

**AN ORNAMENTAL GOURD.**

We have already called attention to the beauty of many of the varieties of gourd, and their value in the flower garden as trellis plants. Their foliage is generally very handsome, and the fruit is frequently interesting on account of its eccentric appearance. Plants suitable for covering walls and arbors are by no means numerous; and the gourds are plants of large growth and rapid development, and are therefore worthy of cultivation. Nearly all members of the genus can be utilized for climbing purposes; and one of the best is the *cucumis metuliferus*, shown in our engraving. The venous structure of the leaf is highly organized, and the curious oblong fruit is studded all over with horny protuberances. The foliage is of a beautiful fresh green color; and if planted in a deep soil, in a sunny place sheltered from high winds, a very ornamental addition will be made to the garden. The gourds require plenty of water in dry weather, and liquid manure is highly beneficial to them.

**The Early Discovery of Coal.**

Bituminous coal, or sea coal, was known upwards of a thousand years ago, in the year 853, but did not come into general use until the 16th century, and was not used in the manufacture of iron until the 17th century. Anthracite coal came gradually into use so late as the 19th century, and was not used as fuel in the manufacture of iron until about 16 years ago.

So early as 1790 anthracite coal was known to abound in the county of Schuylkill, in the State of Pennsylvania; but it being of a different quality from that known as sea coal or bituminous coal, and being hard of ignition, it was deemed useless until the year 1795, when a Pennsylvania blacksmith, named Whetstone, brought it into notice. His success in burning it induced persons to dig for it; but when found, every person connected with the enterprise had to experiment on its combustion, and vain were the attempts to burn it by the majority of them, and all came to the conclusion that it would not come into general use.

About the year 1800, Mr. Morris, who had a large tract of land in Schuylkill county, Pennsylvania, procured a quantity of coal therefrom, and took it to Philadelphia city, but he was unable with all his heroic exertions to bring it into notice, and abandoned all his plans. From that time until 1806 it was talked about as a humbug; when accidentally a bed of coal was found in digging a tail race for a water wheel for a forge, which induced another blacksmith, David Berlin, to make a trial of it. His success was generally made known, which induced others to try to burn Pennsylvania coal.

**Study and Business.**

In learning, concentrate the energy of the mind principally on one study; the attention divided among several studies is weakened by the division; besides, it is not given to man to excel in many things. But while one study claims your main attention, make occasional excursions into the fields of literature and science, and collect materials for the improvement of your favorite pursuit.

The union of contemplative habits constructs the most useful and perfect character; contemplation gives relief to action; action gives relief to contemplation. A man unaccustomed to speculation is confined to a narrow routine of action; a man of mere speculation constructs visionary theories, which have no practical utility.

Excellence in a profession and success in business are to be obtained only by persevering industry. None who thinks himself above his vocation can succeed in it, for we cannot give our attention to what our self-importance despises. None can be eminent in his vocation who devotes his mental energy to a pursuit foreign to it, for success in what we love is failure in what we neglect.

**ACALYPHA MARGINATA.**

To the myriads of fine foliage plants which have been introduced of late years this is a welcome addition. The leaves, as regards size, resemble those of *acalypha tricolor*, but the markings, in which their chief beauty resides, are of a character wholly different from those of that variety. In the present case, the center of the leaf is brown, around which is a distinct margin of rosy carmine about a quarter of an inch in width; and the surface is entirely covered with little hairs, which add considerably to its beauty. This plant, says the *English Garden*, belongs to the spurge family, an order comprising upwards of a hundred species, which are more or less distributed over all tropical and subtropical regions, but the headquarters of which are in South America. A goodly number are annual, but the great mass are perennial plants, having much the appearance of nettles, and readily known from their nettle-like leaves and the disposition of their flowers.

INCOMBUSTIBLE lamp wicks are made in Austria of asbestos

**Railroad Crossings.**

A bill has lately been passed by the Massachusetts legislature, providing that "no highway or townway shall hereafter be laid out across a railroad at a level therewith, nor shall any railroad be laid out and constructed across a highway or townway at a level therewith, without the consent in writing of the Board of Railroad Commissioners, in addition to the authority of the Court Commissioners, as now required."

This is an excellent and most sensible measure, and one which deserves the attention of the legislatures of all the

way to cross on the same plane; and whenever such intersection does exist, guards with signals are kept constantly on the alert.

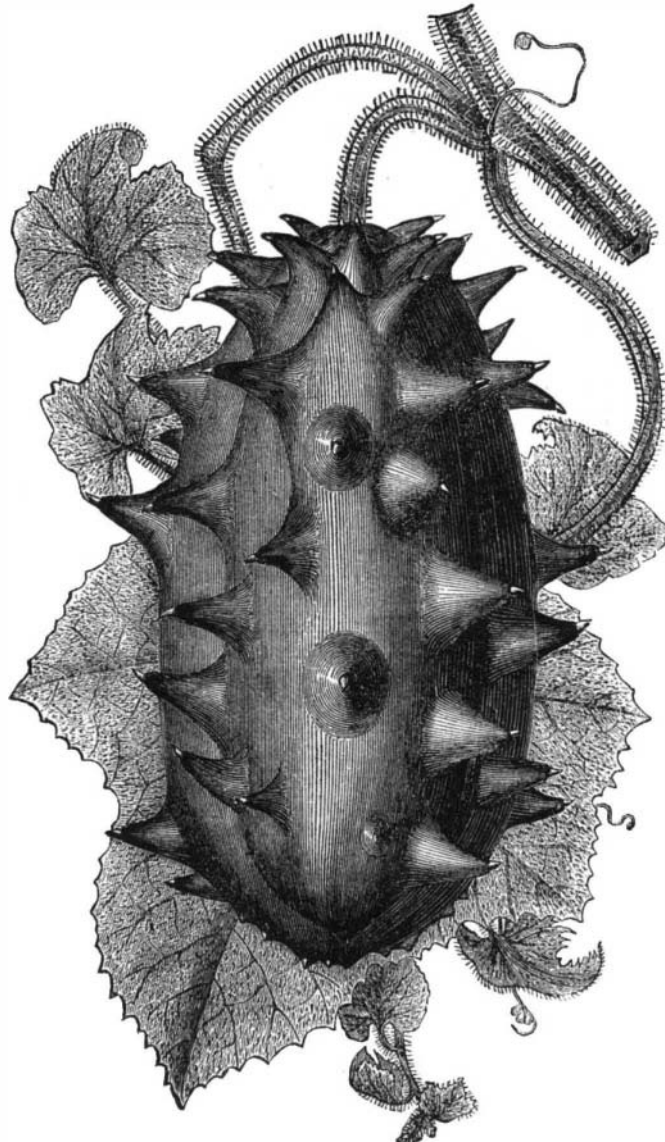
**The Thickest Armor Plate Ever Made.**

Experiment was lately made at the great works of Charles Cammell & Co., Sheffield, Eng., which, it is believed, will have an important influence upon the future of ironclad navies. It was the rolling of the thickest armor plate which has ever been produced. Four and a half inches is the thickness of the plates with which vessels of the Warrior class are covered. Step by step the size has been increased till it has reached 14 inches, which, until the present experiment, was the thickest plate known. Messrs. Cammell & Co. have now succeeded in producing one of 22 inches, this being eight inches thicker than any armor plate ever yet rolled. The plates, of which this is a sample, are intended for the *Dandolo* and *Duilio*, two war vessels now being built in Italy for the Italian government—one at their dockyard at Castellamare and the other at La Spezia. These vessels are to be armored at the water line with plates of this thickness, and the representative plate now rolled was ordered for the purpose of ascertaining the relative resistance of plates of this enormous thickness compared with the thickest that has yet been manufactured. The gun to be used in testing this great plate is one of the 100-ton guns now being made by Sir William Armstrong & Co., at Newcastle. The vessels are to have two turrets, and each turret will contain two of these enormous pieces of artillery. The guns will be about 30 feet long, their bore 19 inches in diameter, and they will throw a shot weighing nearly one ton. Several hundred pounds' weight of powder are necessary for each charge. One of the guns is nearly ready, and Sir W. Armstrong has been specially asked to make a crane, capable of lifting 150 tons, to move it. To give some idea of the enormous mass of metal of which the plate is formed, it may be stated that it had to be in the furnace upwards of twenty-seven hours before it was fit to be placed upon the rolls. It weighs upwards of 35 tons, and measures 17 feet in length and 5 feet in width. The experiment of rolling such a monster was a bold one. Sir Joseph Whitworth, Sir W. Palliser, and a number of officials and diplomatists were present to witness the operation.

Before the plate was rolled, a luncheon was served at the works, at the conclusion of which a few toasts were given and responded to. Sir Joseph Whitworth's health was proposed in connection with his guns. In giving it, Mr. Cammell stated that if Sir Joseph's guns succeeded in penetrating the plate about to be rolled, he should have no hesitation in rolling one of 30 or even 40 inches in thickness. In reply, Sir Joseph Whitworth kept significant silence with regard to what he believed his guns would do when opposed to a 22 inch plate. Sir William Palliser's health was also given. In replying, he said, that, owing to the success of his projectiles, he at first

thought that the days of iron-plated vessels were numbered, and that we should return to unplated ships with heavy guns. Subsequent experiments, however, satisfied him of the enormous resistance which armor plates presented to projectiles, unless they happened to strike exactly at right angles; and it was this enormous resistance that, in his opinion, rendered the retention of ironclad ships necessary to the country. Nobody could yet say whether the gun or the plate would win. If Sir Joseph Whitworth would penetrate even a plate 22 inches thick, then a plate must be made that it could not penetrate; in fact, the bigger the guns, the more powerful must be the plates. Nobody could deprecate more than he the idea that, because of the increase in the power of penetration of our guns, iron-plated ships must be abandoned. What they required was that their plates should be more powerful. It was only in direct firing that the greatest penetration had been obtained, and it was but fair to presume that in actual warfare the greatest portion of the shots would be fired obliquely. He was quite aware that Sir Joseph Whitworth had invented a shot which would bite when fired from an oblique position; but even then the penetration was much inferior to that obtained by a direct shot. That being so, he was inclined to think that armor-plated ships would always possess an advantage over guns.

Shortly afterwards an adjournment was made to the armor plate mills. A group of men were standing round the furnace in which the plate was being heated, and at the word of command from a superior they began to pull away the bricks at the mouth of it. Instantly the flames leaped out, and the men, accustomed as they are to stand a great heat, were constrained to retreat until the fury of the flames had subsided. Then one wearing only trousers and a shirt approached the furnace, raised a little doorway, and looked at the huge monster within. The view was doubtless satisfactory, though how any one could look into this furnace unscorched was a marvel. Men were then seen guiding, up to the mouth of the furnace, a huge pair of tongs with which the plate was to be



CUCUMIS METULIFERUS.

other States. While we have scores of inventions for the safety of passengers in the cars, there is little attention paid to proper safeguards to keep people out of the way of the trains. As a rule, the railroad companies are only required to put up a sign to "look out for the locomotive when the bell rings" at road crossings, and blow whistles or sound bells when the train approaches the road, and that is all that is thought needful to protect the public from trains rushing at the rate of forty miles an hour. It is no easy matter to estimate the speed of an approaching locomotive, and acci-



ACALYPHA MARGINATA.

dents are constantly occurring simply through people thinking that they can drive across a track before the locomotive can reach the crossing, or on attempting to cross, and failing to observe the coming train until too late to avoid it. By sinking or raising the track, so as to leave a clear passage, these accidents, of course, become impossible. In England, it is of a very unfrequent occurrence for railway and high-

grasped. A trolley, too, was sent almost up to the mouth of the furnace, and, by and by, it received the plate when the tongs had done their work. Everything was now ready. The doorway of the furnace was lifted up, the flames shot out and lit up the mill, and, while spectators shielded their faces with their hats or handkerchiefs, the workmen, with their backs to the furnace, pushed up the tongs until they grasped the plate within. Balks of wood were then put on each side of the furnace to enable the plate to be drawn out the more readily; but the flames seized upon them and appeared to devour them as if mere shavings. There was no time to lose, the order was given, and machinery began to move, the chain fastened to the tongs slowly tightened, and the huge mass, which had required twenty-seven hours in such a furnace as this before it was done, made its appearance. Fierce as had been the heat before, it was now ten times greater. One could hardly look upon the plate, white with heat, over and around which little blue flames appeared to be lingering. Slowly it fell upon the trolley, the tongs were then removed, and in a moment or two the rolls, which had been revolving for a while, caught the end of the plate; and the huge mass, weighing 35 tons, passed between them with as much ease as if it were but a 4½ inch plate. Backwards and forwards it came six or seven times, each time the distance between the rolls being decreased, and the operation ended as soon as the required size had been attained. The rolling was most successful, and it is believed the plate is without a flaw. The destination of the plate is Spezzia, where the test is to be carried out.

The experiment shows that there is absolutely almost no limit to the thickness of which armor plate can be made. It was no idle boast on the part of Mr. Cammell when he said that, if Sir Joseph Whitworth's gun penetrated this plate, he would make one 30 inches or 40 inches thick. The result of the test at Spezzia will be watched with great interest.—*Iron.*

#### SCIENTIFIC AND PRACTICAL INFORMATION.

##### STRANGE NATURAL CISTERNS.

In the rough granite country back from Mossamedes, on the west coast of Africa, are some very remarkable natural cisterns. The country itself is peculiar, huge single rocks rising out of the nearly level plain in some places, and in others hills of rock, in several of which deposits of water are found at the very top. A recent traveler visited one of these, and describes it as a natural tank with a narrow entrance, containing some three or four hundred gallons of exquisitely clear and cool water. It was covered by vast slabs of granite, from which the rain drained into it during the rainy season, shading the water so that it could not be seen without a torch, and so protecting it that the sun cannot evaporate it during the dry season. Thus a bountiful store of excellent water is preserved while there is not a drop to be had elsewhere for miles.

A still more remarkable cistern of this sort is that of the Pedra Grande, or Big Stone, some thirty miles from Mossamedes, a huge rounded mass of granite rising out of the sandy plain. On the smooth side of this rock, twenty or thirty feet above the plain, is a circular pit about ten feet deep and six feet across. The rainfall on the rock above the pit drains into it, filling it completely every rainy season. The walls of the pit—which is shaped like a crucible, narrowing gently to the bottom—are perfectly smooth and regular, the enclosing granite being of the closest and hardest description. The cistern will hold several thousands gallons of water. Near by are smaller pits of similar character. Their formation is unexplained. The water of this strange well furnishes the natives and travelers with an abundant supply during the dry season; consequently it is a noted halting place.

##### A SPITTING SNAKE.

There is a dangerous snake, not uncommon about Benjuella, West Africa, called by the natives *naja neje*, and by the Portuguese *cuspedira*. It is small in size and remarkable from its habit of spitting when interfered with. The saliva is ejected to considerable distances, and is said to cause blindness if it touches the eyes. One of the snakes was captured by the natives and brought to where some English miners were at work. It was teased by a miner who was standing over the cage, which was on the ground, and retaliated by a discharge of spittle. Some of the liquid entered one of the miner's eyes; and though the eye was immediately washed out with water, it was very much irritated for several days. The snake was killed before any experiments could be made with it by the scientific superintendent of the mine; he has, however, no doubt of the miner's statement and that of his companions, corroborated as it is by the testimony of the natives and the Portuguese.

##### A RIVER OF INK.

In Algeria there is a river of genuine ink. It is formed by the union of two streams, one coming from a region of ferruginous soil, the other draining a peat swamp. The water of the former is strongly impregnated with iron, that of the latter with gallic acid. When the two waters mingle the acid of the one unites with the iron of the other, forming a true ink. We are familiar with a stream called Black Brook in the northern part of this State, the inky color of whose water is evidently due to like conditions.

A. RICCIO, of Modena, Italy, says: To cure the swellings of chilblains, rub them well at night with petroleum. It will take three or four nights rubbing to cure them.

#### The Breaking of the Lynde River Reservoir Dam.

A serious disaster, causing a large destruction of valuable mills and other property, occurred in the vicinity of Worcester, Mass., on the 30th of March, through the rupture of the dam of the Lynde river reservoir, whence the water supply of the above city is derived. The reservoir has a capacity of some 670,000 gallons, and by the recent heavy rains became filled to its utmost extent. The embankment wall, it is said, was known to be too low for safety, and engineers had recommended its enlargement. These warnings, however, passed unheeded; and consequently, when the dam was subjected to an unusual strain, due both to the large amount of water in the reservoir and to the waste weir becoming choked, it became leaky, and a small stream began to escape through its masonry, thus commencing the destruction that was completed by the breaking of the whole structure thirty hours later. As soon as the first dangerous sign appeared, people in the vicinity of the threatened flood abandoned their houses and shops, and so the loss of life, which attended the like disaster at Mill River a year or so ago, was averted. The damage done is estimated at several million dollars. Several houses, the Bottomly, Smith & Co. Mills, besides a number of smaller manufacturing establishments, and eight hundred feet of the Boston and Albany Railroad were washed away.

#### THE NATIONAL STEEL TUBE CLEANER.

We show in the accompanying illustration an improved apparatus for cleaning the flues of steam boilers. All intelligent users of steam appreciate the economy of keeping the flues of their boilers clean and free from deposits of unconsumed carbon and ash, which are non-conductors of heat and cause a marked difference in the working of a boiler.

The National Tube Cleaner is a plain, practical, durable tool, and has many points of advantage. Among these may be mentioned the absence of small steel springs or thin bands of metal, which, when thrust into a hot flue, lose their temper and elasticity. The scraping edges, supported on blades of Bessemer steel, are cut from saw plates, and are held in place by doubly riveted braces of malleable iron. The blades are dove-tailed into the malleable iron butt, which insures their being held firmly in place. The threaded steel rod in the center is provided with a washer, which runs up and down upon it, by means of which the spread of the blades is adjusted to the size of the flue. These implements received the silver medal at the American Institute in 1875, the first premium at the last Industrial Exhibition in Pittsburgh, and also at the Providence (R. I.) exhibition. It is manufactured by the National Steel Tube Cleaner Company, and has been introduced through the agency of the Chalmers Spence Company of New York. It is sold by the principal dealers in engineers' and mechanics' supplies throughout the country.



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#### NEW BOOKS AND PUBLICATIONS.

**THE FIRST GERMAN READER: a Modification of Marcel's Method.** By Charles F. Kroeh, A. M., Professor of Modern Languages, Stevens Institute. 67 pp. New York city: D. Appleton & Co.

This is a concise and admirable instruction book, for English pupils, in German. The entertaining story of Cinderella is presented in German, accompanied by a literal linear translation, which exhibits at one view the peculiar arrangement of the language. Excellent directions, vocabularies, etc., are given, the author's object being to convey a practical knowledge of the subject without burdening the learner with the technicalities of grammar.

**PORTRAITS OF CELEBRATED DOGS.** Price \$2, for Set of Engr. Portraits. New York city: "Forest and Stream" Company, 17 Chatham street.

These are well executed wood engravings of celebrated pointers and setters, and they will undoubtedly have a large sale among the shooting fraternity.

**THE PHILADELPHIA LEDGER.** Philadelphia, Pa.: G. W. Childs. The enterprising publisher of this old and respectable daily journal inaugurated, on March 27, the forty-first year of its publication, by increasing its size and improving its general appearance. Under the proprietorship and management of Mr. Childs, the *Ledger* has become one of the most profitable newspapers in the country.

**REFERENCE BOOK FOR INVENTORS AND MECHANICS.** 125 pages. Bound in cloth, gilt edges. Price, by mail, 25 cents. New York city: Munn & Co., Publishers SCIENTIFIC AMERICAN and SCIENTIFIC AMERICAN SUPPLEMENT.

This is a valuable little book for inventors, patentees, mechanics, and others. It contains the patent laws of the United States complete, with directions for obtaining patents, trade marks, caveats, designs, copyrights, and forms for transferring, by assignment and license, interests in patents. It contains the census of the United States, by States and Territories; and contains also engravings of 150 mechanical movements, which will be found convenient for all mechanics and inventors to have at hand for reference. A more valuable compilation of rare and useful information has never been condensed into so small a compass, or sold at so cheap a price.

**EVERY MAN HIS OWN LAWYER.** By John G. Wells. 612 pages. Price, by mail, \$2.25. New York city: John G. Wells, 3 East 4th street.

Mr. Wells has just issued a new edition of his business form book, adapted for all classes of persons. It is a guide in all matters of law and trade, and adapted for every State in the Union. To those who have occasion to draw conveyances, to frame wills, agreements, and powers of attorney, or to make assignments, this work will be found most convenient. It contains a synopsis of the laws of all the States relating to usury, the rights of

married women to hold property, how to obtain pensions and letters patent, and other matters likely to arise in the life and experience of most persons.

**THE ALDINE.**—Parts 6 and 7 of the new issue of this beautiful art publication are just from the press; and they compare favorably with the five first numbers of this year's issue. Several finely executed wood engravings of American and foreign scenery and copies from celebrated paintings of our best modern artists, executed by our most distinguished designers and engravers, are features in these issues which render the publication of special interest to lovers of art. Published fortnightly by the Aldine Company, 18 and 20 Vesey Street, New York city, and supplied, to regular subscribers only, at 50 cents a number.

#### Recent American and Foreign Patents.

##### NEW CHEMICAL AND MISCELLANEOUS INVENTIONS.

###### IMPROVED TINNED BLANK.

John C. Milligan, South Orange, N. J.—This inventor forms a little extension lip at one part of the edge of a round plate or blank of tin plate, the object of which is to receive the beads of tin that flow to the lower edge, and there solidify on drawing the sheet out of the bath, so that they can be removed from the sheet by cutting off the lip without destroying the symmetry of the blank.

###### IMPROVED BALE TIE.

Jesse R. Horton, St. Louis, Mo., and Henry A. R. Horton, McKinney, Tex.—This is a simple device whereby the end of the band is held in close contact with the other end by means of a lug, so that the swelling of the bale can never affect the security of the fastening, since the flanges of said lug do not permit it to be pressed out of the slot. The lugs are so arranged that they do not catch in the cotton or wrapping of the bale, either in the act of locking or unlocking.

###### IMPROVED CORSET SPRING.

Joseph Day, New York city, assignor to himself and Nathan Hyman, same place.—This is a corset clasp composed of a broad stay, having fixed hooks upon it, in combination with an overlapping stay having eyes hinged to fastening bands which pass around the stay, said eye being made with broad base, to allow the easy connecting and separating of the parts.

###### IMPROVED MICA LIGHT FOR STOVES.

John W. Elliot, Toronto, Canada.—This invention consists in a mica light, provided with a handle at the upper end, a perforation, and a strengthening tip, the same being applied to a window frame having a lip. The plate is sprung into the rim and guard lip of the stove body, and is provided with an eyelet at the lower part to admit the entrance of air.

###### IMPROVED FILTERING APPARATUS.

Leo Prange, South Brooklyn, N. Y.—In this filter, the liquid is passed through a body of charcoal and a series of bags, formed of woven fabric and suspended vertically from short tubes attached to the bottom of a tank. In order to hold the charcoal necessarily employed as a filtering medium, a strainer supported on a circular flange forms a false bottom to the vessel. The liquor filters through the charcoal and enters the space between the bottoms, whence it escapes as fast as it can ooze through the bags. In order to indicate the height of liquor a glass tube is attached to the outer side; and in order that the tube may not become choked, the lower end is made to communicate with the space between the false and true bottom, so that only clear or filtered liquor can enter.

###### IMPROVED LOCK FOR POCKET BOOKS.

Daniel M. Read, New York city.—The device is fastened by pushing a catch into one of the holes in the case of the lock, when the inclined end of the said catch strikes against the rounded forward edge of a latch bar, pushes it back, and passes it. To unfasten the lock, the rear edge of the catch plate is slightly raised, which throws the engaging end of the catch back a little, so that its upper incline may readily slip off the rounded edge of the latch bar. With this construction there is no projection upon the outside of the lock to wear the pocket.

###### IMPROVED METALLIC SEAL.

Alphonse Friedrick, Brooklyn, N. Y.—This invention relates to certain improvements in that class of metallic seals in which a section of wire is employed for forming the loop, the ends of which wire are bent and secured in a soft metal button by compression. It consists in the construction of the soft metal button, which is made with a deep circumferential groove around its edges forming two connected disks, with or without a hole through the central smaller portion or stem connecting the disks. Around this button, in the groove and through the hole, the wire is variously twisted and secured by the compression of the soft metal button which, when stamped, forms the two edges of the disks into a single milled flange, which imparts greater security to the seal.

###### IMPROVED GUIDE AND REEL BAND FOR FISHING RODS.

Francis Endicott, New York city, assignor to himself and Henry F. Crosby, same place.—This consists of open (expanding and contracting) guide and reel bands for fishing rods, constructed with a loop and binding screws on one end, and a tongue on the other end, passing through the loop for being readily fastened on rods of different sizes. In case a rod is broken, a temporary rod can be easily rigged, and the carrying of a rod may be avoided by taking the rings and reel along and procuring the rod when wanted for use.

###### PROCESS FOR SEPARATING MIXED COAL TAR PRODUCTS.

Charles Lowe and John Gill, Manchester, England.—The nature of this invention is, first, to submit the partially or wholly dehydrated mixtures of tar acids to the prolonged action of temperatures between 15° Fah. and 56° Fah.; secondly, to separate the hydrated carbolic acid crystals, thus formed, from the mother liquors containing the liquid tar acids and a residue of carbolic acid dissolved in them; thirdly, to effect complete purification of the more or less hydrated carbolic acid crystals thus obtained by recrystallization, either by partial fusion or solution in water with subsequent refrigeration; and lastly, to prepare carbolic acid of high or complete degrees of purity by dehydrating the partially or wholly purified more or less hydrated carbolic acid crystals.

###### IMPROVED COMBINED WATCH CHARM AND KEY.

Patrick Dever, Glen Riddle, Penn.—This consists of a suitable case with a sliding and a spring-acted key, that is retained or released to protrude from the case by suitable catch device.

###### IMPROVED PRESS FOR FORMING SPRING SHANKS FOR SHOES.

Emil Briner, New York city.—The object here is to improve and perfect the press or dies for forming spring-shanks for shoes, for which letters patent have heretofore been granted to same inventor under date of February 9, 1875. New devices are provided for perforating the shank blanks and carrying off the punchings, for conveying the sheared-off blanks ready for the action of the shaping dies, and for the purpose of shaping, feeding, and cropping forward the shanks.

###### IMPROVED DOUBLE APRON.

William G. Heaney, Camden, N. J.—This is an improved double apron, designed for use in male diseases.