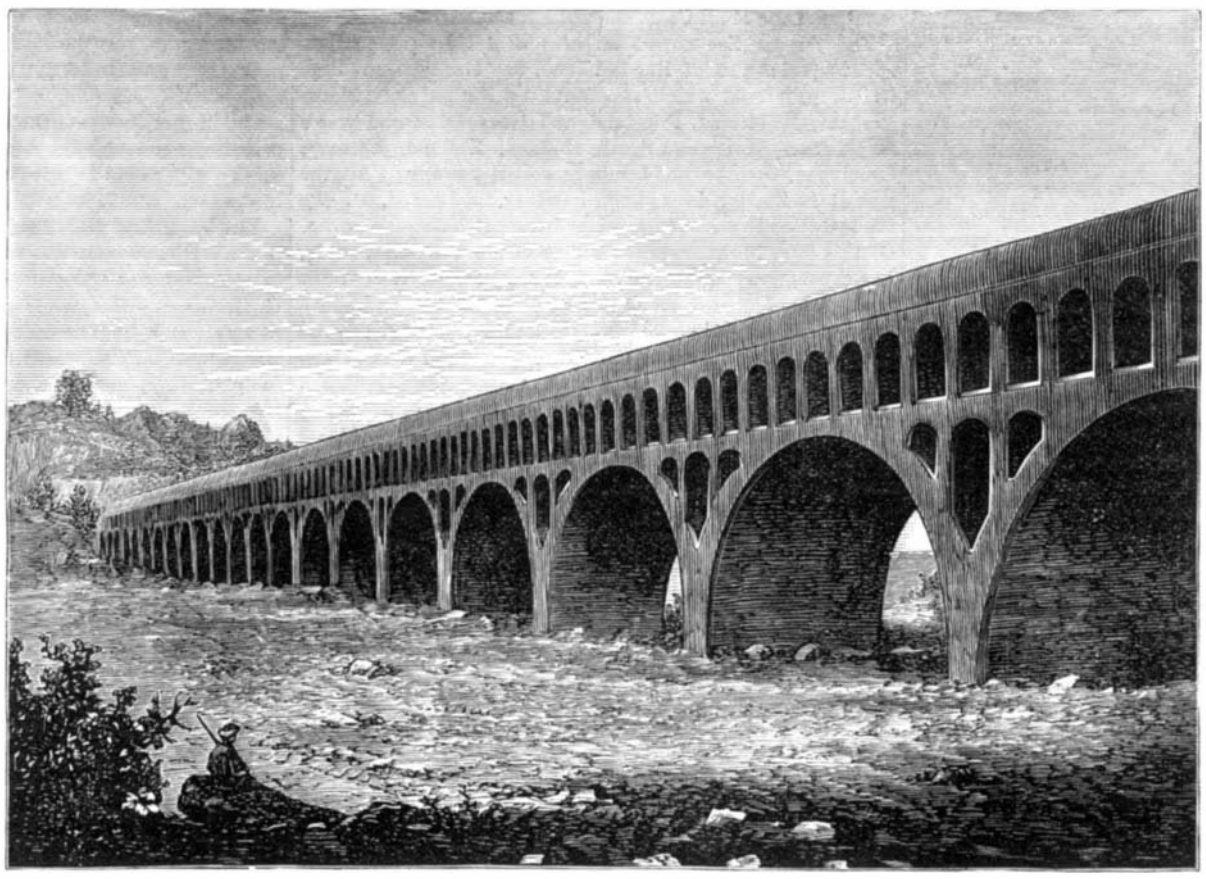
THE AQUEDUCT OF LA VANNE.

An aqueduct, one hundred and thirty-five miles long, which is nearly, throughout its whole length, one solid mass of stone, a colossal monolith, may well be considered one of the engineering marvels of the century. Such is the great aqueduct which, toward the close of the late French Empire, was constructed to bring into Paris, from the Departments *de l'Aube* and *de l' Yonne*, the pure water of the La Vanne River. The greatest difficulties met with in building the structure were found in crossing the forest of Fontainebleau, a distance of thirty-seven miles, entirely destitute of good building material, and cut up by immense hills of almost impalpable quicksand. To this section the *béton Coignet* construction, afterward continued through nearly the whole work, was begun. As shown in the engraving, the Fontainebleau section is composed of a series of arches, some of them as much as fifty feet in hight. Eight or ten bridges of large span (from 75 to 90 feet) are also included, all made of solid masses of *béton Coignet*. The composition of this concrete was: For foundation and gravel walls, sand and gravel equal parts, 5; hydraulic lime 1, Portland cement ¼, parts. For pillars, abutments, etc., sand, and in some cases gravel, 4, and hydraulic lime 1, parts. The other portions were made from sand 4, hydraulic lime 1, Portland cement from ¼ to ½ parts. This concrete, properly dampened, was combined in a mill of especial construction, and agglomerated at once in molds at the spots needed.



AQUEDUCT OF LA VANNE, FRANCE.

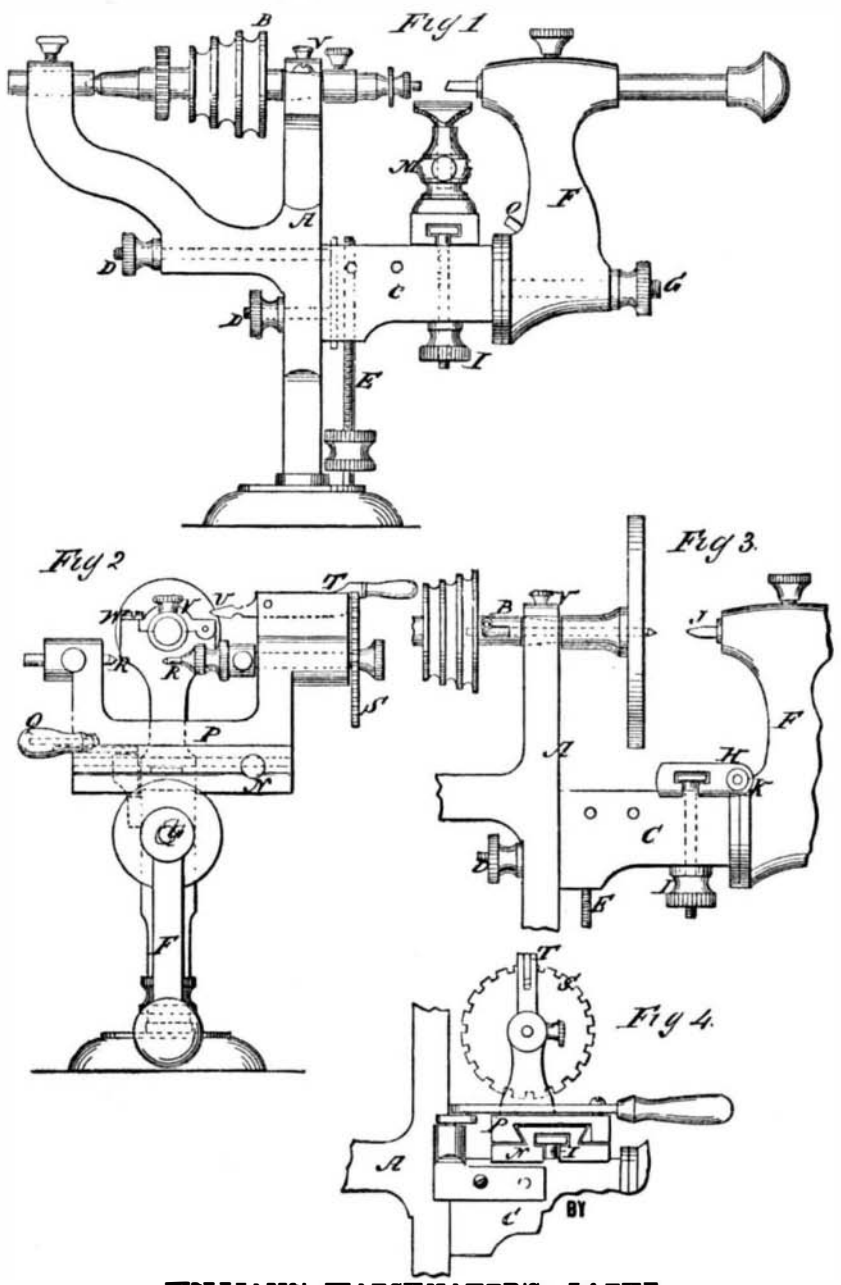
IMPROVED WATCHMAKER'S LATHE.

In the improved watchmaker's lathe, illustrated in the accompanying engraving, the novel features consist of an adjustable bed, the hight of which, in relation to the centers, may be varied to suit different kinds of work, an adjusting tail stock, and an attachment for cutting gear wheels and pinions. Figs. 1 and 3 are side elevations of the lathe adjusted for turning; in Figs. 2 and 4 an end and a side elevation are shown, exhibiting the adjustment for gear cutting.

The stationary part, A, of the lathe carries the live spindle, B, and supports the bed, C, which is clamped to it by T-headed bolts, D, so as to be raised and lowered by the adjusting screw, E. The tail stock, F, is pivoted to the end of the bed by the clamp bolt, G, so that it may be turned down out of the way, as in Fig. 2, when not required for use. When said stock is in working position, a block, H, is screwed on the bed in order to adjust the center, J, in line with the live center, through the screw, K, on said block acting against the stud, L. The screw, I, also secures the tool rest, M, and the bed, N, for the slide, P, which carries the gear-cutting center, R, to be worked backward and forward to feed the blank to the cutter. Said slide is operated by the hand lever, Q. The template, S, is fastened by a lever latch, T, working into notches in the edge. There is a pointer, U, to gage the gear-holding centers to the rotary cutter in setting the bed, N, and slide, P.

The cap, V, for holding the live spindle in the bearing of the head stock, is hinged to the stock and fastened with a single screw, W, to facilitate the changing of the mandrels, two or more of the latter with different centers or attachments being employed for different kinds of work.

Patent pending through the Scientific American Patent Agency. For further information address the inventor, Mr. Daniel M. Williams, Calvert, Robertson county, Tex.



WILLIAMS' WATCHMAKER'S LATHE.

Comparative Cost of Gas and Candle Light.

Eight star candles give as great a quantity of light as a gas burner consuming 5 to 6 feet per hour. The cost of 5 feet of gas, at prices charged in Louisville, Ky., is 1·35 cents. That of the candles is 3·2. Therefore, to produce the same quantity of light in a parlor, the gas is cheaper than candles. But counting in another way, candle light is greatly cheaper than gas. Thus a candle placed on a table, one foot from a book, gives twice as much light to the reader as a gas light placed four feet above the book. By this comparison it will be seen that the candle costs only four tenths of a cent per hour, while the gas costs 1 35 cents. The rule in calculating the strength of light is that it decreases as the square of the distance.

A pound of star candles costs 16½ cents and burns 42 hours, giving a soft, pleasant light, and, at 17 inches from an object, gives a light equal to a gas burner 4 feet from the object, consuming 5 feet per hour. The calculations are as follows: The square of 17 inches is two feet. The square of 4 feet is 16 feet. That is to say, the quantity of light from gas must be in the proportion of 16 to 2, or of 8 to 1, to make the gas and candle light equal at the distances given above. From which it appears that, for reading and many other uses, candle light of the same power costs only one third as much as gas.

STAINS inside of wine decanters can be removed by putting in a handful of chopped raw potato, with some warm water, and shaking briskly.

Novel Use of Apomorphia.

Ed. T. Robinson, M. D., says: The report of the following case may be interesting to your readers, so far, at least as it suggests the value of the comparatively new remedy apomorphia, in a class of cases in which I have not heard of its having been used. On the 30th of November, 1875, I was called to see a little boy, three years old, who had, two hours previously, accidentally swallowed a biconvex lens-shaped tin whistle. I found it lodged near the cardiac terminus of the œsophagus. The little fellow was suffering considerable pain, writhing his body when he attempted the act of deglutition, which act seemed irresistible every few seconds. A small quantity of bread and water was given him to ascertain whether the œsophagus might be completely occluded. He rejected it almost immediately, with no admixture of the stomach contents. I then administered hypodermically in his arm $\frac{1}{12}$ of a grain of apomorphia. In three minutes, by the watch, the emetic quality of the drug was manifested by pallor. He was then placed on a bed, flat on his belly, when, after three or four violent attempts, he in one heave emptied entirely the stomach, the whistle taking the lead, and ringing, as it fell in the basin, producing a most agreeable sound to the ears of the anxious mother, who before had but little faith in my expedient. The whistle measured $1\frac{3}{16}$ inches in diameter. The child, when seen an hour later, was bright and running about as well as ever.—*Medical Record.*

The Total Solar Eclipse of September 17-18, 1876.

The track of totality in this eclipse is wholly upon the Pacific Ocean, and in such course that only two or three small islands or reefs appear to be situated near the central line. Using the *Nautical Almanac* elements, which are almost identical with those of the American *Ephemeris*, wherein the moon's place is derived from Peirce's *Tables*, St. Matthias Island, west of Admiralty Islands off the northeast coast of New Guinea, is traversed by the central track of the shadow, with the sun at an altitude of 5° at 6h. 16m. A.M on the 18th, local time. Thence, skirting Ellice Islands, it passes between the Fijis and the Samoan or Navigator group to Savage Island, in 170° west of Greenwich, latitude 90° south, which is apparently the only spot where totality may be witnessed under anything like favorable conditions, and even here the duration of totality is less than one minute. The after course of the central line does not encounter any land.

In the northern of the two large islands of the Fiji group (Vanua Levu) 169° east, a partial eclipse will occur, commencing at 7h. 47m. A.M., 44° from the sun's north point towards the west, for direct image, and ending at 10h 16m., magnitude 0·86. In the larger island of the Navigator group, Savaii of the Admiralty Chart, there will also be a partial eclipse, though nearly approaching totality; eclipse begins 8h. 23m. A.M. at 53° from the sun's north point towards the west, and ends at 11h. 2m., magnitude 0·97.

Assuming the north point of Savage Island to be in 169° 48′ W., with 18° 55′ south latitude, a direct calculation gives a total eclipse commencing at 10h. 8m. 6s. A.M. local mean time, and continuing 57 seconds with the sun at an altitude of 58°; the first contact of the moon with the sun's limb at 8h. 48m. A. M , 49° from his north point towards west for direct image; and the end of the eclipse at 11h. 29m.

In New Zealand the eclipse attains a magnitude of about 0·5 at Auckland, greatest phase at 9h. 18m. A.M.; towards the extremity of the southern island about Otago, one third of the sun's diameter will be obscured about 9h. 12m. local time. A partial eclipse between similar limits will be visible on the east coast of Australia and in Van Diemen's Land.—*Nature.*

ACCORDING to experiments by M. Rudorff, on cold produced by solution of 20 different salts, the two which give the greatest lowering of temperature were sulphuretted cyanide of ammonium and sulphuretted cyanide of potassium: 105 parts of the former dissolved in 100 parts water, produce a lowering of temperature of 31·2°; and 180 parts of the latter, in 100 parts of water, as much as 34·5°.

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