(7) Calculations of stresses in structures and graphic methods.

(8) Dynamics.

(9) General principles applicable to various forms of prime movers.

(10) Instruction in the selection of types and testing of prime movers and machinery, with information as to the limitations of same.

(11) Transmission of power.

No attempt should be made to teach drawing; this can be better done in the office, and, in my opinion, it is unnecessary to teach the students mere manual dexterity with machine tools. The various processes which can be carried out by different types of tools and the limitations to which they are subject should be fully described and illustrated by the instructors in the laboratory, or by visits to works, but it is not imperative that the student should learn to use the machines himself.

Surveying and levelling can be better taught after leaving the university, provided the student has been instructed in the construction, use and adjustment of the principal instruments which he will have at his command and the theoretical basis on which various types of surveys are founded.

As an illustration of the sort of training required it is much more important that the student should have been instructed in the general capabilities of different types of prime movers and their application under various circumstances than that he should be able to appreciate the intricacies and the niceties of a special valve-gear, however ingenious and interesting it may be.

So far as is known, there is no university or technical school curriculum which covers the ground suggested above, and if there were it would be quite impossible to do justice to it in two years without modifying the usual time-table. On the other hand, two years is as much time as should be allotted to the theoretical part of the training, provided that it is supplemented subsequently by evening work. The addition of a third year to the practical training would be, in my opinion, of far more value than a third year at the university, even if that year were properly utilized. Under the system advocated it is contended that as much useful information could be acquired in two years as is now obtained in three years. The system proposed is a radical change which would upset the whole holiday arrangements of existing universities. It is probable that the number of students would not justify the establishment of many civil engineering courses such as those outlined, but if three or four could be equipped at the Universities of, say, London, Birmingham, Manchester and Leeds, so that the students could share the corporate and social life of those universities, they would be more likely to succeed than would separate engineering schools such as the late Cooper's-hill establishment.

Articles Period

After taking the two years' university course, the student should be articled for a period of three years to a civil engineer in practice, who should be a corporate member of the Institution of Civil Engineers. The first two years of this period should be chiefly devoted to drawing-office work, interspersed with visits to works in progress and practical field work, with qualified assistants on surveys and levelling. Draughtsmanship is of the greatest importance and can best be acquired in an office. It is the groundwork of the designing part of the work, and is essential to the first step after completion of articles—*viz.*, that of obtaining a footing in an office as a paid assistant. The better a man can draw and express his own and other people's ideas on paper, the better the work the pupil will be entrusted with, and the more he is likely to come in touch with his principal. During his first two years the pupil should make himself familiar with all drawings and work going on in the office and should occupy his spare time in making tracings for himself of standard drawings. Such tracings are the best means of impressing on his memory the details of construction, and would form also a valuable fund of information for reference in future years. He should also accumulate a collection of reports, specifications, tenders and bills of quantities, and in the latter should fill in the prices from two or three actual tenders. The more of these he has the better, and the greater amount of labor he puts into them in copying and filling in prices the more complete his knowledge will be.

The third year should be devoted more to out-door work, and the pupil, who should now be able to make surveys or take levels, would be entrusted with this class of work. While a pupil, he should also be sent out for short periods as assistant to a resident engineer or clerk of works. This would enable him to acquire practical knowledge of the quality of materials and workmanship, setting out, measuring up, the management of men, methods of timbering excavations, dealing with water, lifting heavy weights, testing engines and machinery, and other details of actual construction.

During the whole of the three years he should in the winter months devote at least two nights per week to attendance at continuation classes, if possible at the university at which he took his two years' course, or, failing this, at some good technical institute or school. At the end of his third year (say at the age of twenty-two) the embryo engineer should be able to earn a salary sufficient to keep him. He will have his foot firmly placed upon the first rung of the ladder, and it will depend upon himself and the way in which he takes advantage of his opportunities how far and how fast he will go in his profession.

His final step in training will be to take the second part of his associate membership examination of the Institution of Civil Engineers at the age of twenty-three or twenty-four. This examination should, in the writer's opinion, be of a more practical character than the present examination and should be partly *viva-voce* and accompanied by tests in the use of surveying instruments, engine-indicator, etc., and an exhibition of drawnigs, made by the candidate, of works on which he has been engaged.

Specialization

Turning now to the more specialized subject of the training of water engineers, it is submitted that the school—and college—training previously described should be the course followed by those intending to take up water engineering, and the main point to be considered is the period in the training at which specialization should commence. The author suggests that it is most desirable that an intending water engineer should commence to specialize immediately after he has finished his university course. He should become articled to a member of the Institution of Civil Engineers who either holds a public appointment as engineer to a waterworks undertaking, or one who, if in consulting practice, is mainly engaged in the design and construction of works of water supply. Of the two, probably the best general result would be obtained if the intending engineer were articled to an engineer holding an official position as a waterworks engineer. This would give greater insight into distribution and management of waterworks, but should, if possible,