

three or four stories in height, containing the same total floor area, for the reason that the foundations and roofings are more expensive per square foot of floor surface, against which, however, the walling is much less. Its possibilities of extension in any direction are limited only by the boundaries of the property. And it is also contended that for certain classes of work a structure of this design presents exceptional manufacturing advantages, in which event the initial cost of the structure is only of secondary importance.

The following features are, however, of the greatest importance in work-shop designing:—Good light, good air, steady power, efficiently distributed, solid foundations for buildings and machines, comfortable temperature, smooth floors, with adequate facilities for handling the stock from process to process, and the machines so arranged that the several operations from commencement to completion shall be in almost continual progression in one direction. It may be contended that such arrangement of machines is a detail of manufacturing convenience or economy. Such, however, is hardly the case, for the object of modern work shop design is undoubtedly to obtain the maximum production in the least time at a minimum cost, and the advantages of a modern work shop building may be frequently almost entirely lost owing to unnecessary handling of the product in the course of manufacture. And the designer may not necessarily be at fault, since he may not have had an opportunity of becoming familiar with the several processes of manufacture, or may have had only a very indifferent understanding of what was expected to be accomplished. For, to many manufacturers, the idea that any outsider could give any useful information respecting the machinery in their works, or suggest how to arrange the plant to handle the product in process to best advantage would seem preposterous.

Nevertheless the full advantage of the modern work-shop can only be obtained when the whole process of manufacturing is carried out in detail from beginning to end and the shops designed to house the arrangement as laid down. The mill engineer should be engaged long before it is proposed to commence building operations. He should be given, or placed in a position to obtain, the fullest particulars of what is being done and the manner in which it is done, and what it is further contemplated to do. From his natural ignorance of the business it becomes necessary that he diagram and work out every operation in detail to thoroughly understand it. In so doing he will, in all probability, notice features that may not possibly have received more than passing consideration in the past. And his asking an apparently absurd question has no doubt on more than one occasion indirectly attracted the manufacturer's attention