THE AUSTIN, TEXAS, DAM.

There is being built across the Colorado River at Austin, the capital of the State of Texas, a massive granite dam, the object of which is to furnish the city with water works and electric light, and to also furnish manufacturing enterprises with cheap water power. This wonderful structure is being built by the citizens of Austin, who at a public election voted to bond the city in the sum of $1,400,000 for this purpose. The dam is 1,200 feet in length, and 60 feet high. It is 16 feet thick at the top, increasing downward and spreading out in a broad toe or apron, making its extreme width at the bottom 50 feet. The body of the dam is of limestone rock. The upstream face, down stream face, and toe are being made of granite. The capping will also be made of granite in as large blocks as can be handled, worked to regular shape. The entire work is being laid in hydraulic cement. The structure is being built to allow a depth of 16 feet of water on its crest, and the abutments on either end will go to that height. At one end of the dam the natural rock goes far above this. The other end is occupied by an artificial bulkhead, called the gate house, containing the sluices for drawing off the water. The wheels will be some two or three hundred yards from the dam, and the canal, which is being excavated in rock, will also be that length. The function of the gatehouse at the entrance to the canal is to enable the water to be shut out in case of repairs, and to prevent an overflow in time of floods. The water will be drawn from the penstocks through iron pipes, pass the wheels, fall into the wheel pits, and be discharged through underground races into the river. There will be three water wheels, forty-five inches in diameter, each capable of giving 600 horse power on a head of 60 feet. The dam is situated two miles above the city and will create a lake twenty-five miles long and from one-half to one-quarter of a mile in width. Mr. J. R. Frizzell is the chief engineer of this great work and T. J. Fanning consulting engineer. During the flood season the amount of water that will flow over this dam, it is estimated, will be 200,000 to 250,000 cubic feet per second, which is nearly equal to the volume at Niagara Falls, to wit, 275,000 cubic feet per second.

Our illustrations were made from photographs, for which and the above particulars we are indebted to Mr. W. W. Wilson.

In a report upon the work to the Austin board, made last year by Consulting Engineer Fanning, he recommended a modification of the profile of the dam, and remarks as follows:

"Not for its length alone, or its great area of flowage, is the dam remarkable, for in France we observe three longer masonry dams, at Buzey, Chazilla, and Gros Bois, 1,545, 1,759, and 1,805 feet respectively, and in Wales the Vyrnwy dam, 1,350 feet long, the latter being for the storage reservoir of the Liverpool water supply. Not in height alone, for in France there are three dams, in Spain two, in Belgium one, and in the State of California one masonry dam exceeding 150 feet in height. There are fourteen other notable masonry dams having heights exceeding 100 feet.

"But none of these dams are upon great rivers, and very few of them have any water pass over their crest. On the other hand, the Austin dam stands in the channel of the Colorado River, where it has 40,000 square miles of watershed, and will have floods of 200,000 to 250,000 cubic feet of water per second to pass from its crest to its toe. Your citizens will appreciate your responsibility when they learn that no dam in existence has to pass a volume of water, in flood, even approximating this, through so great a height. Limestone and sandstone yield rapidly to the eroding force of falling water. The evidences of this are abundant in the canyon of the Niagara River below Niagara Falls; of the canyon of the Genesee River below Genesee Falls; of the Mississippi River below St. Anthony Falls; and here, of the Colorado River across Travis Co., as well as in the channels of numerous streams that flow down each of the Rocky Mountain slopes. Such evidences admonish us that this great flood must not be permitted to have sheer fall through so great a height and act with a destructive force such as has heretofore created canyons, but it must be made to glide down the slope of the dam and not be permitted to exert the force due to its velocity except at such distance below the dam that the foundations will not be endangered.

"The profile of the dam shown to me seemed not to fulfill the required conditions for passing the floods, because of the slightly rounded or nearly angular form at the front of its crest. The diagram accompanying shows an advised modification of the profile of the upper part of the dam, which is better adapted to pass the flood in a gliding sheet down the face of the dam, and to deliver it to the lower level without a direct blow, and so that its velocity will be expended chiefly in a horizontal direction in the backwater below the dam, and in eddies at a safe distance below the toe of the dam. The lower part of the down stream face of the dam has a curve of 31 feet radius, to which low water surface is tangent. The central part of this face has a batter of 4·5 inches to the foot. The new profile at the top part, as suggested, completes the down stream face and crest of the dam with a curve of 20 feet radius, to which both the front batter and the surface of the pond at a level of the crest are both tangent, this curve ending on the crest at 5 feet from the upper angle of the crest. The upper angle of the crest is then rounded off with a smaller curve, and the entire front of the dam becomes a reversed curve of ogee form, the form of dam best of all adapted to pass a large volume of water through so great a height. The top curve conforms nearly to the theoretical form of a medium flood stream. At higher flood stages there will be a tendency to vacuum under the curved stream immediately after it has passed the crest, which, together with the pressure of the atmosphere upon the top of the stream, will keep the full flood stream in close contact with the curved face of the dam, and cause even the highest flood to glide down the fall without shock upon the face of the dam or the soft rock foundation."

At the Rate of Ninety Miles an Hour.

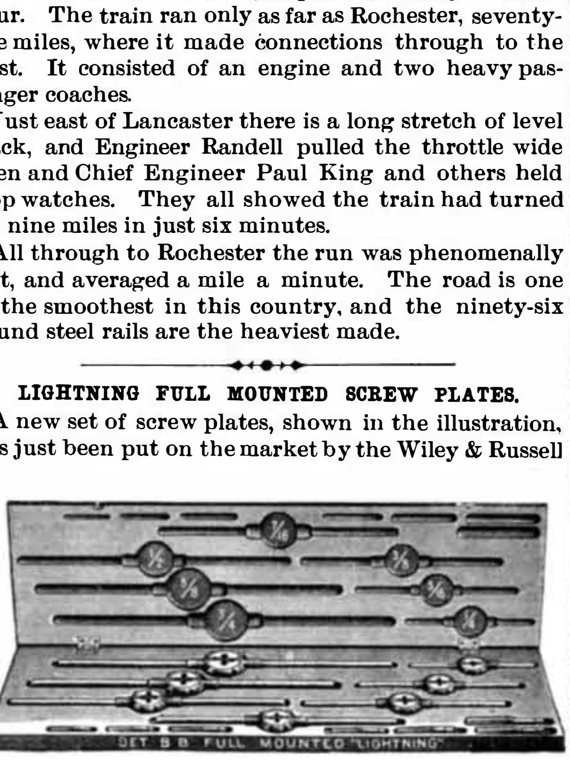
On September 1 the first train out from Buffalo on the Philadelphia and Reading road, according to watches held by the road's chief engineer and newspaper men and guests, made the phenomenal run of nine miles in six minutes, a speed of ninety miles an hour. The train ran only as far as Rochester, seventy-one miles, where it made connections through to the East. It consisted of an engine and two heavy passenger coaches.

Just east of Lancaster there is a long stretch of level track, and Engineer Randell pulled the throttle wide open and Chief Engineer Paul King and others held stop watches. They all showed the train had turned off nine miles in just six minutes.

All through to Rochester the run was phenomenally fast, and averaged a mile a minute. The road is one of the smoothest in this country, and the ninety-six pound steel rails are the heaviest made.

LIGHTNING FULL MOUNTED SCREW PLATES.

A new set of screw plates, shown in the illustration, has just been put on the market by the Wiley & Russell



LIGHTNING FULL MOUNTED SCREW PLATES.

Manufacturing Co., of Greenfield, Mass. These new plates have a stock of suitable size and weight for each die. The time and trouble of fitting and changing the dies each time is saved, and several sizes can be in use at the same. Each die may remain undisturbed in its place, ready for use until worn out in service, when another may be substituted, the stock remaining good.

Softening Water.

According to the *Dyer and Calico Printer*, there are two satisfactory methods for this purpose in use.

In the first process, hydrated baryta is placed in a filter press, which is traversed by the water to be purified, and produces an effluent showing only one or two degrees of hardness. Hydrated baryta, which is now largely used in sugar refining, and is easy to procure, precipitates all the bases, lime, magnesia, etc., as well as the sulphuric and carbonic acids, so that the carbonates and sulphates of lime and magnesia, which are the most harmful substances, are precipitated by one treatment.

According to the other process, hydrated oxide of lead is employed instead of baryta, and precipitates the carbonates, sulphates, and chlorides. It is necessary to obtain the hydrated oxide of lead cheaply, and the following method has been devised for this purpose:

A solution of sodium nitrate is placed in a vat, divided into two compartments by a diaphragm. Lead electrodes of large surface are placed in a solution, and a current from a dynamo is then passed through. The sodium nitrate is decomposed, caustic soda being formed in the negative compartment, and nitric acid at the positive pole, from which it dissolves a certain quantity of lead, forming lead nitrate. When the current has passed through the liquid for a certain time, the solutions are run from the two compartments into a second vat, and there mixed by means of an agitator. The soda precipitates hydrated oxide of lead, and itself forms sodium nitrate; the solution is then filtered, and the nitrate solution again submitted to electrolysis. When the baryta or lead oxide is used up, it is replaced by freshly prepared oxides. It is stated that the use of the filter press can be avoided by employing plumbate of sodium (a solution of lead oxide in caustic soda). The precipitate is simply allowed to settle out, and the water obtained shows a hardness of about two or three degrees.

Taffy Candy.

To four pounds of white sugar add one quart of water, place over a clear fire, stir till the sugar is dissolved, and boil it to the "crack;" when the sugar is at the "ball" add half a pound of good, sweet butter, cut in pieces, stir until the butter is melted and thoroughly incorporated in it. Flavor with extract of vanilla or lemon, and, when cooked to the "crack," pour it upon a buttered marble slab, and, when cool enough, cut it into squares or tablets.

CREAM TAFFY.

Another very fine and rich taffy is made by boiling the sugar with milk, or part water and part cream, instead of all water, using granulated sugar, and flavoring highly with extract of vanilla or lemon, the proportions of ingredients being the same as the foregoing recipe. These taffies may be flavored with chocolate, coffee, ginger, rose, or any fruit juice, and may also be made of maple or light brown sugar, according to the taste of the maker. The original "taffy," or "toffie," is of English origin, and was invented by a lady of the little town of Everton. The lady sent a sample of it to the Queen at Windsor, who immediately adopted it as the confection best suited for the royal nursery. This soon becoming known, all the ladies of the land immediately wanted it for a similar purpose, and the lady inventor was overwhelmed with orders for it, and soon acquired a handsome competence from its sale. Taffy remains to this day the most popular English confection. The manner of its preparation is as follows: Put half a pound of the best of sweet, fresh butter into a bright, clean copper pan, place it upon a moderate fire, and, as soon as melted, add and stir in with a wooden spatula two pounds of brown sugar, flavor it with the grated yellow rind of a fresh lemon and a pinch or two of powdered ginger, stir all constantly, but gently, until it is boiled to the "crack," then pour it upon a buttered marble slab, and, when sufficiently cool, cut it into squares, diamonds, or tablets. Four ounces of sweet almonds, blanched, and cut into fillets, and then thoroughly dried in the stove or oven, may be added to the above, thus forming a very delicious kind of nougat.

BUTTER SCOTCH

is simply brown sugar and butter melted together, flavored with extract of lemon, cooked to the "crack," and finished as taffy.

TO PREVENT CANDIES FROM BECOMING STICKY.

All boiled candies are liable to become sticky if exposed to the action of the air. They should be kept in closely covered jars or boxes. The best plan, however, that we know of to prevent candies, such as taffies, peanut bar, walnut bar, clear candies, nougat, and all similar goods, from becoming sticky, which is caused by their absorbing the moisture of the atmosphere, is that which we have always adopted when we desired to keep such articles for any length of time, and one that has always proved satisfactory: When the candies are first made, and cut into bars or pieces, varnish or cover each bar or article by means of a soft brush with a thin alcoholic solution of gum benzoin. Varnish them all over with this preparation and let them dry; this forms a thin, impervious skin on them, which effectually prevents the air from acting on the candies, besides it gives them a fine gloss. Benzoin has a fragrant odor with very little taste, and is easily pulverized; it is a stimulant and expectorant, and is sometimes used in pectoral affections. This varnish may be made in advance and kept in a closely covered jar or bottle, for use at any time. It is also an excellent varnish for glossing chocolate creams, etc.—*Confectioners' Journal.*

Galvano Plating with Iron and Nickel.

Mr. Capelle, the French chemist, recommends, according to *L'Industrie*, the following solutions for plating with iron and nickel: Solution 1st, for iron.—Take equal parts of pure sulphate of iron and of the sulphate of iron and ammonia, to which is added 1 in 1,000 of sulphate of magnesia. The solution should have a strength of 18° to 20° B. Solution 2d, for nickel.—To a solution of sulphate of nickel and ammonia, 2 per cent of sulphate of magnesia and 2 per cent of boric acid are added, and the solution is then neutralized with carbonate of magnesia. The bath should have a strength of 8° to 10° B.

Discovery of Another Satellite of Jupiter.

The Lick Observatory announces that Prof. Barnard has added a fifth satellite to the four satellites of Jupiter discovered by Galileo on January 7, 1610. It was discovered by Barnard on September 9. Its period is about 12 hours and 36 minutes. Its distance from the planet center is about 112,400 miles. It was observed by him on September 10, 20 hours 53 minutes and 20 seconds Greenwich mean time. Its magnitude is the thirteenth.