

several fragments of such have been found in the Seine, and M. Perrault has also discovered a number in a Neolithic deposit in Burgundy. This gentleman found, in addition, a pot ladle. "The table spoons," says he, "are elongated and exactly resemble the wooden spoons in use in our kitchens. Their bowls vary from 3 to 14 mm. in depth." The portions of handles which he collected were too fragmentary to allow it to be determined whether or not they terminated in a flattened handle like the modern forms.

It might be pertinent to inquire to what possible use a spoon could have been put in the Reindeer Age, when raw meat was eaten, and when skin bottles were the only water vessels. Yet a genuine spoon made of reindeer's horn has been discovered in the Grotto of Gourdan. It is oval, very long, and quite shallow. Its handle is very elegant, being covered with engraved figures. Unfortunately it is broken so that it is impossible to say whether the handle was flattened. The slight depth of the spoon should not surprise us, for the men who made it knew neither soups nor sauces, and they could only have used it for the purpose of extracting the marrow from the long bones of large animals, or for eating the brains of the latter, and for such uses depth of bowl was of small consequence. M. Piette has likewise found other well characterized spoons in deposits of the Reindeer Age. One of these, more delicate, narrower, deeper, and less elegant than the one just mentioned, was found in one of the lowermost strata. At a still greater depth in the same deposit he came across a thick rudely made spoon, which appeared never to have had any handle. It was made of rough dressed bone, with polished edges, and its shape was oval. Before the invention of such an implement as a spoon, man of the Reindeer Age employed the spatula; and this is found at all depths in the Gourdan and Lortet deposits. M. Garrigan discovered in the Grotto of Alliat a fragment of reindeer's horn hollowed out in its whole length, and apparently designed for holding liquids; and similar utensils were found by M. Piette at Gourdan. These, however, were probably only temporarily used as spoons, the only genuine spoons which have been discovered being those described above, and which served as models for Neolithic man who afterwards appeared on the scene.

The Hudson River Tunnel.

The *Engineering News* says that in consequence of certain newspaper reports of a sensational style going the rounds, it has obtained the following information regarding the progress thus far made in the construction of the Hudson River Tunnel which is reliable.

A shaft 30 feet in diameter has been sunk in Jersey City, 80 feet west of the Hudson River, to a depth of 55 feet below mean high water.

A horizontal air lock has been placed in position, penetrating the side of the shaft, and the necessary machinery for compressing air has been provided and is now in good working order.

To ascertain as early as possible the effect of the air on the mud, the experiment was tried of driving a heading from the shaft, instead of commencing the tunnel in an open cut. The opening was made 25 feet below high water, the roof consisting of mud 10 feet in depth, underlying loose ash filling 18 feet in depth, the size of the excavation being 15 feet x 6 feet x 4 feet, and the air pressure applied amounting to 12 lb. per square inch. This pressure was kept on four days, during which time no air escaped through the mud. At the end of the second day, the surface of the mud which had been exposed to the air pressure became dry and began to crumble and crack open in places, and at the end of the fourth day these cracks had extended sufficiently through the mud to allow the air to commence to escape. Thereupon, the sides and roof of the opening began to give way, and twelve hours later the whole had fallen in.

The loose filling above was then removed to a depth of 9 feet below high water, the bottom of the trench covered with canvas and timber and the loose filling replaced. A new heading is now being driven in such a manner as not to allow any given surface of the mud to be exposed to air pressure for more than twenty-four hours.

Patent Bills Before Congress.

In alluding to the bills before Congress for changing the patent laws, to which we referred a few weeks ago, the *Milling World* in referring to Mr. Converse's bill, concludes that it appears to meet every possible requirement of those opposed to the granting of patents; but is it not a little singular, the editor adds, that such legislation should be attempted in face of the fact that the United States owes its remarkable growth and prosperity to the genius and skill of its inventors, more than to any other source? Take away the incentive (fortune and fame) from our inventors, and we shall soon lose them. It is a mistake to think an inventor can be nothing else than an inventor, and whether protected or not, that he will still invent. He is actuated by the same desires and aspirations as other men; he invents because in that way he thinks he can more quickly realize a competency (how often he fails is, alas! too well known); and the attempt at this time to wrest from him all protection should be frowned down by all who have the real interests of the country at heart. That certain modifications of our patent system can be judiciously made, with advantage alike to the inventor and the public, is no doubt true; but the *Milling World* would suggest the advisability of having such modi-

fications presented by gentlemen of sufficient intellectual caliber to dispassionately consider the interests of both parties.

ON THE CRYSTALLIZATION OF CANADA BALSAM.

BY GEO. M. HOPKINS.

On reading Professor Barker's interesting paper on the crystallization of Canada balsam I was reminded of having observed a similar phenomenon long since. I did not then attribute it to crystallization, nor do I now think the beau-

Fig. 1.



tiful arborescent forms are anything more than cohesion figures. There is before me at this moment an achromatic objective, the two lenses of which were separated some months ago by first warming them and then introducing between their edges the point of a knife; as the lenses began to separate the arborescent forms appeared, and were so like the forms shown in Fig. 1 (a reprint of Professor Barker's engraving) as to be at once recognized as the same thing. I have again separated the lenses, only partly, however, and there are figures having precisely the same characteristics as those shown in the cut.

This experiment may be readily repeated with two pieces of plate glass pressed together with an interposed film of Canada balsam. By separating the plates with a thin edge instrument the adhesion of the two surfaces is overcome, the balsam recedes, and air enters. Now this, I think, is precisely what happened to the objective referred to in Professor Barker's article. It was exposed to the action of the elements for three years, it probably became wet, then frozen. Some of the water entering between the edges of the flint and crown lenses, on freezing separated them, producing the arborescent forms. Upon the thawing of the ice the lenses approached each other, and in so doing inclosed a small quantity of air in the balsam. The next freezing separated the lenses and expanded the air spaces, giving them the beautiful forms shown in the engraving.

Of course it is not known how many times the lenses were separated and allowed to come together in the manner described; it is probable that the balsam after a time dried around the air spaces and thus fixed the arborescent forms.

I cannot leave this interesting subject without referring to a lantern slide, to which I applied this principle, and which forms one of the most beautiful objects that can be projected

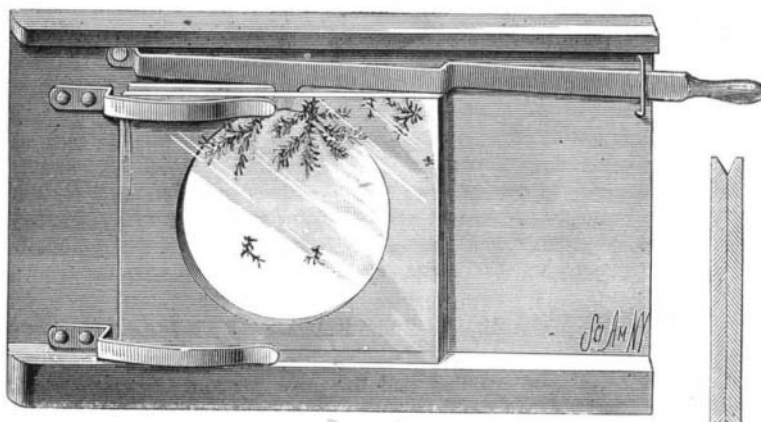


Fig. 2.—LANTERN SLIDE FOR PROJECTING ARBORESCENT FORMS.

on a screen. Fig. 2 shows this device. The slide, which is fitted to the lantern, has a circular aperture for the passage of light, and is provided with two springs for holding two pieces of plate glass cemented together with Canada balsam.

The upper and inner corners of the glass are beveled up to within a short distance of the ends, forming a groove or trough for the reception of an aqueous solution of some of the aniline colors. A lever carrying a pointed knife for separating the glasses is pivoted in the upper portion of the slide. At the ends of the glasses the two adjoining edges are beveled—as shown in the small detail view—to receive a portion of the surplus balsam pressed from between the glasses. This extra balsam prevents the entrance of air from the ends of the glasses.

The groove formed between the upper edges of the glasses being freed from balsam is filled by means of a pipette with a strong aqueous solution of one of the more brilliant aniline colors, and the slide is placed in the lantern. Now, by gradually pressing down the lever, the glasses are separated by the entrance of the knife between their edges. The arborescent forms grow downward in the slide, and the aniline color fills them, while upon the screen huge ferns and cacti grow up with great rapidity. Any of the brighter aniline colors will answer and look beautiful; but green seems the most appropriate, as the exquisite forms that appear on the screen resemble leaves and vegetation more than anything else.

Without the application of color the balsam yields images on the screen which closely resemble richly embossed white satin, the form of the figures being substantially like those shown in the engravings. Any viscous liquid will exhibit this phenomenon, but the balsam gives the best results.

What the New York Fair Should Be.

Discussing the favorable prospects for a World's Fair in this city in 1883, the *Tribune* makes a good point in saying that there should be no striving after mere magnitude, but rather an effort to compress the Exhibition into an area of moderate proportions by excluding advertising shows and crude and commonplace articles. The world is weary of colossal displays of objects that may be seen in the shop windows of every town. For a time it was curious to see what each nation produced, without regard to the quality and inherent merit of the articles themselves; but it got all the information it wanted in that direction at Vienna and Philadelphia and twice at Paris, and now it only cares to see the things that are most useful and most beautiful. Let us therefore have an Exhibition in New York that will surpass all its predecessors for real attractiveness and will not appal visitors by its enormous size. Let every square yard of its area contain something to please the eye or instruct the mind, and let the whole Fair be a condensed typical representation of the latest and best achievements of civilization.

The Mississippi River Survey.

The Mississippi River Commission report three triangulation parties, one topographical party, three observation parties, and one boring party in the field at work. These parties comprise a total working force of about 200 men, of whom about 20 are assistant engineers. The triangulation has covered a length of 125 miles between Cairo and Memphis. The topography has reached a little below Tiptonville, nearly ninety miles below Cairo. One of the observation parties is stationed at Fulton, Tenn.; another at Lake Providence, and another at Carrollton. The boring party is below Memphis at work.

NEW INVENTIONS.

Mr. Adelbert O. Müller, of Fremont, Neb., has patented a bushing that will protect the bung hole against charring during the operation of pitching the barrel, and which is also adapted to be tightened up as the stave shrinks, and thus prevent leakage. It consists in making the bushing in two parts, with an internal and external screw thread, to adapt them to be screwed together. The two parts are provided with flanges, which bear against the stave around the bung hole.

Mr. Henry Hartman, of Fort Douglas, Utah Territory, has patented an improvement in carbine holders, which consists of a metal spring clasp having straps attached thereto in such manner as to adapt them for attachment to the saddle.

An improvement in fan attachments has been patented by Mr. Walter M. Vestal, of Marcella Falls, Tenn. The object of this invention is to construct and arrange rods and levers by which motion can be given to a number of fans suspended over a table or elsewhere, for driving away flies and imparting an agreeable motion to the air.

Mr. Lemuel D. Dobbins, of Camden, N. J., has patented an improvement in apparatus for treating celluloid bases for artificial teeth. It consists of a top plate, from which the press and clamp are suspended by means of screw bolts, the plate resting on the upper edge of a cylindrical chamber. It consists in an improved press and clamp, arranged so that the clamp can be readily removed from the press for cooling.

Mr. Bernard T. Murphy, of Marengo, Iowa, has invented a durable and efficient device for hanging gates. It consists, essentially, of an adjustable roller hinge, by which the gate is attached to the gate post, and which admits of the vertical adjustment of the gate and its swinging in one direction laterally.

An improvement in tags has been patented by Mr. Clarence E. Sackett, of Garden Prairie, Ill. The invention consists in securing the wire to a tag in a novel manner, and so that it will not cut it, and so that the tag will lie flat and not turn edgewise when attached to an article.

Mr. James Robertson, of East Cambridge, Mass., has patented an improved system and apparatus for slaughtering animals for food, whereby the work may be done with great facility and economy.