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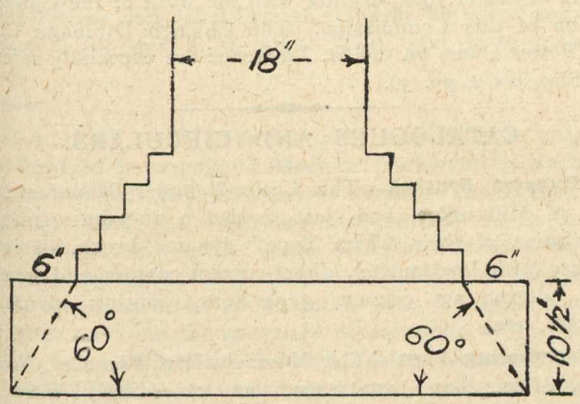
CONCRETE FOR FOUNDATIONS OF BUILDINGS AND MACHINERY.*

Spread foundations of concrete are necessary only when the soil is deficient in bearing power, and where a saving would be effected by using it rather than offsetting the base of the brick wall to the required width for safe bearing.

The composition of the concrete depends upon the conditions of the work. For heavy walls and foundations the cement used should be heavy and slow-setting; that is, having a setting period of from two to five hours. A suitable mixture would be 1:3:6, employing as aggregate broken stone, brick, clinker or gravel up to 1½-inch mesh.

Considerable care in placing the concrete is necessary for the best results. If the trench is to be deep, the mass should be deposited through a chute, since dumping from a height of ten feet or more causes the aggregate to settle to the bottom, or gives rise to possible disintegration of the mass already placed, if it be in the process of setting. It is preferable to place the concrete in layers of about one foot thickness, lightly ramming each layer, but for long foundations a step of a foot may be made at intervals of ten or fifteen yards, so that the filling may go on in two or more places at the same time.



The dimensions of the foundations are governed by the character of the soil built upon. They generally extend laterally a distance of about six inches on each side beyond the lowest course of brick footings, because this is the allowance made in excavations for the bricklayer to get at his work properly. The depth of the concrete should be such that its projection is just sufficient as a cantilever to withstand the bending moment produced by the upward pressure of the soil. This is obtained by proportioning it as in Fig. 1, where the width having been previously determined, an angle of 60 degrees from the horizontal is drawn from the outer edge of the brick footings to cut the width. A rule which is generally sufficiently accurate is to make the depth 1½ times the projection.

In the concrete foundations of machinery subject to vibration or shock, it is necessary to provide a large mass in order to absorb the energy thus liberated with diminished movement. Where there is any grinding effect accompanying the revolutions of the machine, as, for example, in the case of emery grinders, the foundation requires to be divided into two parts: the lower or true foundation will be an ordinary bed of concrete; then a layer of cork, india rubber or felt may be interposed to deaden the transmission of sound, and upon that the mass of concrete is placed that may be necessary to absorb the vibrations and give stability to the machine.

C. R. Y.

* Abstract of article in April-June number of "Public Works," by Henry Adams, M.Inst.C.E.

BOOK REVIEWS.

Books reviewed in these columns may be secured from Vannevar & Company, 438 Yonge Street, Toronto, Ont.

Modern Machine Shop Construction, Equipment, and Management.—By Oscar E. Perrigo, M.E. New York: The Norman W. Henley Publishing Co. Cloth; size, 7 x 10; pp. 328; over 200 illustrations. Price, $5.

To quote from the preface: "The aim and object of the author in publishing this book is to produce a work suitable for the practical and every-day use of the architects who design, the manufacturers who build, the engineers who plan and equip, the superintendents who organize and direct; and for the information of every stockholder, director, officer, accountant, clerk, superintendent, foreman, and workman of the modern machine shop and manufacturing plant of industrial America." The first part of this book takes up the design and construction of manufacturing plants in general, and the author lays stress on one point that is often neglected, viz., the great question of future extension. We have seen too many plants started without consideration of their future needs, and as a result we find them in a few years struggling with their shops and yards crowded and no possible chance of extending their plants. To illustrate the contentions of the author, the general discussion is followed with a detail design of a model plant suitable for the manufacture of machine tools. These works include machine shop, foundry, forge shop, power plant, and pattern shop, besides the necessary adjuncts, such as works office, draughting-room, tool-room, store-room, etc. The only criticisms that can be made of the general layout are that the foundry is put to one side of the machine shop instead of being directly in line with it so as to decrease the cost of transportation of castings, and that the offices and draughting-room are directly connected with the shops, and are thus subject to all the noise and vibration due to the travelling cranes, etc. Except for these defects the plant is compact and at the same time capable of considerable extension, though at a sacrifice of valuable yard storage. The arrangements of the tools and the methods of shop transportation are such as to insure low costs of operation. For the design of the individual buildings two types are discussed, viz., steel frame and wooden mill construction. No mention is made of the use of reinforced concrete, although this type of construction is often used for buildings of this class. While the general design is good, the same cannot be said of some of the details. This, however, may be excused, as detail design is a study in itself, and cannot be expected in a book treating the subject of shop construction in a broad and general sense. The subject of lighting, heating, and ventilation is discussed, and attention called to the importance of placing the windows so as to give a uniform light to all parts of the shop. Power and power transmission is taken up, and the relative merits of the system of transmission by line shafts and those by driving by individual motors are compared, though the question is not discussed as fully as we think its importance would warrant. The second part of this book is devoted to machine shop equipment, and contains some very good diagrams, showing floor plans and layout of machinery in all the branches of the model plant. Each department is considered in detail, and, although very few illustrations of actual machines are given, the general plans show the method of grouping each set of tools so that they may be used to the best advantage. One chapter is devoted to cars and trackwork for shop and yard transportation, and contains some very useful hints. The arrangement of offices, draughting-room, and tool-room is also shown, and attention is called to the importance of having a place for everything and everything in its place. The third part is on shop management, and starts with a general discussion of the organi-