Notes and Queries.

Kindly write queries on separate sheets when writing about other matters, such as patents, subscriptions, books, etc. This will facilitate answering your questions. Be sure and give full name and address on every sheet.

Full hints to correspondents were printed at the head of this column in the issue of March 13th or will be sent by mail on request.

(12096) H. E. asks: We have cast life-size statues in Keene cement, and wish to treat same with paint or gilt. Our experience is that the sweating of the cement will loosen the paint within a short time and same will fall off. Can you advise us how to prevent it, or how long it will take to season the Keene cement statues so that the paint will remain on same? A. Cement may be painted with any kind of paint without "sweating" it off, if the condition is right. The older the cement is, the better: it should be a year old before painting, but may be less. Paint the cement first with water glass (silicate of soda and potash dissolved in water), after two coats of which, if the surface is thoroughly *washed,* it will begin to have a glassy appearance, and one more coat should render it quite impermeable, so that it will take any kind of paint or enamel.

(12097) L. E. D. asks: Will you kindly let me know what are the principal objections for railroads not using steel ties, and if there is a railroad in Mexico using them, and how rails are fastened to the ties? If you have a copy of the SCIENTIFIC AMERICAN that will let me know please forward at once. A. The reason for the comparatively small use of metal railroad ties in this country is apparently that in tests made by several of the leading railways over a period of ten years or more prior to 1890, the results unanimously showed that the increase in life and wearing qualities of metal ties was not sufficient to compensate for their higher cost. We are satisfied that a repetition of these tests would reverse this decision, taking into consideration the increasing scarcity of suitable timber, improved method of manufacture of steel ties, and especially the great improvement in roadbed conditions on American railways in recent years. The previous failure of metal ties seems to have been largely due to deficient roadbed. In Europe, where the density of population is so much higher in proportion to the mileage of railway, and where consequently the larger available capital for the building and maintenance of permanent way produced roadbeds with which our railways have only recently begun to compare, metal ties have been successfully and economically used. Metal ties are in use there, still in good condition, which have been in continuous use for upward of twenty-five years, their longer life much more than compensating for their high first cost as compared with wood. Rails are attached to metal ties in a variety of ways, an essential feature seeming to be an elastic pad between rail and tie to prevent crystallization of the latter by vibration. We can send you our issue, No. 1, Vol. 99, describing the use of steel ties, and have a number of others on wood preservation, which has also militated against the introduction of steel ties. Price, 10 cents each.

(12098) W. L. B. writes: The citizens of this city are trying to get drainage for the lands lying west of the city. Can you assist us in arriving at a solution of the problem by answering the following question: How much water per hour will a concrete ditch dispose of or carry away that is 5,330 feet long, 24 feet wide at the top, 12 feet wide in the bottom, and 6 feet deep? The elevation of the water level of the highest lake is 16 feet above the one to be drained into. A. The quantity of water discharged by such a ditch as you describe is figured by the formula $Q = av$, in which Q = quantity in cubic feet per second, a = cross-sectional area of channel, and v = velocity in feet per second. In your case $a = 12 \text{ feet} \times 6 \text{ feet} + \frac{12 \text{ ft} \times 6 \text{ ft.}}{2}$ = 109 square feet $\therefore Q = 109v$. The velocity is figured by the formula $v = c\sqrt{rs}$, in which c is the coefficient of friction between the water and the material of the channel (which has to be determined by experiment), r = the mean hydraulic depth or radius, and s = the slope, or the sine of the angle of the slope. In your case $s = 16$ feet (the difference between the levels of entry and discharge of the ditch) ÷ 5,330 feet (the length of the ditch) = 0.00303 nearly, and $\sqrt{s} = 0.055048$; r, the mean hydraulic depth, is the sectional area ÷ the wet perimeter, in your case $\frac{109}{8.48+12+8.48}$ (supposing the ditch to be running full) or $\frac{109}{29}$ nearly, and $\sqrt{r} = 1.936$. C will be about 142, taking n, the coefficient of roughness, as 0.013 for fairly rough concrete. (For very smooth concrete, higher in cement and well laid, n might be as low as 0.011, in which case C would be nearly 170, and the quantity of water discharged would be greater, but we take the lower figure to be on the safe side.) Substituting these values in the formula $v = C\sqrt{rs}$ we have $v = 142\ (1.936 \times 0.055) = 15.05$ feet per second, and $Q = 109 \times 15.05 = 1{,}640.45$ cubic feet per second, which the ditch is capable of discharging when running full.

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PATENTS

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Hame fastener, H. H. Deming ... 923,955
Hammer, electric power, W. Scribner ... 924,195
Hammer, pneumatic, H. A. Brockway ... 924,531
Hand bag, L. Merzbach ... 924,172
Harrow, F. Hosford ... 923,845