Adjustable Heads for Gear-Cutting and Slotting on Lathes.

In small shops it is often required that a gear should be cut for some specific purpose where the demand for this sort of work is not sufficient to warrant the purchase of a gear-cutting engine; and if a milling machine or planer cannot be at liberty to be used for fluting reamers, taps, etc., then some convenient attachment to the lathe might be advisable and handy. To fill both these requirements is the object of the inventor of the devices shown in the engravings.

Fig. 1 shows Parker's gear-cutting attachment for engine lathes. It is a standard to be secured to the lathe carriage by a bolt passing through the curved slot in the projection, A, which carries a spindle in the box, B, that supports the bearing, C, and the index wheel and finger, D. Under the platform is a plate secured to the upper part of the lathe carriage by a bolt similar to that used in fastening the ordinary tool post, so that the appendage can be swung around in such a position as to meet all exigencies. The blank to be cut is secured to the arbor, E—shown in blank—in the usual way. The screw, F, elevates or lowers the index wheel and its parts and the set-screw, G, secures them in place. The segmental slot in A allows the attachment to be turned at an angle to the ways of the lathe in order to accommodate itself to the cutting of "slashed" or spiral teeth, and the means of elevation or depression by the screw, F, adjusts the arrangement for different sized gears or ratchets. Every machinist will see how readily it may be adapted to the cutting of the straight, bevel, miter, or spiral gears, from the smallest up to those of ten or twelve inches diameter, with any desired number of teeth. For cutting bevel gears it is only necessary to set the arbor, E, with its connections by means of the nut on the end of the box, B, to give the proper incline to the arbor, and its appurtenances. The arm of the finger, D, has a scale of figures marked on it to designate the number of the holes in each concentric circle on the index. It appears to be a very neat and complete device for the purpose intended.

Fig. 1

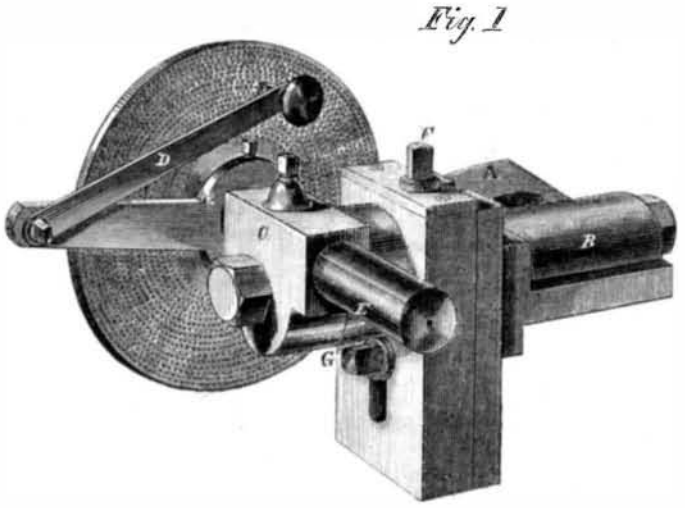
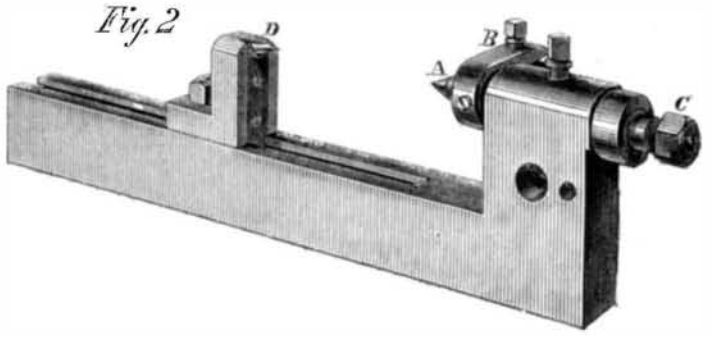


Fig. 2



PARKER'S GEAR-CUTTING ATTACHMENT FOR LATHES.

Fig. 2 is a handy attachment to be affixed to the carriage of a lathe for fluting reamers and taps and splining studs and short shafts. The stationary center, A is furnished with a radial clutch, B, to receive the tail of a dog or any other device for holding the shaft or taps, having a set-screw to prevent "back-lash." On the end of this center, at C, the index plate of the other device can readily be affixed. The other center, D, can be moved from point to point and secured by the set-bolt. The center of this movable part is dressed down to allow the action of a milling tool or cutter to the lowest point. No further explanation is required by the practical workman.

These appliances are the subjects of patents, one issued July 3d, 1866, and have been tested for more than a year and proved to be valuable aids to the machinist. All additional information desired can be obtained by addressing the manufacturers, Warwick Tool Co., Middletown, Conn.

Science Familiarly Illustrated.

STARCH, ARROWROOT, SAGO, AND TAPIOCA.

All the above are only synonyms for one and the same substance, that of starch, the difference between them being mainly those occasioned by the differing proportions of the constituents and the presence of more or less foreign matters. Starch is a component of many articles of food, all the farinaceous vegetables containing a large proportion. That manufactured variety known as corn starch is prepared from the maize called the "white flint." Before being ground, the corn is soaked in vats, and then is run through the stones with water. The mass is then filtered and the residue is dried in a kiln until all, or most of the water is evaporated, when it is again ground to a dry powder.

Arrowroot is a term loosely applied to the starch extracted from a number of roots and cereal products, as the maranta, mandioc, tacca, arum, potato, etc. That from the maranta of the East and West Indies is the true arrowroot, but much of that in commerce is from other substances. It is a simple food, very nutritious, containing no nitrogen, and well adapted for producing adipose matter or fat.

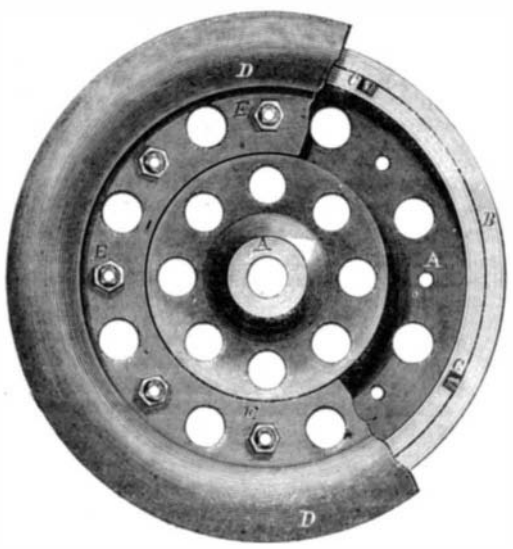
Sago is a farinaceous substance prepared from the pith of a species of palm growing on the islands and main land of the Indian Archipelago. To obtain it the tree is felled and the trunk split. The pith is then removed, macerated with water, and beat with paddles, when the woody fibers separate and float. These being removed, the grains settle and the flour or grain, after being dried, is sifted and then generally bleached with chloride of lime. Pearl sago is prepared from the ordinary sago by being heated on an iron surface. In cold water neither forms of the sago are solvent, but only in hot water, when they form a thick starch-like solution, and make an excellent and very nutritious food.

Tapioca is prepared from the root of the mandioca or cassava, grown in the West Indies, South America, and some parts of Africa. The root grows sometimes to the weight of thirty pounds. It contains, with the starch, a large proportion of a poisonous, milky juice, containing hydrocyanic acid and an acrid bitter substance. The poisonous principle is used by the inhabitants of northern South America to poison thorn arrows thrown from their *pucunas*, or blow guns, for the killing of game. The root is brought from the mandioc patch and then washed and peeled. The peeling is usually performed by the teeth; after that the root is grated, the grater being a wooden slab about three feet long, a foot wide, slightly hollowed, and set in diamond-shaped patterns with sharp pieces of quartz. The grated pulp is then partially dried on a sieve and placed in a long cylindrical basket of elastic fibers. One end of this basket is affixed to the limb of a tree or a stout peg in the wall and a pole passed through a loop on the lower end. One end of the pole is rested under some projection and the Indian woman seats herself on the other end as the power. Her weight draws the sides of the basket together until it assumes the shape of an inverted cone. The milky juice drops into a vessel placed to receive it. The pulp is then removed and dried in a kiln or oven. This pulp is known as *semonilla* and used for a bread. The poisonous liquid deposits the starch known as the tapioca of commerce. This deposit is dried either in the sun or by rude, kilns and granulates, as is seen in that so extensively used for puddings. Sometimes it is denominated Brazilian arrowroot, but under whatever name, it is the product of a root which in its natural state is one of the most virulent of poisons.

It is almost impossible to believe that one of the most nutritious and palatable of the elements of our *cuisine* should be derived from one of the most fatal poisons known in the vegetable kingdom, yet such is the case.

FORREST'S COMBINATION CAR WHEEL.

The engraving presents a double view of a car wheel intended to overcome the objections to the common cast wheel and the wrought wheel used on European roads. It is composed



of three distinct parts, secured together by screw bolts. The hub and body, A, of the wheel is either cast from suitable iron or forged from good wrought iron—which is preferable—to prevent breaking. The tire, B, is a separate piece of chilled iron, or cast steel. It has projections, C, on its inner surface which fit into corresponding recesses in the rim of the body, A, which reach partially across its face. The disk-flange, D, is either of chilled iron or steel, and is made to fit over the central projection of the body, A, and confine the tire in place. The three parts are secured by square shanked bolts, seen at E, which may be of any convenient number. To procure lightness, the webbing of the wheel may have a number of holes of any form made through the parts. The flange of the wheel and the webbing of the wheel outside of the hub is in one piece and when bolted to the mass of the wheel secures the tire place. The tire or tread may be of the hardest metal, as steel or chilled iron, as its position on the wheel rim does not depend upon shrinkage. The advantages of wrought over cast car wheels have never been acknowledged in this country, where chilled cast car wheels have been used to the exclusion of wrought wheels, ever since the first successful running of railroad cars. But in Europe, except Russia, the rule is that car wheels should be of wrought iron or steel tired.

The inventor of this combination wheel believes that its value for durability is far in advance of those generally in use, and that it is cheaply made and easily kept in repair, as the tire can be removed at any time when worn and replaced by a new one; or any other part can be similarly replaced.

This plan was patented through the Scientific American Patent Agency July 23, 1867, by David Forrest assignor to himself and James Eldridge, Jr. For further information address Forrest and Eldridge Eastport, Me.

Railway Bridge Excitement in Hamburg.

Hamburg is in a state of alarm and excitement, as there is some reason to believe that Prussia is seriously contemplating the expediency of constructing the much talked-of railway bridge across the Elbe, at a spot that has hitherto never entered the wildest dreams of the most speculative engineer—namely, below Altona, near the terminus of the Kiel and Altona Railway. There can be no doubt that, as the two banks of the river belong to Prussia, that power has as much right to build a bridge there as over the Rhine at Cologne and Coblentz, where both banks are also Prussian; but should the plan be really executed, Hamburg will be cut off from all direct communication with the sea, and then good-bye to its commercial prosperity. From being fully as much of a sea port as London, at present, it will become as much an inland city as Dresden or Berlin. The trade of Altona will also be totally ruined by the bridge, but as that town is now Prussian, the government has the right to do what it likes with it. As far as regards Hamburg, however, the case is different; and in an international point of view, it is very doubtful whether Prussia has the right to cut off the traffic of an independent state and preclude it from direct commercial intercourse with the rest of the world.

Editorial Summary.

METEORITES.—M. Daubrée, who has been investigating the specimens of meteorites in the Paris collection, divides all meteorites into two primary groups—Siderites and Asiderites—the former being characterized by the presence of metallic iron, and the latter by its absence. The Asiderites contains one group only, which is termed Asideres. The Siderites are divided into two sections: in the first the specimens do not enclose stony particles, and in this we find the group of Holosideres; in the second both iron and stony matter are present. This, then, induces two groups: Syssideres, in which the iron is seen as a continuous mass; and Sporadosideres, in which the iron is present in the form of scattered grains.

SURGERY AMONG THE INCAS.—M. Broca, says the *British Medical Journal*, has presented to the Academy a skull found in the tomb of the Incas four miles from the city of Cuzco, which is chiefly remarkable from bearing marks of having had a surgical operation performed upon it. The skull gives evidence that it underwent a fracture and denudation of the frontal bone, and traces prove that trepanning was performed. A circular white spot is visible which shows an inflammation of a portion of the bone, terminating in death, as is believed, in about fifteen days after the operation. M. Broca thinks that the trepanning was performed with a gouge.

FOSSIL IVORY.—About forty thousand pounds of fossil ivory, that is to say, the tusks of at least one hundred mammoths, are bartered for every year in New Siberia, so that in a period of two hundred years of trade with that country, the tusks of twenty thousand mammoths must have been disposed of—perhaps even twice that number, since only two hundred pounds of ivory is calculated as the average weight produced by a pair of tusks.

IT is said the Indians have an ingenious way of setting fire to houses with their arrows. They wrap with a rag some powder on the heads of their arrows, and on the tip of the arrow head place a percussion cap. When the arrow strikes the object to be fired, the cap is exploded and the powder and rag ignited. The rag burns long enough to set combustibles with which it may come in contact on fire.

THE FRENCH SCIENTIFIC ASSOCIATION promises to take the lead of all the Continental organizations in promoting the cause of science. It has this year appropriated 78,000 francs for investigations and experiments. In future, its *Bulletin* is to be published every week instead of monthly, as heretofore.

SUBSTITUTE FOR COFFEE.—In Germany the seeds of grapes are frequently used in place of the coffee berry. When pressed, they yield a quantity of oil, and afterward when boiled, furnish a very economical, and it is said, a very delicious substitute for the genuine Mocha.

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