is good compared with the average present practice, but is it good compared with the standard which should be set up in this age when we hear so much about conservation? Should we complacently accept a loss of 25 per cent. as inevitable, And if this loss cannot reasonably be much reduced in the systems already constructed, what about the possibility of better methods of construction in the pipe to be laid in the future? It is, of course, out of the question to consider the relaying of present systems or to do more than make leakage surveys and check the larger losses, but in the light of present knowledge, is it not time to undertake seriously an analysis of the causes responsible for the present large percentage of water unaccounted for? If these losses are chargeable to underregistration of meters, then this should be definitely made known, and consideration given to the possibility of developing more sensitive or more accurate measuring apparatus.

Are we taking sufficient care in testing pipe for watertightness when laid? About 60 per cent. of those replying to a recent circular of the Committee on Leakage of the New England Waterworks Association state that the pipe is tested when laid, and all but six make the test before backfilling. In the writer's experience, testing before backfilling in the ordinary work of laying distribution systems is rare, and it is undoubtedly from the practice of simply turning on the water without any test that a considerable part of the present leakage develops. The standard of those who test, as indicated by the replies received, is "absolute tightness," but in the writer's experience this result is not easy to obtain, and only possible where the joints are gone over several times after the pressure is applied.

Where pipes are backfilled before testing, the allowable leakage, as determined by such test, has varied greatly in different specifications. John H. Gregory, at Columbus, made the limit 500 gallons per inch-mile per day. At Akron 200 gallons per inch-mile per day was specified, while actual results at Akron showed about 70 gallons per inch-mile per day. E. G. Bradbury, in his paper before the Association in 1914, proposed 100 gallons per inch-mile per day as a reasonable standard for the allowable leakage in testing after backfilling, and he figured that the difference between 500 and 100 gallons per inch-mile per day, estimating the cost of the water at $25 per million gallons, would equal a yearly cost of $5,256 for water lost in a city of 100,000 people, or, in other words, the city could afford to spend $470 per mile in order to save 400 gallons of leakage per inch-mile per day.

Again, are the present jointing methods the best qualified to maintain tightness after periods of use? Who knows anything about the comparative leakage when laid and after several years? In this latter connection the history of the work at Grandview, Ohio, is of interest. As reported by Mr. Bradbury, the supply is measured by a tested meter and all service pipes are metered. The 5.5 miles of pipe originally laid were tested before backfilling and the leakage before any connections were made amounted to .31 gallon per inch-mile per day, or, in other words, the system was practically watertight. Subsequently 0.9 miles of additional mains were laid, and gradually in the four years since the date of original construction the services have increased to the present number of 205. Either by less careful work in the extension or by depreciation of the original work, or by under-registration of the gradually increasing number of meters, the unaccounted-for water has increased until at the present time it averages about 150 gallons per inch-mile per day. An interesting feature in connection with these records is that the unaccounted-for water, based on three years' observations, averages 60 gallons per inch-mile per day during the six months from October to April, and 213 gallons during the six months from April to October. In other words, the records indicate in this system that the unaccounted-for water is three times as great during the summer as during the winter months. Whether some local explanation can be found for this result, or whether it is a reasonable result of temperature changes, is not known, but data from other systems showing the unaccounted-for water during periods of varying temperature would be of considerable interest.

SPECIFIC SPEED DIAGRAM FOR HYDRAULIC TURBINES.

The simple alignment diagram reproduced in the accompanying figure has been devised by C. D. Babcock, of Troy, N.Y., for finding the specific speeds of hydraulic turbines. It is believed to be smaller and handier than the older diagrams in use by turbine designers. The

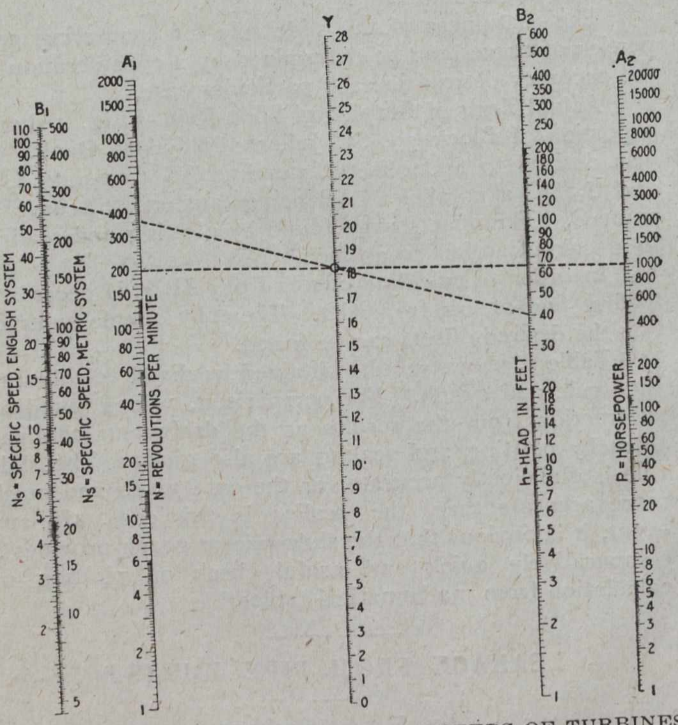

DIAGRAM FOR FINDING SPECIFIC SPEEDS OF TURBINES

results are read in either English or metric units directly from the diagram, without computation.

The use of the diagram is nearly self-explanatory; a point is found on the Y-axis, or centre line, where intersects a straight line connecting the given values of horse-power and speed, A_1 and A_2 axes; this intersection point is joined to the given value of head, B_2 axis, and the line projected cuts the specific-speed line, B_1 axis, at the desired value.

The volume of coal traffic at four principal Atlantic seaports has been investigated by the United States Geological Survey. The figures are approximate only and give the totals in net tons for the year 1915. New York leads with 27,000,000 tons; Hampton Roads comes next with about 16,000,000 tons; then Philadelphia with something over 13,000,000 tons, these figures not including the bituminous coal consumed in Philadelphia itself. The total receipts at Baltimore were about 7,600,000 tons.