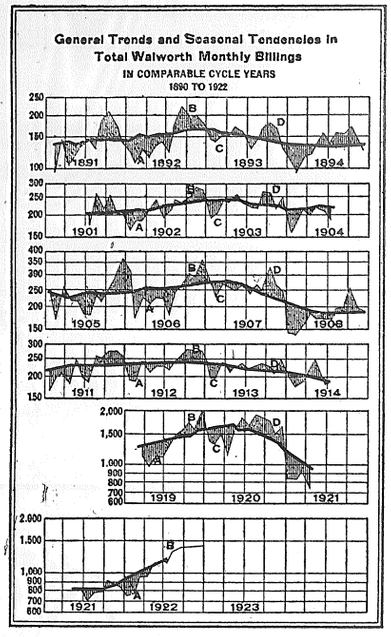

Figure 3.

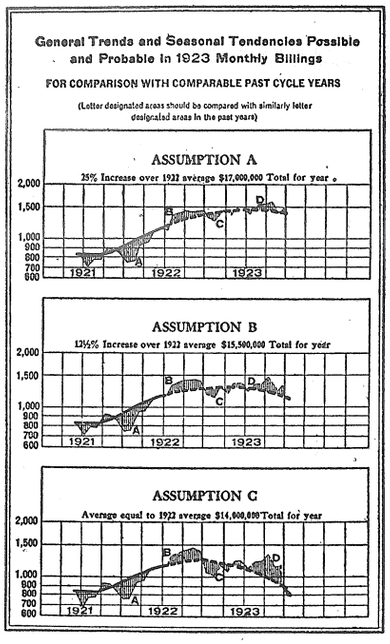

Figure 4.

not thought desirable, nor necessary, to harmonize the purely statistical assumption B with the assumption A supported by the sales department's analysis of possibilities.

By utilizing suitable break-down ratios—tempered by other considerations, each of these two larger assumptions was broken down to individual monthly amounts for each unit. To add zest to the quota, the lower figure, that is, 12½ per cent increase over 1922, was called the "dead line," because it was the amount that the company was immediately going to commit itself to, and, therefore, the amount which the sales organization *must* develop as a real demand. The larger figure was called the quota. It was the amount which the vice-president in charge of sales felt each unit really had the opportunity to attain. Of course, the margin between the dead line and quota was not for all sales units a like percentage over the unit's dead line. It was realized that in some territories, more than in others, there existed opportunity for a large dead line increase over 1922 levels, and also that certain units had greater opportunities than others with reference to attaining a quota far above their dead line. All these differences were mathematically adjusted and the final monthly sales dead line and quota figures for each unit took recognition of these differences. Figure 5 pictures the general plan as it was presented to the salesmen; many of the local managers broke their local unit dead line and quota amounts down to dead line and quota amounts for each salesman.

Coincident with the establishment of the annual sales program, the meaning of the dollar figures was calculated in terms of tonnage requirements upon the producing unit, and facilities were checked up against the requirements. Since this paper is primarily concerned with the current and continuous forecasting and the consequent adjustment of inventory and production, we shall pass over at once the many interesting by-products of such an annual forecast. Before leaving the subject of the sales quota, however, it will be interesting to note that the local units were considerably stimulated month by month, through the publication in the sales department house organ of the monthly sales performance chart. This monthly sales chart was followed with great interest throughout the year and its form is exhibited in Figure 6, fictitiously posted as if for the month of May. This general style of quota and its form of presentation is unchanged in 1924. The upper hollow bar is the year-to-date quota; the short vertical line toward the right of the hollow bar represents the location of the year-to-date dead line. The lower bar of the pair, that is, the black bar, represents the per cent of year's quota actually attained for the year-to-date.

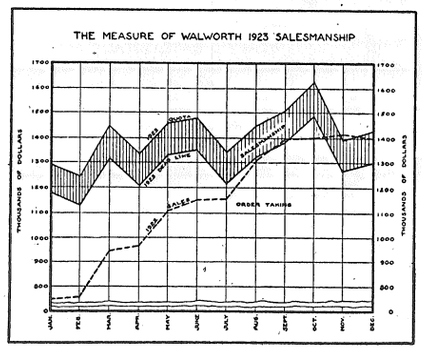

Figure 5.

We shall now dismiss further consideration of these earlier statistical methods, carried out with a staff force of three persons, which largely emphasized the analysis of billings in dollars, in order to consider the more advanced steps taken during 1923 to improve the statistical methods and to analize more definitely the real demand as we find it expressed in orders received, in terms of tonnage, devoid of price considerations. The sales figures which we have been discussing comprised the demand as expressed by *shipments* from all our various distributing units, but to our customers only, that is, excluding all intercompany shipments. Now we are to switch our thought, not only to tons, as contrasted with dollars, but more specifically to the tonnage demand as it falls immediately upon the works only—the producing units—regardless of source of demand—whether from our ultimate customers, who buy direct, or from our own distributing units as customers, buying from the works for their own stock.

In our discussion of works orders, we shall briefly accept the fact that we have used improved statistical analysis, closely parallelling the style of analysis followed by the Harvard Bureau of Economic Research. The chart form of Figure 7, with its explanatory matter, indicates an arrangement which has been adopted as standard for the portrayal of the analysis of customers' sales for each selling unit, of the analysis of total orders for the combined and for each individual works, of the detailed analysis of orders for each of the several major product groups, and so forth. Here the chart form is used to picture the combined works' orders, and the record shown is as of about January 10, 1924. It is observed that the upper section of Figure 7 depicts the raw figures. While these figures indicate a very evident business cycle action, there is a certain indefiniteness to the cycle swing of the curve. In the second section of the chart there is inserted, in the column covering each calendar year, the same seasonal variation curve. This seasonal curve shown against each succeeding calendar year is the average seasonal curve based on the five year post-war experience. In the third section of the chart, this automatically calculated seasonal influence has been eliminated from the raw figures of the upper chart, and the residue figures, month by month, are shown in standard units of deviation. The deviation is calculated from an assumed normal. In the particular chart shown, the normal had been arbitrarily selected as the average of 1919-1922.

At this point it may be stated that this same chart style has been used in the analysis of some groups for which there is a "long-time growth" increase of appreciable magnitude even in such a short period. From the raw figures for any one of such groups, the straight line of long-time growth has been calculated by an accepted automatic statistical formula and the deviations (of the seasonally corrected figures) have been measured in standard units above or below the calculated slope of the normal growth line. Even in such cases, in the third section of the chart,