of grain pressures under all working conditions should be obtained to permit of the intelligent design of bins of different materials or increased diameter and depth. Notwithstanding that the modern elevator system had its inception, and has reached its highest development in America, there is no record of any systematic series of tests having been made on this continent, with a view of obtaining a definite knowledge of the pressures produced by grain in deep bins. In fact, there is ample evidence that some who have undertaken the design and construction of bins for the storage of grain, coal, or other granular substances have been entirely lacking in knowledge of this subject; and there have been very few of even those engineers making a specialty of grain elevator or coal bin construction who could calculate with any degree of confidence the pressures produced by granular materials in bins having a breadth and depth varying to any considerable extent from standard size or constructed of different materials.

The author does not, however, wish to convey the impression that all grain elevator designers have been entirely groping in the dark on this subject, nor does he claim to have had a superior knowledge of grain pressures over other experienced elevator engineers, before undertaking the extensive and systematic series of tests which form the chief subject of this paper.

It has been well understood by experienced grain elevator engineers that grain stored in bins of standard dimensions (12 to 14 ft. square and 60 to 70 ft. deep), produced comparatively small vertical and lateral pressures, and that much the greater part of the grain load in the bin is carried by the walls and only a small part on the bin bottom, and that this is due to the friction between the grain and the bin walls.

Very few, if any, have, however, realized to what extent this was governed by ratio of breadth to depth of bin, and the ratio of the horizontal area of the grain column to the bin walls; and therefore to what extent the vertical and lateral pressures are increased, due to increase of horizontal dimensions of the bin.

This lack of data by which to calculate the pressures and strength of grain storage bins of varying dimensions and materials of construction, has been greatly felt by experienced grain elevator designers who have fully realized the importance of an ample factor of safety combined with economy of construction. It has, therefore, been rather surprising to find that some designers instead of conducting a series of tests to obtain the pressures produced by grain, which would enable them to intelligently proceed with their designs for bins of any dimensions, have built experimental tanks or bins at large expense, from which they gain very little practical information, since some parts of the construction when loaded may be strained far beyond its safe strength, and the weaknesses only be developed by time, while other parts may be of unnecessary strength. This may be called the "fit and try process," on which the wooden grain bin was originally developed and which was no doubt necessary in ancient times, but should now give place to modern engineering methods.

With an accurate knowledge of the pressures produced by grain and the necessary experience to enable the data to be intelligently used, and with the present knowledge of the strength of different materials of construction, there is no reason why a grain elevator may not be designed and built with the same regard to safety and economy as any other engineering work. It must, however, be borne in mind that while engineers may keep up with the times, their clients do not always do so, and that a structure actually built and in use, even if it has many weaknesses of which he is not aware, will often be selected by the prospective owner in preference to the most carefully prepared designs based on accurate data.

Most of the experienced elevator designers, knowing the very heavy loads that have to be carried in grain elevators or storage structures, have hesitated to depart from the standard sizes of bins. Unfortunately the demand for cheap storage and low insurance rates, has brought men into the field without either engineering knowledge or grain elevator experience, who have undertaken the design and construction of storage tanks apparently built by pure guess work, or at best, on some indefinite percentage of water pressure, with the result that in most cases serious weaknesses have developed and in others total failure and serious losses have occurred. This has frequently been the fault of the prospective elevator owner to whom low first cost of construction is often the chief and sometimes apparently the only consideration.

(To be continued.)

—The Hamilton Tool and Optical Co., Hamilton, Ont., has been increasing its staff and putting in new special tools for fine punch and die work. Caliper gauges and graduated scales are among the new lines being made by this company.

—Among the papers read before the Engineers' Club of Toronto during the past month was one on "Military Engineering," by Prof. W. R. Lang, of Toronto University. An instructive topical discussion, led by E. R. Clarke, of the Canada Foundry Co., took place on pumping machinery.

—Experiments with Signor Perego's system of telephoning over telegraph wires have been carried out at Milan, Italy, over a distance of about two hundred and forty-five miles. In spite of the fact that four telegraph stations were working on the same line, messages were heard clearly at either end of the wire.

—Among the papers read before the Engineering Society of the School of Practical Science, Toronto, last month was one by Willis Chipman, C.E., on "Sewage Disposal," and one by A. G. Christie, of the Westinghouse Co., of Pittsburg, on the steam turbine. Mr. Christie's paper was read by Mr. Dunlop, of the Hamilton branch of the Westinghouse Co.

—We have received enquiries regarding the new motor reported in last issue to have been invented by a man named Thornley, of Burton-on-Trent, Eng. In these days of remarkable achievements one must keep an open mind as to new inventions, but we share our correspondent's skepticism as to the claims made for this motor until more definite information is forthcoming.

The George B. Meadows Wire, Iron and Brass Works Co., Toronto, have issued a booklet on baby's wire cots, which they justly think reflects credit on the printer's art in Canada. Those who read the booklet will also think the booklet reflects equal credit on the compiler, who is apparently a good father as well as a good writer.

John S. Fielding, M.E.,and C.E., has returned to Toronto to resume practice as consulting engineer at No. 20 King St. East. Mr. Fielding is well known in Ontario, having been prominent in the construction of bridges, piers, breakwaters, etc., and has had extensive experience in recent years with the Carnegie Steel Co., at Pittsburg, Pa., and also at Sydney, C.B., where he spent three and one-half years as one of the designing engineers of the steel plant there.

Hon. Charles A. Parsons, the inventor of the steam turbine bearing his name, has applied for an extension of time within which he must manufacture in this country to save his Canadian patent. In his application he states that a steam vessel fitted with turbine machinery of about 3,000-h.p. is being constructed on the Tyne in England to ply on Lake Ontario and other inland waters this coming summer. It has been found impracticable as yet to equip and start a factory in Canada for the manufacture of turbine machinery, which is practically a new art, but arrangements are on now with the view of manufacturing on a commercial scale in this country.