like increase to the brawn-workers. On this particular property, the *intelligentia* are but 20 per cent of the total employees, even when all executives and departmental heads are included. The platform men alone constituted 57 per cent of all employees (there is no