

to some shorter method or economy which had not previously been observed, and in just such accidental manner have many of the short cuts and economies which are now in general use, been observed and taken advantage of.

Having diagramed and determined the general procedure for performing the several operations of manufacture, the engineer should, with the assistance of the manufacturer and his superintendents, lay down the machinery in a manner to insure continuous progression in one direction as nearly as possible with the minimum amount of handling from process to process. This being accomplished all that remains is to design buildings to house the machinery as laid down, embodying, of course, to the fullest extent possible, the essential features previously cited. Without such preliminary planning it is extremely doubtful if the full advantage of modern work-shop design will be attained.

Of course, it may be contended that this is all very well in the case of designing new shops, but that it would be entirely different in the matter of carrying out extension to works presently in operation. The plan, however, holds good in either case.

In contemplating extensions to existing works, manufacturers very properly fear and try to guard against the consequent interruption to business. Extreme conservatism in this respect has sometimes led to the construction of a new and practically independent shop or factory, with the result that establishments may be found operating several departments or shops performing practically the same class of work, at, of course, greatly increased cost of operation, not only in the handling of goods between departments, but in the general management and supervision. More superintendence, foremen, labouring help, power, supplies, etc. being usually required than if the departments were concentrated under one roof. Therefore, in considering a re-arrangement and extension of works, it should be assumed that the existing buildings contain practically no machinery and that the proposition is to arrange therein the most economical and efficient plant possible of the increased capacity called for. The plan when completed is compared with the existing arrangement and modified until a plan is finally determined upon that may be carried out with the least possible interruption to the existing works, and which when ultimately completed, will be modern and up-to-date in most respects, and economical to operate. The remodelling can then be commenced, carried out from time to time and the old plant will gradually evolve into a modern works of increased capacity without any serious manufacturing or financial inconvenience.

In connection with the construction of shop or factory buildings, there is a prevalent but mistaken idea with many builders that