

**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. 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.**

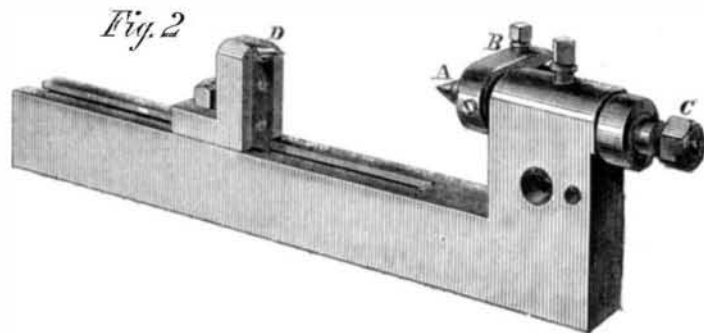
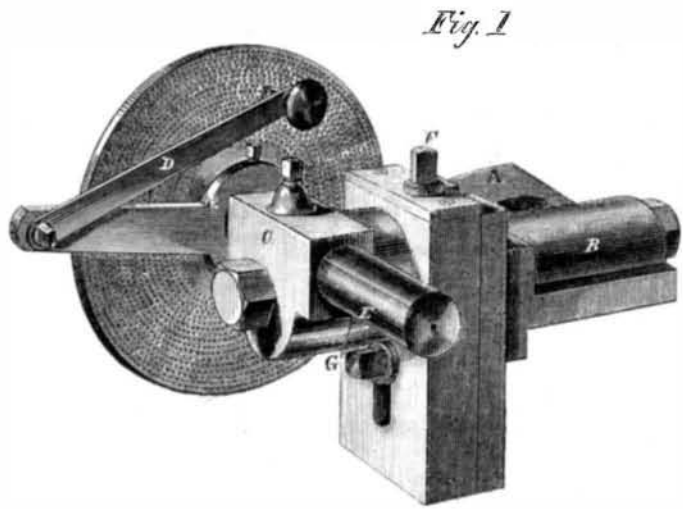
All the above are only synonyms for one and the same substance, that of starch, the difference between them being mainly those occasioned by the differing proportions of the constituents and the presence of more or less foreign matters. Starch is a component of many articles of food, all the farinaceous 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



**PARKER'S GEAR-CUTTING ATTACHMENT FOR LATHES.**

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



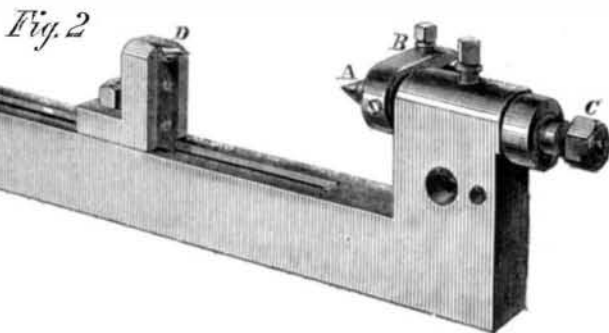
of three distinct parts, secured together by screw bolts. The hub and body, A, of the wheel is either cast from suitable iron or forged from good wrought iron—which is preferable—to prevent breaking. The tire, B, is a separate piece of chilled iron, or cast steel. It has projections, C, on its inner 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 Coblenz, 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



**Editorial Summary.**

**METEORITES.**—M. Daubr e, 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: Ssideres, 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.

CUTTING GLASS.—Take an old three-cornered file, heat it red hot and suddenly plunge it into a previously prepared mixture of salt and ice, stirring it about so as to cool as rapidly as possible.

CHLOROCARBON, the new anaesthetic of Dr. Protheroe Smith, is a tetrachloride, or as it used to be called, bichloride of carbon. Although powerful and rapid in its effects, consciousness is rapidly restored after its use.

IS SWEDEN A RISING NATION?—Sir Charles Lyell, thirty-two years ago, from an examination of some ancient sea marks on the Swedish coast, concluded that the peninsula was rising at the rate of three feet a century.

CARRIER PIGEONS lately traveled the distance between Brussels and Cologne, one hundred and ten miles, in from three to five hours. One bird flew thirty-seven miles, another twenty-two, and others twenty miles per hour.

BEER VERSUS BREAD.—The amount of nutriment contained in beer is generally greatly over estimated. Liebig asserts that in 1,460 quarts of the best Bavarian beer, there is exactly the nourishment of an ordinary two and a half pound loaf of bread.

THE NIAGARA SUSPENSION BRIDGE.—Ever since the middle of March, 1855, from thirty to forty railway trains have passed over the Niagara Bridge daily. With the exception of the removal of the timber girders, and some other wooden parts which showed signs of decay, no part of the suspended system has ever been disturbed.

ANOTHER NEW FIBER.—By a late patent, a species of nettle, which grows luxuriantly and spontaneously throughout the Mississippi valley, is employed in the manufacture of cord, rope, cloth, bagging and paper.

FISH BISCUIT.—Professor Rosing, of Asa, France, has invented a process of making flour from a species of sea fish, which he forms into biscuit, thereby providing a very nutritious and compact article of food.

LECTURES AT THE PARIS EXHIBITION.—The Imperial Commissioners have made arrangements for the delivery of a course of lectures, at various places within the buildings and grounds, on various subjects, such as caoutchouc, artificial ice, iron smelting, brass founding, and other kindred themes, connected with the mechanical and art displays in the Exposition.

AN INEXHAUSTIBLE ICE HOUSE.—A company has been formed in France for supplying towns in the southern provinces with ice from the sides of Savoy Alps. The glacier ice is loaded on vehicles at the foot of the mountains, transported to Geneva and thence by rail to its destination.

WE are indebted to Mr. H. T. Anthony, 501 Broadway, N. Y., for samples of Lithographic paper, from Paris, which we find excellent for printing photographic pictures.

J. H. HALL, 102 Fourth Avenue New York, cured by his patent process, for one man in Cincinnati last year 11,000 dozen eggs. They were so well preserved that the dealer sold them in February as fresh eggs.

MESSRS. NOTMAN & Co., of Boston, Mass., have sent us some photographic cards which indicate excellent skill in portraiture.

National Academy of Science.

This association held its semi-annual session in Hartford, Conn., during the past week. A report of their proceedings, which we had prepared, is crowded out of this issue by other matter, but will appear next week.

Patent Report for 1867.

We are glad to learn that the contract for engraving the diagrams for the Patent Report for 1867 has been awarded to Messrs. E. R. Jewett & Co., Buffalo, N. Y., whose excellent work has for many years adorned these important volumes.

Distances from San Francisco to New York.

THE CENTRAL PACIFIC RAILROAD ROUTE.

The following complete table of distances and elevations of points on the Central Pacific Railroad of California, and other roads connecting therewith, between San Francisco and New York, is useful for reference.

Table with columns: Names of Places, Distance from point to point, Total distance, Elevation in feet, Names of Places, Distance from point to point, Total distance, Elevation in feet. Lists various locations from San Francisco to New York.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The oldest mills in Pennsylvania are in the quaint old town of Bethlehem Pa., built by the Moravians in 1793, and are now in good running order.

A stationary engine of 500 horse power is being built in Newburgh, Cuyahoga Co., Ohio. This, the largest stationary engine in the Western States, is the property of the Cleveland Rolling Mill company.

Large importations from Belgium are annually made of rough plate glass, there being hitherto, a lack of suitable apparatus for manufacturing the article in this country.

The salt springs of New York produce nearly 7,000,000 bushels of salt per year. The wells are owned and worked by the State, the water being purchased for evaporation by private parties.

The work of changing the North Missouri railroad from a broad to a narrow gage, for a distance of one hundred and seventy miles, to Macon, was finished in four days. Quick work.

The Viceroy of Egypt is said to be the owner of more than one hundred steam plows. We would like to get drawings of them for publication.

Ransom's concrete stone, is to be manufactured in this country by a joint stock company of Baltimore. The process of making this artificial stone is simple enough.

The Montana people are congratulating themselves over the discovery of genuine sapphires in that territory. The precious stones found on the El Dorado Bar, are familiarly known in that locality by the name of "Collin's diamonds"

The largest dye-house in America is about to commence operations in Paterson, N. J. Its appointments are on a very extensive scale and all its arrangements have been made under the direction of a French gentleman.

An exceedingly rich bed of oinnabar has been discovered about four miles south of San Jose, Cal. There is a solid ledge about twelve feet wide and eight feet thick, between walls of rock, which grows richer as the excavation proceeds.

A sudden reduction has been made in the working force at the Springfield Armory, in consequence of an order to reduce the production of breech-loaders to two hundred a day.

A train on the New York Central Railroad ran from Spencerport to Rochester, a distance of 10 miles, the other night, in 9 minutes.

The net profits of the Anglo-American Telegraph company for the eleven months ending on the first ult., was more than sufficient to meet the sums of \$125,000 and \$25,000 payable to the company as a first charge upon the working of the two cables and the lines of the New York Newfoundland and London Telegraph company.

Natural soap, it is again announced, has been discovered in Missouri some thirty miles from St. Louis. What has been really found, is probably "fullers earth" a variety of clay which from its unctuous touch might easily be mistaken for soap.

The Mount Cenis railway is to be forty-eight miles long. The initial point on the French side is 2,438 feet, and the summit of the pass, 6,322 feet above sea level. For six miles before reaching the summit the ascent must be on an average gradient of 1 in 14.

The largest iron works in the country are located at Johnstown, Pa. The works are run day and night and give employment to 3,000 hands.

Steel boilers, it is said, are coming into use on French locomotives. Twelve express engines, with steel boilers, are employed on one railway leading out of Paris, fifteen on another, and several on other roads.

The entire tankage capacity of Oil City, nearly 200,000 barrels of oil, is awaiting a rise in the river for transportation to Pittsburg.

The new bridge at Louisville, Ky., is to be 5,220 feet, or nearly one mile in length. The longest span will be 360 feet, thirty-six feet longer than the longest span of the Montreal "Victoria bridge."

The Anglo-Indian Telegraph company propose to build a direct telegraph line, via Egypt and Aden, with subsequent extensions to Singapore, China, Japan and Australia. The direct route from London to Suez will, it is anticipated, be in actual work during the present year.

It is found necessary on some railways having numerous short curves, to have the flanges of the driving wheels of the ordinary 6 wheeled engines turned anew as often as every six weeks.

For the past three years, \$4,000,000 worth of boots and shoes have been shipped annually from Worcester, Mass. This business gives employment to 2,000 hands in the city, and as many more in the neighboring villages.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

LATHES.—S. L. Hart, Milwaukee, Wis.—This invention has for its object to furnish an improved device for attachment to lathes for the purpose of cupping the ends of wagon hubs, turning the interior of hollow wooden ware, and for similar uses.

BON SLEIGH.—G. O. Momeny, Locust Point, Ohio.—This invention has for its object to furnish a bob sleigh, or other sleigh or sled so constructed as to adapt it to all kinds of roads, and to enable the beams and raves of the sleigh to be readily removed from the knees and runners for convenience in storage, making the sleigh limber, strong, and durable.

OX YOKE.—W. A. Thompson, West Winsted, Conn.—This invention has for its object to so improve the construction of ox yokes as to diminish their weight and increase their strength and durability.

BEDSTEAD FASTENING.—L. L. Jackson, Paterson, N. J.—This invention has for its object to furnish an improved bedstead fastening, simple in construction, reliable in operation and which will enable the bedstead to be easily and quickly set up and taken down.

SNAP HOOK.—W. S. Furlow, Geneseo, Ill.—This invention has for its object to furnish an improved snaphook simple in construction, not liable to get out of order, not liable to freeze up in cold weather, and which can be manufactured at a small expense.

AERIAL MACHINE.—J. F. Elston, Elston Station, Mo.—This invention has for its object to furnish an improved machine for navigating the air so constructed and arranged as to be completely under the control of the navigator.

FOUNTAIN PEN HOLDER.—J. S. Charles, Omaha, Nebraska.—This fountain pen holder is made in two parts, arranged to move the one within the other, and relatively so constructed that the ink can be drawn in at one end, and from the other discharged and expelled upon the pen, attached or inserted at such end.

WELL SEED BAGS.—A. D. Griffin, Meridith, Pa.—This invention relates to a method for closing the bore of an oil, artesian, or other well, and thereby stopping off the surface or other water, during the process of boring or working the said wells.

OX YOKE.—C. H. Post, Guilford, Conn.—This invention consists in attaching a hinged metallic plate to the yoke, the end of which engages with the bow in such a manner that the bow is securely fastened thereby.

OX COLLARS.—Jackson Robinson, Curwinstown, Pa.—This invention consists in supporting and moving the steering oar on metallic surfaces whereby the friction is greatly lessened, and the management of the steering or rudder oar is rendered much less difficult, and consequently the raft is much more easily managed than by the old method.

RADIATORS.—J. A. Marvin, Red Wing, Minn.—This invention consists in forming the flue through which the products of combustion pass, in such a manner that the heat from the stove is compelled to travel a long distance and be retarded in its course and radiated from the surface of the flues and the casing utilized.

WATCHES.—Thos. Baker, New York City.—This invention relates to that class of watches, which are provided with an arrangement of mechanism, for stopping and setting free the second hand, or the hand for indicating half, quarter, or any other fractional parts of a second.

COMBINED BUREAU AND BEDSTEAD.—John Stark, El Paso, Ill.—The present invention consists in so constructing a bureau, in such a manner, and in parts hinged or hung together, that they can be opened from each other and brought into a horizontal position for use as an ordinary bedstead, while at the same time, if so desired, they can be brought into an upright position and shut the one upon the other, forming a bureau, to all appearances, with the mattresses and other articles constituting the bedding, encased within the same.

SNAP-HOOK.—M. F. Mitchell, Waukau, Wis.—This snap-hook is so constructed as to be most durable and substantial, and most convenient and serviceable.

LUBRICATOR.—R. P. Underwood, Brooklyn, N. Y.—This lubricator is for the spindles and shafts of machinery, and is more especially intended for cotton and spinning machinery.

HOLDER FOR REINS.—Phineas Jones, Newark, N. J.—The object of this invention is to provide a simple device, whereby harness reins may be securely held, and whereby they will effectually be prevented from slipping out of the hand.

SPRING MATTRESSES.—Henry H. Vere, New York City.—The object of this invention is to so arrange and hold spiral springs in mattresses that the durability of the mattress will be increased, and to do away with the wooden frames now generally used in spring mattresses, that the mattresses may be easily handled, and may be reversed and used on both sides.

CALCULATING MACHINE.—A. Mendenhall, Cerro Gordo, Ind.—The object of this invention consists in constructing a machine by which figures of any desired magnitude may be readily added, subtracted, multiplied and divided.

STOP ATTACHMENT FOR REGULATING THE LENGTH OF STITCH IN SEWING MACHINES.—George Robinson, Detroit, Mich.—This invention relates to a new and improved attachment for sewing machines, more especially designed for the Wheeler and Wilson machine, whereby the length of stitch may be regulated or varied as desired, with far greater accuracy and facility than by the ordinary cam attachment now used for that purpose.