sin 3 min.  $\times$  60 ft. = .00087  $\times$  60 = .05 ft. or about .64 in., a point midway on chord is then .64  $\times$   $\frac{1}{2}$  = .32 in. from tangent. The point N, centre of chord is distant from tangent sin (3  $\times$   $\frac{1}{4}$ ) min.  $\times$  30 ft. = .00022  $\times$  30 ft. = .08 in. The ordinate of the whole chord between B.S. and M is .32 in. — .08 in. = .24 in., or about a quarter of an inch.

The average foreman, thinking of it as a curve gives it an ordinate of perhaps ¾-in., thus throwing the point N actually across the tangent and causing a quite visible kink. It is suggested that the difficulty could be obviated either by



breaking up the first chord into two of thirty feet, or by showing the foreman that the first ordinate is only  $\frac{1}{4}$ -in., less than half that of a 1° curve for a shorter chord of fifty feet.

This problem is equally true for the first chords of curves up to about 3° after which a slightly greater ordinate must be allowed,  $\frac{1}{2}$  in. for the 4°,  $\frac{3}{4}$  in. for the 5°, 1 in. for the 6°, and so on.

Yours sincerely,

A. C.Oxley.

## Height of Arc Lights.

Sir,—I am supervising the installation of an electric light plant, including the wiring of the streets of the town. The consulting electric engineer specified that certain of the arc lights, on the streets should be placed centrally over the poles and in a hood; others hung from brackets, but he has not specified the height the lights shall be above the streets. I would like to know what is the best height to hang these lights so as to avoid the shadow under the light as much as possible.

Yours, Junior.

## Concrete Specifications.

Sir,-The specification for concrete in our work under construction read:-

A mixture of one part cement, three parts sand, and five parts broken stone or gravel, is to be used. Proportions by measure.

This appears to me a very loose specification, and although I am not myself prepared to improve on it, yet I feel sure there must be a better way of defining the proportions in the mixture. Perhaps some engineer engaged on larger works under other specifications will give his experience.

December 5th, 1907.

December 20th, 1907.

Yours, Associate.

## AUTOMATIC BOILER CLEANER.

This is an improved mechanical device, patent granted to Herbert J. Varlow of Stratford, Ont., Canada. A spherical receptacle is located on or near the top of the boiler. The design of this receptacle differs from any other now in use, having an inner hemispherical shell, suspended within the spherical receptacle, with a pipe leading from the surface of the water in the boiler to the top of the receptacle. Attached to this pipe is a skimmer, the position of which is self-adjusting to the variation of water in the boiler, this being an im-



portant point. Before the scale forming deposits have time to gain sufficient density to sink and adhere to the tubes and shell of the boiler they are collected and carried by the circulation to the receptacle where separation takes place, the deposits fall to the bottom and are drawn off as desired. The water then is carried back to the boiler by another pipe thereby promoting a perfect circulation and equal expansion throughout the entire boiler, which undoubtedly increases the steaming capacity and reduces the fuel consumption.



The apparatus is automatic in action, commencing to operate when the steam pressure in boiler reaches 10 lbs. Many of these cleaners are in active service and giving entire satisfaction. It can be attached to all kinds of boilers, and is especially adapted to those of the locomtive type.

The two great advantages of this device are: first, they are economical and add to the life of a boiler and also save much labour on the part of engineers and firemen.

Mr. Varlow is now in the east with the idea of completing arrangements looking for the manufacture and sale of his invention in this part of Canada.