RECENT INVENTIONS.

Oil Well Bailer.

Oil wells are cased low enough to shut off all water from the well, and then the water inclosed in the casing is bailed out until but a few feet remain. This water, with the reciprocating motion of the drill, causes the rock to be worked into a thin mud, which is bailed out with a bailer, then more water is again poured into the well, and the drill and bailer are operated in turn. A bailer is an iron tube from fifteen to twenty feet long, with a bail on its upper end to tie the line to, by which it is raised and lowered, it has a valve and valve seat at its lower end, and is made of light iron, to make the weight as little as possible. The valve seat, as ordinarily constructed, is a simple ring, from one to two inches deep, inserted in and riveted to the end of the tube, and when the valve gets stuck in the bottom of the well the holes tear out, and the valve is left in the well. The bailer being open at the top, if then the water in the well is of greater depth than the length of the bailer fills in from the top instead of the bottom, and ordinarily the valve is so tight that the water forces it up before it reaches the thicker fluid in the bottom, and it is not at once removed. An improved bailer, that overcomes these objections, has been patented by Mr. William H. Birge, of Franklin, Venango county, Pa., and is shown in Fig. 1 of the annexed cut. The bailer has its top nearly closed, which prevents the ingress of water. The valve seat is a short metallic tube of the same exterior diameter throughout, but its internal diameter is reduced at the bottom by an annular shoulder. The thin portion of the valve seat is of much greater portion than the shoulder portion, and is driven up into the bailer body so that their edges are flush with each other, and is secured by two or more sets of rivets, thus making a seat that cannot be torn out. The valve is of the common style, and is within the body of the bailer and fitted to close upon the body of the valve seat, and is secured on the upper end of a screw bolt that projects downward, and has at its outer end a head that is of sufficient weight to hold the valve to its seat until the head strikes the bottom of the well, when the thin mud passes in and is raised to the surface.

Combined Slate Cleaner and Pencil Holder.

A combined water receptacle and sponge holder is shown in Fig. 2. It is so constructed that it may be attached to a pencil, the object being to provide a cleanly, convenient, and inexpensive article for use in cleaning slates. The metal water receptacle is made of suitable size and form, the thimble shape being preferred. The pencil clamp is attached to or formed with the thimble, and is a short tube split lengthwise to form spring tongues, and fitted with a sliding ring, by which the tongues are clamped on the end of the pencil. A cork is fitted into the open end of the water holder tightly, and to the outer end of the cork is secured a sponge by a staple, and in the side of the water holder there is a small orifice, through which the water will escape in drops when the holder is shaken, but not otherwise. The device is very convenient as a slate cleaner, and serves as a pencil holder. The point of the pencil may be put in the clamp for protection when not in use, and the device serves to prevent the pencil from rolling off the desk. The above device has been patented by Mr. William H. Metcalf, of Brooklyn, Kings county, N. Y.

Method of Making Shoe Nails.

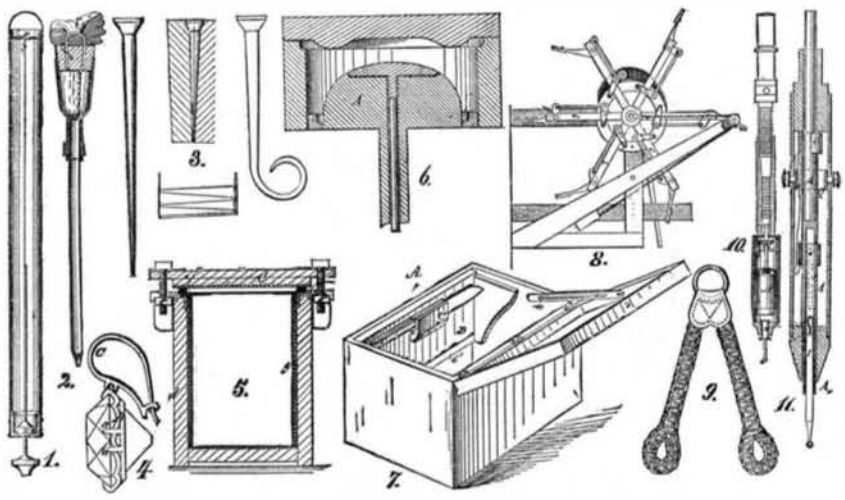
To furnish nails that will curve back in clinching, for fastening the soles of boots and shoes and that can be made lighter than nails made in the ordinary way, is the object of the recently patented invention of Mr. John Hyslop, Jr., of Abington, Plymouth county, Mass. The invention is shown in Fig. 3. The nails are cut from a strip of sheet metal, of the thickness of the points of the nails, and the width of the length of the nail. The blanks are cut of a width at the point equal to the thickness of the plate, and the head is of a width that will furnish sufficient metal to give the desired size and taper to the nail, and is pressed or upset by dies, so formed as to grasp the blank from its head to or near its point, and to give the nail a uniform taper from head to point, and they may be made with or without heads as desired. The dies are made with one-half of the tapering cavity in each die, and the blank is pressed width-ways between them, so that the width decreases while the thickness increases until the cavity is filled. The dies are adapted to be used in an ordinary nail machine. Nails, as ordinarily made, when they are driven against the iron bottom of a last, bend to one side at a right angle, and the clinch has little strength; but these nails being round, or nearly so, curve back upon themselves, forming a clinch of great strength, and the nails being made of uniform taper, will not work forward, but form a secure and reliable fastening.

New Jewelry Setting.

We find among the recent patents an ingenious setting for diamond earrings, invented by Mr. Harrison B. Smith, of New York city. The object of this invention is to obtain light appearance in the settings and to display the stones to the best advantage. The setting of the stone is a narrow ring or band, of proper size, and beveled for fitting snugly to and around the edge of the stone, and is provided with cramps on its edge, which being turned down over the edge of the stone, it is securely held. Between two of the cramps is an eye for the ear loop, the eye being level with the edge of the stone. It will be seen that with this setting the back of the stone shows as well as the front, and the stone itself is displayed to the best advantage, and the setting is subordinate to it.

Improved Butter Case.

The wooden cases in general use for packing and transporting butter are objectionable on account of the taint they impart to the contents, and because of the loss by soakage or absorption of the butter by the wood, leaving a space between the case and the butter, and exposing it to the influence of air and bad odors. An inexpensive, light, and durable package for containing and preserving butter fresh and sweet for any length of time, and in which the finest grades of butter may be put in summer and kept for winter use, has been lately patented by Mr. John K. Hamlin, of Philadelphia, Pa., and is illustrated in Fig. 5 in the annexed cut. The package consists of a wooden box of suitable size containing an inner box of sheet tin or galvanized sheet iron, that fits snugly within the box. A cast iron ring, to which the tin box is soldered, rests upon the upper edge of the box, and is formed with tips projecting upon the sides of the box, through which screws are inserted to retain it in place, and it has also formed upon it slotted lugs for securing the cover. The cover is formed of wood, and is lined with tin, and on its upper surface has strengthening cleats that project over the lugs on the box, and are slotted and carry screw bolts which, when in place, pass into nuts placed beneath the lugs of the box. The under side of the cover has a packing ring made of suitable material and covered with paraffine, that rests on the metal rim of the box. The inside of the metallic box is lined with slides of tin that are covered with paraffine, and are also faced with muslin that has been previously saturated with a solution of borax. The muslin on the slides absorbs the brine liberated during packing, and the anti-acid and antiseptic properties of the borax retard and prevent the formation of acid from which the rancidity of butter comes. A sheet of paper coated with paraffine is placed over the opening of the case, and on this the packing ring and lid are placed and screwed down tightly.



1. Birge's Oil Well Bailer.—2. Metcalf's Slate Cleaner and Pencil Holder.—3. Hyslop's Horseshoe Nail.
4. Smith's Jewelry Setting.—5. Hamlin's Butter Case.—6. Leak's Mould for Paste Boxes.
7. Fournier's Bread Box.—8. Kanne's Harvester Reel.—9. Netzger's Suspender Strap.—10. Ebi's Dental Plugger.—11. Richmond's Dental Drill.

Bread Box.

Among the recently patented inventions is a novel and convenient bread receptacle, composed of a box for holding bread and a board upon which to cut it and provided with a knife. It is the invention of Mr. Joseph Fournier, of New York city, and is shown in Fig. 7 of the annexed cut. A is the box, and B is the board upon which the loaf of bread is supported while being cut. The box is made of any suitable size and material. Inside of the box, upon the end pieces, are secured end cleats of a triangular shape, and upon the inside of the front board of the box is secured a cleat. The end cleats are at such a distance from the front side as to admit the thickness of the board, B, and the cleat on the front board is below the upper edge of the board a distance equal to the width of the board, making a secure place in which the board can be placed. To facilitate the withdrawal of the board, the ends of it are rounded so that they will not bend, as would be the case if they were left square. Upon the inner side of the board is secured a block that is adapted to receive and hold the bread knife. To the box is hinged a cover provided with a slotted metal strip, which moves on a pin secured to the inside of the end of the box, and that holds the cover from tipping too far back when it is opened, and when the cover is closed the strip moves down toward the bottom of the box so as not to interfere with the closing of the cover.

Making Porcelain and China Paste Boxes.

An invention, by which the removing of the moulding dies and mandrel from a clay mould of a porcelain or china paste box without breaking or damaging any parts of the mould is greatly facilitated, is shown in the annexed cut, and is the invention of Mr. Elias Leak, of Trenton, Mercer county, N. J. The mandrel, A, has a rounded moulding surface of the same size and shape of the cavity of the paste box that is to be made, and this mandrel is provided with a tubular handle projecting down from its bottom surface. The middle part of the rounded moulding surface of the mandrel is formed by a removable plate that fits in a recess in the rounded part of the mandrel, the rounded surface of the plate and of the mandrel being flush. A handle projects downward from the lower surface of the plate through the tubular handle of the mandrel. A ring provided with an annular groove in its upper and inner edge fits closely around the lower edge of the mandrel and is detachable from it, and the width of the ring is such that it fills the annular space between the lower edge of the mandrel and the lower edge of the outer die. When the die is placed together properly and the box is moulded, the box is removed by first removing the top die, then press the mandrel upward by the handle, and the moulded box, the mandrel, and the ring leave the outer die. Then the removable plate is pressed upward by its handle, when the moulded box will be removed from the mandrel. When the ring is removed from the neck of the box it will be found that the box is perfect.

Jointed Harvester Reel.

We give herewith an engraving which illustrates an improved jointed reel for harvesters, lately patented by Mr. Frederick F. Kanne, of Waterville, La Sueur county, Minn. *a* is the platform of a harvester, provided at its front edge with fingers and cutters of any of the well known constructions. *b* is the horizontal shaft of a reel that is journaled in a vertical reel post, secured at its lower end to the platform near its front edge and at the driver's side. The reel is unsupported by a post on the grain side of the harvester, and is provided with a central gudgeon at this end, to which a metallic hook is secured, to the upper end of which a cord is attached that extends over a pulley in the upper end of an inclined brace attached to the platform, and provided with a weight by which the end of the reel shaft is supported. At the driver's end the reel shaft is provided with a grooved cam, and the cam is provided with an eccentric hole for the passage of the reel shaft, and is also provided with a lever secured to its closed face on the driver's side, by which the driver in his seat, and while the machine is in motion, can, by raising or lowering the lever, give more or less pitch to the cam and to the joints of the reel. The reel shaft is provided with reel arms, and each arm at its outer end has attached to it by bell crank levers a slat or beater. These beaters are so connected to the cam on the reel shaft by rods and rollers that in the revolution of the reel in the usual manner the beaters will seize the uncut grain and raise it up on the platform, raising lodged grain. On windy days, when the grain leans from the platform, the reel will reach over the heads of the grain and move it back to the cutter bars. This reel will not force the grain over the platform, because the beaters are tipped by the motion of the cam and lift themselves out of the cut grain on the platform slowly and gradually.

Suspender Strap.

An ingenious and very serviceable suspender strap, patented by Augusta Netzger, of New York city, is shown in Fig. 9 of the accompanying engraving. The suspenders are provided at their lower ends with a button loop, and their upper ends are attached by a leather or other suitable fastening to a ring in the usual manner. The straps are made of knotted cords in the following manner. Two or more strands of cord are placed parallel with each other to form a core, and at their middle are surrounded by two other cords, that are knotted together every time they have passed around the strand, whereby that portion of the strap forming the loop is formed. Then the ends of the knotted strands that are in the inner part of the loop are brought together and placed parallel with each other and with the parallel strands of the loop. The strap will then be formed of six strands, but only two in the loop part, which must be more pliable than the body. When the strands have been folded as above described the remaining outer strands of the knotted cords are passed around the six strands directly above their place of uniting, and, as before, every time they pass around they are knotted, and in this way the strap is formed from the loop to the upper end of the strap. Two such straps are united and attached to the ring, as shown. The cords can be of different colors and different styles of knotting, and be very ornamental, and will be very durable.

Dental Plugger.

Mr. Edward Ebi, of Cedar Rapids, Linn county, Iowa, has patented an improved dental mallet for compressing the metals used in filling teeth. It is shown in Fig. 10 of the annexed engraving. A solid plunger is contained in a tubular casing that is provided with two longitudinal slots through which pins pass into the plunger, for the purpose of

guiding it and holding it in the casing, and a spiral spring is interposed between the top of the plunger and the top of the casing. This casing is adapted to slide in a casing, E, which is provided at its upper end with a split tube for holding it to a dental hand piece. The inner casing is connected with a small crank shaft, H, journaled in the outer casing, E, by a pivoted connecting rod. A bevel cog wheel is rigidly mounted on the shaft, H, and engages with a bevel cog wheel, mounted on the end of a shaft projecting from the upper end of the casing, E, into the rotating part of the hand piece. A short tubular piece, flanged at top and bottom, fits loosely in the aperture at the lower end of the casing, E, and serves to hold a plugger point. When the shaft of the hand piece is rotated the crank shaft, H, is also rotated, and the casing containing the plunger is reciprocated, the plunger striking the plugger holder every time it descends. If the dental engine is operated slowly, the impact will be gentle; if it is operated rapidly the blows follow each other more rapidly and the impact will be much greater.

Improvement in Dental Drills.

Mr. Cassius M. Richmond, of New York city, has recently patented an ingenious tool holder for dental engines, which is constructed in such a manner that the tools can be readily attached and detached and will be securely held when attached. The holder is clearly shown in Fig. 11 of the opposite engraving. A is a rod, one end of which is designed to be connected with the flexible shaft of a dental engine, and the other end is perforated longitudinally, and in this perforation is placed a rod, B. To the inner part of this stem is attached a cross pin whose ends project through slots in the rod, A, and are attached to a sleeve which slides freely upon this rod. The slots in the rod are made of such a length that the rod, B, can be slid outward so far that its end will project beyond the rod, A. The stem, B, is held in place, when pushed inward by a spring catch, the shoulders of which engage with the sliding sleeve on the rod, A. The spring catch is fulcrumed to the rod and its rear end rises from it, so that the catch can be disengaged from the ring, E, by pressing the rear end inward. In the end of the shank of the tool is a rabbet and a cross groove that corresponds with a similar rabbet and cross groove formed in the lower end of the rod, B, the two parts interlocking with each other and leaving their outer surfaces flush and smooth. When the tool and stem have been interlocked and pressed inward it will be impossible for the tool to become detached accidentally, and at the same time the tool will be held firmly, so that it can do good work.

Action of Aluminum upon Copper Chloride.

Even at common temperatures aluminum reacts briskly upon a solution of copper chloride. The products of the reaction are hydrogen, metallic copper, and an aluminum oxychloride, the composition of which varies according to the degree of concentration of the copper solution. The oxychlorides seem not to be definite compounds, but mixtures in variable proportions of aluminum chloride and oxychloride. They are non-crystalline, and are easily decomposed if heated even in the water bath. The solution of aluminum oxychloride, like that of ferric oxychloride, is precipitated on the addition of sulphuric acid and of certain salts. A single drop of sulphuric acid determines a coagulum of aluminic hydrate so abundant that the whole liquid is solidified. The hydrate obtained is sparingly soluble in sulphuric acid, and is probably not ordinary alumina, but an isomeric modification. Among the salts which throw down alumina from its oxychloride are sodium, ammonium, potassium, zinc, copper, magnesium, and iron sulphates. On the contrary, potassium, ammonium, copper, and barium chlorides, potassium bromide and iodide, ammonium and potassium nitrate do not precipitate aluminum oxychloride, even at a boil.—*Dr. D. Tommasi.*

Dephosphorization of Iron.

At a recent meeting of the Society of Arts a paper was read by Sid Gilchrist Thomas and Percy C. Gilchrist, on the manufacture of steel and ingot iron from phosphoric pig iron. The authors, after stating that nearly nine-tenths of the iron ores of Europe were so phosphoric as to produce a pig iron unfit for steel making without a process of dephosphorization, showed that by the new lime process perfect dephosphorization was produced, so that the steel made from phosphoric pig was actually purer than that made from hematite iron. They then instituted a comparison between the basic Bessemer process and the puddling process, pointing out that the former process was peculiarly adapted to the manufacture of soft weldable steel, having all the characteristics of puddled iron, with considerably greater strength, elasticity, and ductility. It was stated that this soft, basic, Bessemer steel could be made for some shillings a ton less than ordinary puddled iron, while an economy of seven shillings a ton was gained in its subsequent treatment by the smaller loss which it undergoes in rolling. The authors stated that nearly half a million tons a year of the new dephosphorized metal were now being made, and that on the Continent works were erecting having a capacity of a further half million tons a year, while in England the new special works erecting had only a capacity of under 200,000 tons a year. The paper concluded by querying the wisdom of allowing continental iron masters to push so far ahead of us in the production of this new ingot iron, which was not only cheaper, but immensely superior to puddled iron.

Manufacture of Green Tea in India.

A correspondent of the *Indian Tea Gazette* says:

"Manufacture can be commenced as soon as the leaf is plucked, but as it is more convenient to manufacture a day's plucking at once, the leaf plucked during the day is allowed to be all night in the leaf shed, spread out from two to four inches deep, and is constantly turned over to prevent heating.

"The manufacturing process is as follows: A large iron *karai* or pan, 36" diameter by 12" deep, is heated almost red hot, and when ready is filled with green leaf, which is rapidly turned about to prevent burning, until it has become quite soft, and the mass reduced to about half its former size. This process takes about three minutes. It is then thrown on the rolling table, and while the next panful is being prepared, is rolled by the tea makers. As the leaf is perfectly soft and flaccid, the rolling is done in the same time as the panning takes. If there is any sun, the rolled leaf is then thinly spread out in it until it becomes a blackish green and is very sticky to the touch; or if cloudy is put in *chalnees* over charcoal fires until in the same condition. It is then put into smaller iron pans, 25" in diameter by 12" deep, which are only heated to such a degree that the hand cannot be kept on the iron. These pans are about half filled, and the leaf is kept turning over until it has become quite soft again, when it is again rolled. When the day's batch has all been rolled a second time, the small pans are filled to the brim, the heat being gradually lowered, and the leaf is cooked, being constantly turned about as before for about four hours, when it is almost dry to the touch. If a large quantity of the two classes of gunpowder are required, it is then screwed up in bags as described by your correspondent, but this is not necessary nor indeed advisable at present, as the gunpowders do not bring the same prices as young hyson and hyson, a quantity of which classes become gunpowder in the screwing. The tea may now be left for weeks in the bins before being classed and colored, but we will suppose that the next process takes place next morning. The small pans should be heated to the extent of burning the hand if kept on the iron for a short time, and about half filled with the tea, which is worked rapidly from side to side until it assumes a light greenish tint, which will take about an hour and a half. It should then be classed, fanned, and picked. Before being bagged for market, about the same quantity is put into the pans, heated to the same degree as before, and is again worked rapidly to and fro for about two hours until it has assumed all the bloom it will take—usually a whitish green; but if the leaf is hard and old when plucked, the color will turn out yellow green, and will require coloring matter, usually pounded soapstone. It is in this last panning that the coloring matter is put in, but I believe that the Europeans in this district do not use it unless requested to do so by the native buyers. It is easily detected by taking a handful of unadulterated tea and breathing on it, when it will be found that as the damp dies off the bloom will return, but will entirely disappear in adulterated tea. The tea is then packed hot in 200 lb. bags composed of an inner cloth and an outer gunny bag, and is dispatched in this state to market. In heating the pans, wood is always used, and it is quite as efficient as and much cheaper than charcoal.

The River Amu or Oxus.

East of the Caspian Sea there lies spread out a vast extent of country of which the rest of the world knows but little, nor knows that little well. Through it there flows a mighty river, which appears to have the power of changing its direction now and then at will, leaving its bed and resuming it without asking permission of the Czar. Since Russia has obtained possession of the countries bordering the Caspian Sea on the east, more attention has been directed toward the old bed of the Oxus (or Amu), with the intention of trying to induce the river to return to its old channel. The matter did not seem to make any real progress until 1880, when a dam broke away near Chiwa, and the river again went in quest of its old bed from this place onward toward Old-Urgendsch. Hence arose the question whether this stream could not be turned again into the river instead of emptying where it does. A survey of the Oxus, led by Petrussewitsch, from Chiwa down, yielded encouraging results. According to his report the river is navigable from Chiwa for vessels of small draught, and the quantity of water is considerable, about like that of the Volga at Symbirsk, and would suffice to make it navigable all the way to the Caspian Sea.

The descent to the Sea of Sary-Kamysch, in the southwestern part of the basin of the Aral, is all that is needed, and there is no danger of its filling up with sand, because the current caused by the fall is able to keep out the sand. It is very probable that the stream had two courses through the oasis of Chiwa; at present there are three. Of these the two northernmost flow into the Sary-Kamysch, while the southern one loses itself in the desert. A commission appointed to examine this region reported that this sea was situated 15 meters below the level of the Caspian Sea. This gave rise to doubts as to the possibility of conducting the Amu River through this sea, for it was thought that the river would not be able to fill up this basin of 11,000 or 12,000 square meters, and that a large portion of the water must be lost by evapotion, so that there would be none left to enter the Caspian Sea. Dr. Lenz, of St. Petersburg, in a communication to the *Globus*, opposes this view, and shows that after filling up this basin the river Amu would still be able to bring a considerable water to the Caspian Sea.

The Aral, says Lenz, has a surface of about 67,600 square meters. The Amu-Darja brings to it three times as much water as the Syr-Darja, so that that gives the Amu 50,700 square meters, and the Syr 16,900. It can be said that the Amu brings along as much water as would evaporate from a surface of 50,000 square meters in extent. If this river had to fill up a lake of 11,000 or 12,000 square meters in area, as the Sary-Kamysch is estimated by the commission to be, only one-fourth of the water would evaporate, and three-fourths of all the water could flow into the Caspian Sea. Whether the Amu would really take its course through the so called bed of the Usboi, or Duden, as the Turks call it, can be better judged of after the completion of the surveys already undertaken and quite far advanced by the Russian government. Prof. Lenz is influenced by historical circumstances to assume that the Amu once really did flow into the Caspian Sea.

The results of the expedition of 1876, '7, and '9, which prove that the slope of the country from Laudon to Usboi is twice as great as the actual fall of the river to Aral, and the circumstance that the oasis of Chiwa only takes one-eighth of the water of the Amu to irrigate it while the remainder of the water evaporates uselessly in the side arms, in the delta of the river, and in the Ural sea, all these indicate the correctness of the views of the author above named.

It may be otherwise as regards the traffic on the newly procured river. Chiwa and Bucharest have but slight productive power, and will scarcely change much, since the increase of population and the attendant production cannot be very considerable within the limits of the oasis. A more favorable prognosis may be made of the newly watered region of the Usboi. If what Abul-Ghazi-Behodur says in his description of this region is correct, that in his day, when the Amu still flowed through it, it was very fruitful and densely inhabited, the reclaiming of this strip of desert, 1,200 versts wide, will amply repay its cost. H.

On the Production of Sugars and Starch in Plants.

Ad. Perrey has made some interesting communications to the Paris Academy in regard to this subject, from which it appears that the leaves of beans on the 29th of June contained no trace of any glucoses in the five samples tested. On the 7th of July it made its appearance in the stems, and stayed in them until July 29. From this he concludes that glucose is not formed directly from chlorophyl.

Saccharose, on the other hand, showed itself in the leaves constantly from June 29 till July 29. Under glucoses he includes whatever reduces Fehling's solution immediately, while those which reduce it only after invertion are classed as saccharose (cane sugar).

	GLUCOSES.		SACCHAROSE.	
	Leaves.	Stems.	Leaves.	Stems.
June —	16	56	25	90
" 29	0	0	56	38
July 7	0	36	34	51
" 15	0	20	8	50
" 29	0	11	22	64
August 13	0	9	Trace.	30
" 26	10	14	24	28
September 11	12	23	42	30
" 23	14	15	42	37

The question is now discussed as to whether the saccharose, which is constanly present here, is formed directly or is produced by a doubling of the starch molecule, something like the way that Berthelot represented as its possible constitution.

$$\underset{\text{Cane sugar.}}{C_{12}H_{22}O_{11}} + \underset{\text{Glucose.}}{C_6H_{12}O_6} + H_2O = 3(\underset{\text{Starch.}}{C_6H_{10}O_5}) + 3H_2O.$$

According to this a small quantity of glucose must appear in the leaves momentarily at least. Millot concludes from this observed absence of glucose that saccharose is formed directly from its elements by the cell power. Glucose, on the other hand, is in all plants (beans, oats, and Indian corn), and always in the presence of saccharose, and therefore is to be considered as the product of its dehydration.

The presence of a small quantity of starch in the cells might be due to a secondary reaction between the saccharose and the glucose. This, which is a matter of secondary importance in the leaves, becomes a primary reaction in the seed; on entering the seed or grain the glucose disappears, while the saccharose continues there. The two kinds of sugar combine, molecule with molecule, and form starch. A small portion of the glucose is used up in the formation of starch. At germination the starch breaks up into dextrine and glucose.

Saccharose then appears to play the essential part in plants, for it is formed directly, while glucose and starch are made from it.

If this is true it is hardly likely that if the synthesis of cane sugar is ever accomplished the sugar will not be made either from starch or glucose; and should some ingenious chemical investigator succeed in making starch artificially from glucose and saccharose, which seems probable, it would be of no practical or economical use, though of theoretical interest. Some other source for artificial saccharose must be sought instead of starch and dextrine. What that source is has never yet been even indicated, so far as we are aware, but carbonic acid ought to be one of the elements employed in some of its innumerable transformations.

There is annually manufactured on the Mississippi River and its tributaries about 1,500,000,000 feet of white pine lumber, with its proportionate accompaniment of shingles, laths, and pickets.