

ENGINEERING INVENTIONS.

Mr. Charles H. Kuhne, of Butler, Pa., has patented an apparatus for regulating the supply of water to steam boilers, by which the water is prevented from falling too low and rising too high in the boiler, thereby avoiding the danger and damage incurred by an excess or scarcity of water. The invention consists in a chamber connected with the boiler, and containing a float that moves a steam cock, combined with a feed water chamber, and a steam cylinder containing a piston, connected with the valve in the water chamber in such manner that the rise and fall of the float permits or cuts off the flow of water to the boiler as required.

Mr. Horace Harding, of Tuscaloosa, Ala., has patented an automatic lock that is adapted for use not only upon canals, but also upon rivers, where wide gates are required for passing tows, rafts, and large vessels, and where, in case of submergence from freshets, it is desirable that there shall be no levers or other lock fixtures exposed above the walls to damage from drift or floating ice.

Mr. Charles W. Rich, of Whitehall, N. Y., has patented a vibrating propeller. The object of this invention is to facilitate the application of steam power to canal boats and other vessels, and to adapt the propelling apparatus for use in deep water and in shallow water.

An improvement in gas engines has been patented by Mr. Charles J. B. Gaume, of Brooklyn, N. Y. The object of this invention is to simplify the construction of gas engines, and to utilize the power produced by the explosion of the mixture of gas and air to greater advantage.

In the ordinary process of tanning leather the hides are thrown into the vats that contain the tanning liquor, and as the stronger and sour liquor in the vat settles to the bottom the hides have frequently to be handled and moved about, that they may all of them, and all parts of them, be equally exposed to the action of the liquor. Mr. Charles Flohr, of Canisteo, N. Y., has patented a combined tan vat and stirrer, the object of which is to avoid the labor and cost of this customary handling of the hides, and to agitate the liquor and expose the hide to the action thereof in such a manner that the tanning process shall be more speedy and the hides more evenly tanned.

IMPROVED WIND MOTOR.

We give an engraving of an improved wind motor, lately patented by Manuel de la Torre, of the City of Mexico, Mexico. It consists of a wheel provided with curved vanes rotating on a vertical axis in a cylindrical hood, which is closed on two opposite sides and opened on two intervening sides, so that the wind entering the wheel at one side escapes at the other side. The frame is revolved or adjusted to the wind by two vanes fixed on its top, one of which is adjustable and may be moved to regulate the supply of wind to the wheel.

The supporting frame of the device consists of a base, upright post, and horizontal cross pieces, which unite above the center of the base. The vertical shaft turns in a step at the bottom, and is journaled at its upper end in the cross pieces of the main frame.

The turbine wheel is composed of two similar disks secured to the shaft at a suitable distance apart to receive between them four curved vanes. The inner edge of each of these vanes is fixed on a point about half way between the center and circumference of the two disks, and its outer edge reaches to the circumference of the disks. The cylindrical hood, closed on opposite sides by curved quadrantal plates, is supported on a vertical pivot, that is fixed centrally in a step on top of the cross pieces or timbers of the main frame, and it is also supported by means of anti-friction rolls, which run on an annular track attached to the under surface of the top of the cylindrical frame. On the top of the cylindrical hood there are two horizontal vanes, one of which is fixed and the other stationary, while the latter is laterally movable through a quarter of a circle. These vanes, under the influence of the wind, control the movement or adjustment of the cylindrical hood, turning the frame so that the wind is admitted at one side of the wheel and escapes at the opposite side in a greater or lesser degree, according to the pressure or force of the wind.

The cylindrical hood is held perpendicularly and revolves easily on anti-friction rolls fixed on the top of its cross pieces of the main frame, and projecting up against a circular track under the top of the cylindrical frame. Rolls that project laterally from the lower part of the uprights against a ring on the inner surface of the cylindrical frame near the bottom support it against lateral pressure. This motor is compact and effective, and is not so liable to damage from storms as windmills of the usual pattern. M. De la Torre, the inventor and patentee, is for the present at the Continental Hotel, Broadway and 21st street, New York city.

Growth of Timber.

As the result of observation, and from the testimony of reliable men, the following is about the average growth in twelve years of the leading desirable varieties of timber, when planted in belts or groves and cultivated: White maple, one foot in diameter and 30 feet high; ash, leaf maple or box elder, one foot in diameter and 20 feet high; white

willow, one and a half feet in diameter and 50 feet high; yellow willow, one and a half feet in diameter and 35 feet high; Lombardy poplar, 10 inches in diameter and 40 feet high; blue and white ash, 10 inches in diameter and 25 feet high; black walnut and butternut, 10 inches in diameter and 20 feet high.

NEW BOOK PROTECTOR.

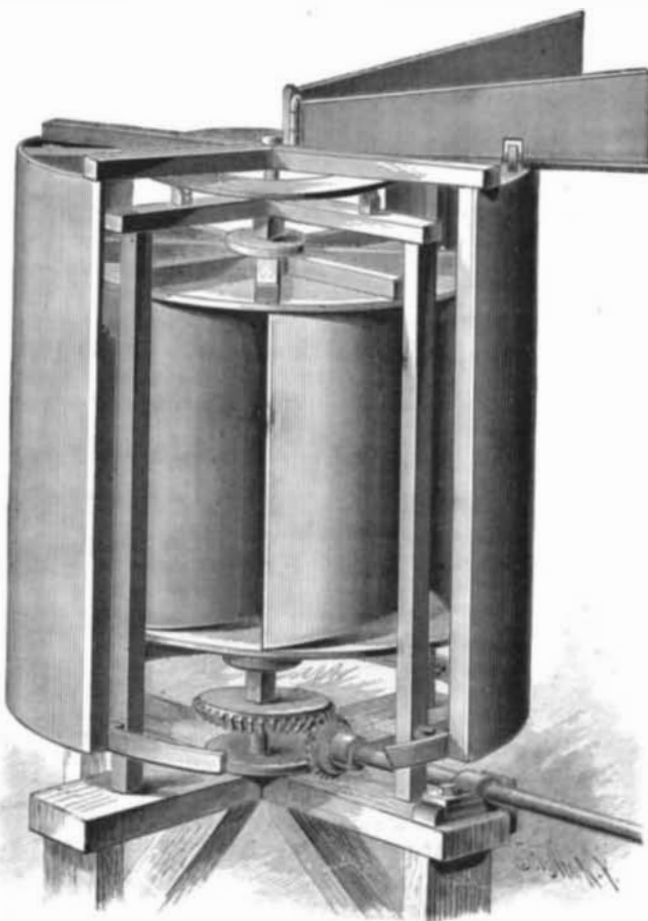
The device shown in the engraving is designed for the protection of books that are continually subjected to wear, and also to prevent valuable books from becoming lost, by



BRUMM'S BOOK PROTECTOR

attaching the protector by a chain to a desk, pew, or other permanent object.

The case or frame inclosing the cover of the book is made of sheet metal, and attached to a curved sheet metal back by hinges. The edge strips of the frame are folded over the edges of the book cover, and are provided with a clasp in front. A short wire loop attached to the back receives the chain by which the book is secured. This chain is covered with leather or other flexible material to render it smooth and easy to handle, and prevents rattling.



DE LA TORRE'S TURBINE WIND MOTOR.

The light open frame inclosing the book does not add materially to the weight of the book, while it protects it from wear and injury.

This device was lately patented by Mr. George W. Brumm, of Boise City, Idaho Ter.

IMPROVED STARCH POLISH.—Spermaceti, 1 part; gum arabic, 1 part; borax, 1 part; glycerine, $2\frac{1}{2}$ parts; water, $21\frac{1}{2}$ parts; and a sufficient quantity of perfumed alcohol to produce an emulsion. About three teaspoonfuls of this emulsion are required for about one-quarter of a pound of starch.

MISCELLANEOUS INVENTIONS.

Mr. Howard Newlin, of Brooklyn, N. Y., has patented a machine for treating street refuse or sweepings, or for the separation therefrom of materials having value. The machine is also adapted for use in separating garbage and ashes, coal and coal dust, and the cleaning and separation of coffee, rice, and other grains. It consists in a combination of endless traveling belts, screens, blowers, and washing tanks, forming the complete machine, whereby the material is separated and washed, and further separated by specific gravity, if required; also, in separating screens and water tanks of novel construction.

An improved fish-plate for use on railroads, whereby the ends of the rails will be securely held and the transverse strain upon the holding bolts entirely avoided, has been patented by Mr. George H. Waring, of Indiantown, New Brunswick, Canada. The invention consists of a fish-plate having around its bolt holes projecting thimbles or bosses, whose length is equal to half the thickness of a rail web, so that when two plates are applied to opposite sides of a rail the thimbles entering the corresponding holes in the web will meet in the center.

Mr. Isaac W. Norcross, of Red River Iron Works, Ky., has patented an improvement in lumber booms designed to catch and retain logs that are drifted down by the current of the river. The improvement embodies a drift sheer, which is in the nature of a series of logs converging toward each other, to gather the timber and the commingled drift, ice, debris, etc., combined with a shore section having a series of side gaps and a trail boom floating nearly parallel with the shore section, which holds the logs and drift as they pass from the drift sheer close to the side gap; where they are assorted from the drifts and safely placed inside the shore section, which is divided into a series of pockets by shore fastenings with outriggers, so as to avoid the cumulative strain of the whole lot of timber by distributing the timber in lots in the several pockets, and thus avoiding the breaking of the boom and loss of logs, which is liable to occur when the cumulative strain of a great number of logs is brought to bear against the boom.

An improved toe weight, to be attached to horses' hoofs, which is so constructed to fit any style of horseshoe and does not injure the hoof, has been patented by Mr. Charles Drew, of St. Louis, Mo. The invention consists of a weight provided with a longitudinal threaded perforation which receives a threaded pin that is clamped to the horseshoe by means of clips catching in opposite edges of the shoe and held together by a screw.

An improvement in snap hooks has been patented by Mr. Edward Davidson, of West Dedham, Mass. The invention consists in making a snap hook with the loop on the same side as the hook, folding the end of the strap within it and securing said strap by a screw.

An improved fruit drier has been patented by Mr. George S. Grier, of Milford, Del. The invention relates to improvements upon the fruit drier patented by the same inventor, October 28, 1879, in which a vertical series of trays were used, each of which was supported upon pawls attached to four vertically-sliding posts, and the whole raised or lowered and sustained one above the other, while heated air passes up through the open bottom of the same.

Mr. Martin A. Howell, Jr., of Chicago, Ill., has patented an improved wire stretcher for either plain or barbed wire, whereby one person with an ordinary lever or wooden handspike is enabled to draw to its proper position any barbed or plain wire, all injury and danger of breakage from kinks, short bends, curls, or abrasions of the wire being avoided.

Mr. Frank W. Mix, of Terryville, Conn., has patented an indicator padlock, in which a change is made in the indicator wheel, and a different set of symbols, figures, or letters made to show through openings in the case, for the purpose of enabling the proper authorities to detect any surreptitious opening of the lock.

Heretofore the machines for making felted yarns have been constructed with a taut cloth or linen sheet, upon which the yarns were felted, but it was impossible to give this sheet the desired tension. The operation was very inconvenient and the yarns were stretched, thereby separating the filaments, which is just the reverse of that which is to be obtained by felted the yarns. Mr. Louis Bourau, of Paris, France, has patented a yarn-felting machine which is simple in construction, will felt the yarns without tension, and complete the felting in a single operation.

An automatic device for centering the blocks from which bobbins and quills are formed, has been patented by Mr. Jerome B. Fellows, of Fryeburg, Me. The invention consists of forked block supporting posts actuated by suitable mechanism to present the block to the lathe centers, and then fall out of the way to permit the turning of the block.

An improved gauge for bracelets has been patented by Mr. Willis H. Howes, of New York city. The object of this invention is to readily ascertain the exact size and form of bracelet required to fit any particular wrist. The invention consists in a gauge for bracelets that can be readily contracted and expanded to fit a wrist, and thus give the exact form and size of bracelet required to fit the wrist.

Mr. Anthony St. Mary, of Decatur, Ill., has patented a trap intended to facilitate catching hogs and other animals and holding them while being ringed or marked.

The House Wren as an Insect Destroyer.

The observations I have been able to make during a residence of several years on a farm, have convinced me that the common house wren is really one of our most valuable birds, not, perhaps, for what they have done, but from the possibilities wrapped up in their diminutive bodies. They are quite as social as the purple martin or blue bird, and greatly surpass both of these in the rapidity with which they increase. I began several years ago to provide them with resting places in the vicinity of my buildings. Sometimes I fastened the skull of a horse or ox, or a small box, in a tree top. But latterly I have made it a practice every spring to obtain thirty or forty cigar boxes for this purpose. If the box is long and large, I put a partition across the middle and make a hole through into each apartment. It is very seldom that these boxes are not occupied by one of these little families. In most instances two broods are annually reared in each nesting place. One of my boxes last season turned out three broods of young wrens—six little hungry birds each time, or eighteen in all! I think a cigar box never before did better duty. The lamented Robert Kennicott stated that a single pair of wrens carried to their young about a thousand insects in a single day! Like all young, rapidly growing birds, they are known to be most voracious eaters, living entirely upon insects. The point upon which most stress may be laid is this: That by providing them with nesting places, in our gardens, orchards, or grounds, and not allowing them to be caught by cats or scared away by mischievous boys, we may have scores if not hundreds of them about during most of the time in which insects are destructive. They undoubtedly return to the same localities to rear their young year after year. Last season I had up about thirty of these nesting boxes, and all but two or three, which were not favorably located, were occupied. My crop of wrens could scarcely have been less than one hundred and fifty, and the old birds filled the air with music when they were not on duty in building their nests or feeding their young. The coming spring I intend to put up at least a hundred of these nesting boxes in my orchards and groves, and I have no doubt I shall be repaid a hundred thousand fold for the little labor it costs. As long as they come back so regularly every year and in constantly increasing numbers, and serve me so well, I shall do all in my power to protect and encourage them. And I am of the opinion that when one species of social, useful birds can be made to congregate in such unusual numbers, others will come also. But the hardness, sociability, love of the locality where it was reared, and wonderful fecundity of the little house wren, render it, in my judgment, one of the most valuable of all our insectivorous birds.—*Charles Aldrich, in the American Naturalist.*

THE LUMP FISH.

Family Cyclopteridae, a small family, characterized by the ventrals being united into a disk or cup-shaped form. Body smooth and without scales. Eyes placed on each side of the head. The two dorsal fins are so much enveloped in a tuberculous skin as to appear like a hump on the back. Body deep and rough, with bony tubercles.

The shape of the lump fish is suborbicular in outline, compressed towards the dorsal ridge. The body of the fish is soft and flaccid, resembling a lump of jelly. Instead of scales, the body is covered with minute bony tubercles. From the anterior portion of the dorsal ridge, the outline slopes in a concave line to the orbits, where it becomes abruptly declivous to the snout. The space between the orbital ridges, flat. On the top or ridge of the back is a series of large compressed tubercles, and a smaller row on the anterior slope. Other series of tubercles are distributed over the body. The eyes are prominent. The nostrils double, mouth moderately large and broad, the under jaw slightly longest, small blunt teeth, in three or four rows, in front of each jaw; teeth also on the pharyngeals, and a small patch on the base of the tongue, which appeared to be distinct from the pharyngeals.

The dorsal hump, without any vestige of rays, ventrals immediately under the pectorals united into a disk, with a funnel-shaped cavity in the middle; the margins softly dentated. The skin of the lump fish is very thick, the stomach enormously large, intestines very long. No air bladder.

The range of the lump fish is from the polar regions to Cape Hatteras. A spinous variety inhabits the coast of Greenland and the Bay of Fundy. On the Long Island coast the lump fish is called the indigo bag, from the fact of its being of an indigo blue in color. On the Scotch coast it is called the cock-paddle and hen-paddle. In England it is known as the lump sucker and sea owl. On the French coast *licorne de mer*, where it is considered a great delicacy, and is known as a valuable market fish.

The little jelly fishes shown in the illustration as floating near the surface of the water, are known as sarsia, while its hydroid is called

coryne. The sarsia is about the size of a small walnut, with a wide circular opening, through which passes the long proboscis, hanging from the under surface of the disk to a considerable distance below its margin. The four tentacles are of an immense length when compared to the size of the animal.

AMPHORA OF BRONZE AND WHITE METAL.

We give an engraving of a fine amphora of French manufacture, classical in design and highly wrought. The body

**AMPHORA OF BRONZE AND WHITE METAL.**

is of bronze, and the medallions and a portion of the ornaments are composed of white metal, giving a rich and striking contrast. It is mostly handwork, and is a truly artistic piece of metal work.

Recent Facts about Smallpox.

An interesting illustration of the value of revaccination is afforded by a report just furnished, at the instance of the Local Government Board of London, by the chief medical officer of the General Post Office. This report relates to an average number of 10,504 persons permanently employed in the postal service in London, all of whom have been re-

quired to undergo revaccination on admission to the service, unless that operation had been performed within seven years previously. Among these persons during the ten years 1870-1879 there has not been a single fatal case of smallpox, and in only ten instances have there been non-fatal attacks, all of which were of a very slight character. In the telegraph department, where the enforcement of revaccination has not been carried out with quite the same completeness, twelve cases have occurred in the same period among a staff averaging 1,458 in number. Eight of these attacks were of persons who had not been revaccinated, and one proved fatal. The remaining four were of revaccinated persons, who all perfectly recovered without pitting. This experience, like that of the nurses at the smallpox hospitals, seems to show that revaccinated persons enjoy absolute immunity from severe attacks of smallpox, and that their risk of catching that disease at all, even in its most modified form, is infinitesimal.

Heath's Discoveries in South America.

PROF. JOHN D. PARKER, KANSAS CITY, MO.

Since the death of Prof. Orton in South America, his assistant, Dr. Ivon D. Heath, and his brother, Dr. E. R. Heath, have both taken a deep interest in completing the unfinished work of that expedition. Prof. Orton had formed the purpose of conducting his expedition through the unexplored portion of the Beni River, over which there has always hung such an uncertainty and superstitious fear. But just before he reached this portion of his journey, the soldiers, whom he had hired and paid in advance for his whole expedition, intimidated by superstitious fear, suddenly presented their bayonets at the breast of Prof. Orton, refused to go any further, and returned home. Prof. Orton was, therefore, compelled to abandon his expedition, and returned almost heart-broken to die of weariness and disappointment on the legendary lake of Titicaca.

About three years ago, Dr. E. R. Heath returned to South America to complete, if possible, Prof. Orton's work, and explore this unknown region, the *terra incognita* of South America. It was hoped that some geographical society would aid in this important work, but while plans were being laid to secure material assistance, Dr. E. R. Heath undertook and solved the problem himself.

On December 28, 1880, Dr. Heath, of Wyandotte, Kansas, received a letter hastily written by his brother, dated Reyes, Bolivia, on the river Beni, Aug. 3, 1880, on the day of his embarkation for the rubber camps and the unknown country further below. He wrote that he was just setting out to explore this unknown region, and that three months would tell the tale of his success or defeat.

On March 19, Dr. Ivon D. Heath received another letter from his brother in South America, announcing that his expedition had proved a complete success. The following extract will be interesting from this letter, which is dated Reyes, Bolivia, Dec. 20, 1880:

"The question of the Beni is solved. This work of Prof. Orton is finished. I made the trip from Cabinas (rubber camps on the Madi) in a canoe with two Indians. I left Cabinas September 27, and, after delays from sickness of my men, at 8 A. M., October 8, discovered a new river entering from the south, and at mid-day of the 8th arrived at the junction of the Madre de Dios with the Beni. No other white man has ever seen the mouth of this magnificent river. Crude measurements gave 735 feet for the width of the Beni, and 2,350 for that of the Madre de Dios. Took careful observations for latitude and longitude. At 6:50 A. M. of the 9th I passed the mouth of a river the size of the Yacuma, entering from the north, to which I gave the name Orton.

"At night we slept on a sand bar joined to a large island. On the 10th we passed this island, and at 8 A. M. another large one, and at 10 A. M. came to a line of rocks obstructing the river and making rapids. One mile further down we came to the main fall, which exhibits a perpendicular descent of the entire river of thirty feet. We occupied the remainder of the 10th in drawing our little craft over the rocks to the waters below. With much risk we passed the waves below the falls and camped. On the morning of October 11 we passed some rocks in the river corresponding to the rapids of the Palo Grande of the river Mamoré, but which, here, offer no serious obstructions to navigation. At 10 A. M., October 11, 1880, we arrived at the mouth of the Beni—that is, at the junction of the Beni and Mamore rivers. From thence we ascended the Mamore, 300 miles, to Exaltacion and Santa Ana, and from Santa Ana to this place, 200 miles west over the pampas; brought my boat on an ox cart.

"Here I am safe and sound, with a map of the three rivers—Beni, Mamoré, and Yacuma. From the river Madi to the mouth of the Beni there are but four families of Pacavara Indians in the place of 'multitudes of man-eating savages,' as every man, woman, and child in Bolivia has believed during many scores of years. Rubber gatherers are already



THE LUMP FISH.—(*Cyclopterus lumpus*.)