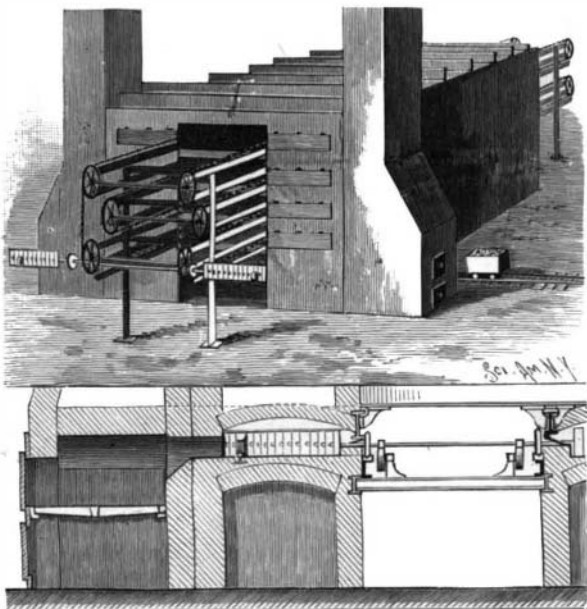


THE WETHEY PARALLEL CALCINING FURNACE.

The improved furnace shown in the accompanying illustration has been patented by Mr. Arthur Harvey Wethey, of Butte, Montana. The object of the invention is to provide a new and improved calcining or desulphurizing furnace for rapidly and thoroughly desulphurizing ores and other material in a ground, crushed, pulverized, or concentrated state, and without loss or waste of material. The furnace consists of two parallel structures set about eight feet apart, and each having four floors or hearths opposite to each other. In the space between the two structures carriages are run which have laterally extending arms



THE WETHEY PARALLEL CALCINING FURNACE.

carrying rakes or plow blades for stirring and moving forward the ore lying in each compartment. The main outside brick walls are braced and strengthened by a stout skeleton structure of channels and I beams which serves to carry the load and bind the whole furnace together. This skeleton frame is one of the excellences of this furnace, as it prevents the sagging and splitting of the brickwork. The outside walls are braced by vertical channel beams, to which are strongly riveted the main horizontal I beams, which pass from outside to outside of the whole structure, and serve to carry the floors. To prevent their getting unduly heated, they are inclosed in airspaces. Upon them are laid a set of longitudinal three inch I beams upon which is placed sheet steel and a layer of brick, forming the floors or hearths. The inside wall of the furnace is divided by a horizontal slot for the passage of the arms of the plow, the lower half of the wall being formed by a channel iron upon which run the wheels of the plow carriages, the upper half being formed of an I beam, which is suspended from the main transverse I beam above, this I beam also carrying the inner footing of the arched roof of the furnace. Swinging doors are provided at the end of each hearth or compartment, so that the plow arms can pass into or out of the furnace as desired. The carriages with their plow arms are drawn across each floor and transferred from one floor to the other by means of a pair of endless chains which pass over sprocket wheels at each end of the furnace. Thus the plow, after passing through the top floor, stirring up and pushing forward the ore, passes out through the end door and over the end sprocket wheel. It then enters the furnace on the second floor, and so on until the lowest floor has been traversed, when it is returned again to the top floor. The above mentioned slot in the inner walls of the furnace is closed by a series of tripping doors, which open and close automatically as the plow passes. At the far end of each hearth is provided an opening through which the ore falls to the hearth below, and as the travel of the plow on each floor is in the reverse direction to that on the floor above, it follows that the ore is slowly pushed forward to the final discharge, where it is caught by the truck shown in the engraving. The heat inlet from the firebox is arranged near the final ore discharge and at the side of the furnace as shown, and the heat travels through the various hearths in a direction contrary to that of the ore, finally passing to the chimney by an outlet situated on the first or upper floor. The ore travels about 200 feet from the point where it enters the furnace to the point where it leaves it.

A New Method for Determining the Melting Point.

In the course of legal analyses, where it became necessary to examine carefully very small quantities of stearin and other candle material upon pieces of clothing, and where the quantity of material was so small that the use of capillary tubes was impossible, Van Leden-Hulsebosch (Pharm. Weekblad) devised the following method: He laid small pieces of the cloth on which the fat was detected in a small aluminum capsule, and floated this upon water in a large beaker. He then heated this water bath very care-

fully, and suspended in it a thermometer so adjusted that only the upper portion of the water affected the thermometer. Slowly raising the temperature, he kept a close watch on the thermometer and upon the grease under examination, and was thus enabled to determine with considerable accuracy both its melting and congealing points.

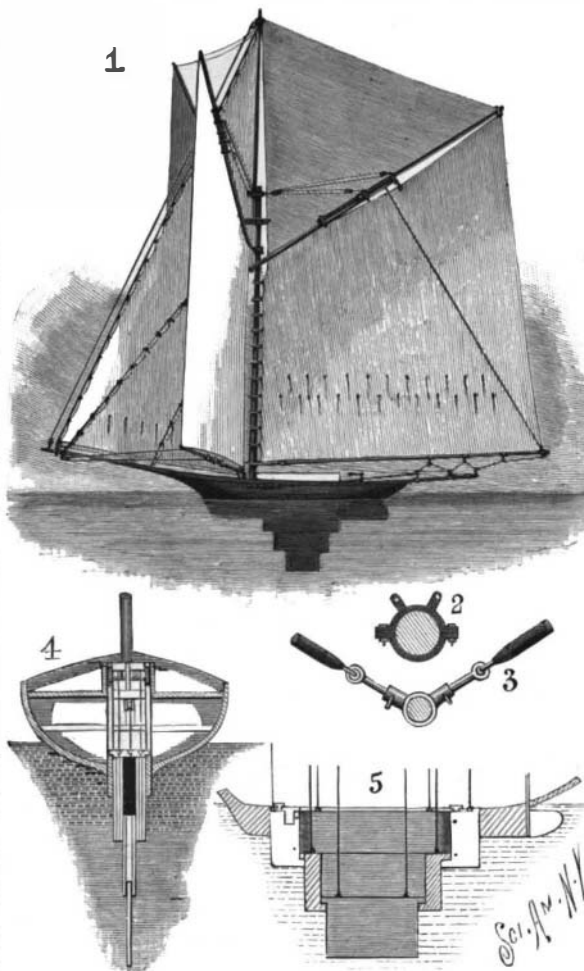
AN IMPROVED SAILING VESSEL.

An improved form of centerboard and new methods in the construction of spars and rigging are shown in the accompanying illustration of a sailing vessel. The various devices have been patented by Mr. William King, of New Orleans, La. By reference to the illustrations it will be seen that the stability of the vessel is increased by providing it with a telescopic centerboard which consists of a main centerboard within which is a double centerboard, an amidship centerboard carried by the double centerboard, and a port and starboard centerboard respectively carried on each side of the double centerboard, and within the main centerboard. When the boards are down to their full depth they are supported by lugs at their ends which engage ledges in the adjoining boards, and they are raised or lowered by cables which are actuated by winches conveniently arranged above the centerboard well. When the vessel is closehauled in a fresh breeze the board is lowered to its full depth as in Figs. 1, 4, and 5. When it is sailing free all the boards are housed within the well. If it is cruising with light sails or with a nearly fair wind, one or both of the port and starboard centerboards may be used. In this way the lateral plane and stability of the vessel may be regulated at will.

The spar plan and sail plan are also formed so that they may be enlarged or decreased at pleasure. This is accomplished by providing the spinnaker booms, and the gaffs of the mainsail and of the spinnakers, with auxiliary spars, sliding within suitable rings or sockets which are fixed near the ends of said gaffs and booms. These spars are adjusted by means of halyards and blocks, and can be reefed home or run out as desired, and a larger or smaller amount of canvas carried. Two spinnakers are used, and the booms are pivotally mounted on suitable steps which are placed one on each bow of the vessel. The spinnakers are not hoisted to the topmast as is usually done, but are provided with extensible gaffs, the heels of the gaffs being pivotally connected with a band, which is clamped upon the mast, as shown in Figs. 2 and 3. This connection has a universal pivotal movement. Should the topmast be carried away, one of the gaffs could be swung up into position and used in its place. These gaffs are hung from the topmast by the customary halyards and blocks.

The spinnaker booms are sheeted forward to the bowsprit end and aft to the outrigger as shown, and when they are not in use they rest in crutches at the end of the bowsprit.

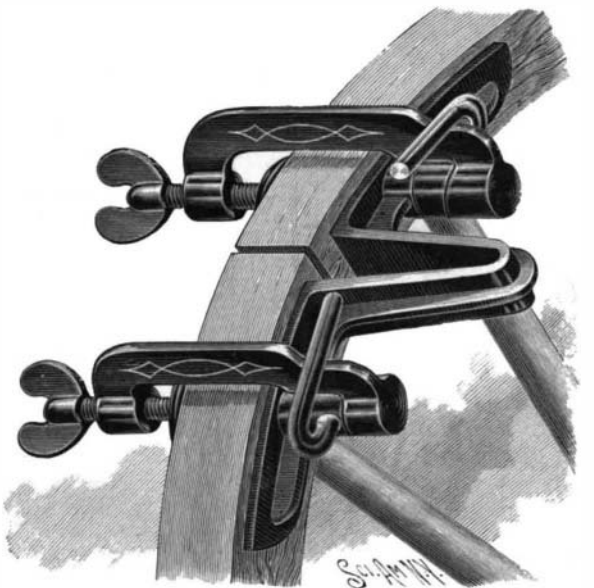
By the use of the two separate spinnakers the handling of the sails when running before the wind is simplified, and the dangerous operation of "gybing" is avoided. A stout outrigger is provided at the stern upon which the blocks of the main sheet are fastened, the long boom being greatly stiffened thereby.



AN IMPROVED SAILING VESSEL.

A RIM CLAMP FOR WHEELS.

An improved clamp for use in the manufacture of the rims or fellos of wheels, which has been patented by Mr. Charles Schalles, of Cortez, Colorado, is shown in the accompanying illustration. It consists of a body bar, which is T shaped in section, and is provided at the middle of its length with a deep, laterally extending arch. On each side of the arch a bearing surface is formed, which is provided with a hole to receive a sliding spindle or pin. Associated with the body bar are two clamps or yokes, at one end of which are provided adjusting screws, which terminate in flat swiveling heads or bearing plates. The outer end of the yoke carries a spindle, which projects



A RIM CLAMP FOR WHEELS.

inwardly and lies in the same axis as the above-mentioned adjusting screws. Upon this spindle is arranged a lock lever, and the adjacent faces of the lever and the clamping yoke are formed spirally, so that when the lever is thrown over across the yoke, as seen in the illustration, it will cause the lock to travel in the direction of the adjustment screws, and so exercise a clamping action upon the bearing surfaces of the body bar. In applying the clamp the lock levers are thrown back and the body bar is placed across the joint so that the abutting ends of the rim will be directly opposite the laterally extending arch. The bearing plates are brought snugly up against the opposite side of the rim, and the clamp is then tightened by turning the cam levers into the position shown in the cut. By this device the abutting ends of the rim sections may be accurately trimmed with a saw, for being rigidly held in position they cannot twist and bind the saw. The invention is also capable of attachment to wheels of different widths, and it provides a means for locking the clamps independently, so that one section may be loosened and allowed to assume its proper position relative to the clamped section, thus facilitating inspection of the joint.

The Appellate Justices Decide Against the Broadway Tunnel Scheme.

The question of rapid transit for New York City has taken one step forward, or backward, according as the citizens may individually regard the recent ruling of the justices of the Appellate Division of the Supreme Court against the proposed tunnel beneath Broadway, New York. The Broadway scheme as submitted by the Rapid Transit Commission and indorsed by the Supreme Court Commission is vetoed with unusual emphasis, and the decision is one from which there is no appeal. The ruling states that "the most serious question is that of cost," and it dwells upon the fact that "after all the investigation which the Court Commissioners made upon the subject, they were entirely unable to come to any conclusion as to the probable expense;" and it points out that the cost of construction in any case would pass the city's debt limit.

The public will now turn naturally to the late proposition of the elevated roads as affording the only immediate prospect for enlarged transit facilities. It is the intention of Mayor Strong to submit the proposals of Messrs. Gould and Sage for an extension and enlargement of the facilities of these roads to the Rapid Transit Commission, and it is to be hoped that the scheme will be indorsed and pushed through to completion at an early date. It would appear to be the general sentiment that an underground system of transit is only to be regarded in any case as a "dernier ressort," but while the sentiment is reasonable and strong, we think that the statistics of the city's growth give reason to believe that we shall be driven to this extremity sooner than is generally supposed.

Two trees, 125 feet from each other, at Gainesville, Ga., were recently struck and shattered by a single bolt of lightning.

Science Notes.

In the ocean, at a depth of 500 feet below the surface, the sun has an illuminating power about equal to the light of the full moon.

Dr. Behring has donated the 25,000 francs he received from the "Albert Levi" prize to establish a fund for sero-therapeutic research.

The deaths from alcoholism in Sweden amount to 90 per thousand. This is the highest rate in the world, says the Medical Record.

The German Emperor has had his left arm "skia-graphed" preparatory to an operation which is expected to give him partial if not complete use of the now useless member.

It is reported in the British Medical Journal that those working with the X rays are likely to suffer from a variety of skin affections said to be similar to the results of sunburn.

The Medical Society of Berne has inaugurated a plan for the suppression of press notices of suicides, as it has been observed that epidemics of suicides, so called, come from "suggestion," acquired through printed accounts of them.

A peculiar case of rabies has occurred in Cheshire, England. A black retriever last September bit eight cows, and after being killed proved to be mad. The cows showed no sign of madness, but two of them gave birth to calves which undoubtedly died of rabies.

Observations taken during the second half of 1895 at the observatory of the Roman College by Tacchini show that during this period sunspots have continued to decrease with a secondary minimum in November, when days without sunspots were observed. The protuberances have shown very little change during 1895.

A curious property of potassium uranyl sulphide has been reported to the French Academy by M. Becquerel. When excited to phosphorescence, this substance emits rays which last a long time—more than 160 hours—after phosphorescence ceases, which pass through paper, aluminum and copper, and which discharge electrified bodies like the Roentgen rays.

The discomfort produced by crowded, ill-ventilated rooms, in persons not accustomed to this condition of things, is not due to the excess of carbonic acid, nor to bacteria, nor, in most cases, to dusts of any kind. The two great causes of such discomfort, though not the only ones, are excessive temperatures and unpleasant odors.—Drs. J. S. Billings, S. Weir Mitchell, and D. H. Bergen in Smithsonian Contributions.

The researches of M. Moissan show that yttrium forms a carbide of the formula C_2Y . It occurs in transparent crystals decomposable by cold water, with formation of a gaseous mixture rich in acetylene, and containing methane, ethylene, and a small quantity of hydrogen. Thorium also forms a crystalline and transparent carbide, C_2Th , which is also decomposed by water, producing gaseous carbides, poorer in acetylene, but richer in free hydrogen.

Mount Manna Loa, in the Sandwich Islands, was in violent eruption at 7 o'clock on the morning of April 20. The fountain of lava, flame, and ashes on the summit of the mountain was estimated by observers at Hilo as 4,000 feet high. The light was so brilliant that it was seen from Lahama, 110 miles away, the next night, and the glow was seen at Diamond Head, 180 miles distant. This indicates an eruption of the greatest magnitude.

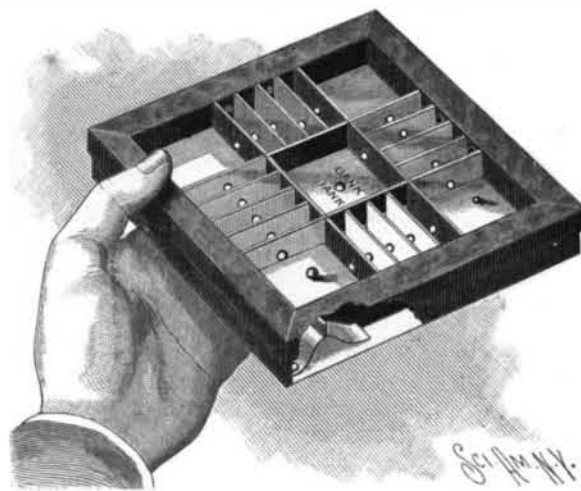
The first edition of Prof. C. A. Young's work on "The Sun," published in 1881, mentions twenty-one elements as having been detected by the spectroscope in the sun. In all of these 860 lines had been identified. The new edition of Prof. Young's book states that Prof. Rowland has now compared sixty elements with the solar spectrum, and established the existence of thirty-eight of them in the sun, being doubtful in regard to eight of the others. Of iron lines alone he has identified more than two thousand.

M. Moissan, in France, has analyzed specimens of opium as used by the Chinese, says Knowledge, and finds that the smoke is formed of volatile perfumes and a small quantity of morphine. It is the latter which produces the phenomena sought by opium smokers, and it is said that they do not appear to find more ill effects from the practice than most tobacco smokers, provided that they use the preparation known as chandu of the best quality. The commercial quality of opium is, however, very different, and the inferior sorts when decomposed by heat produce various poisonous compounds.

An egg of the now extinct great auk was recently sold in London for 160 guineas, although the shell was slightly cracked. So rare and consequently so valuable are these eggs that each one has a history. The one in question was purchased in 1841 from Frederick Schultz, of Dresden. In the Newcastle Natural History Museum, which possesses one of the finest collection of sea birds in Great Britain, the curator keeps in a locked drawer what appears at first sight to be a large number of great auks' eggs. But only one is a real specimen, the rest are chalk or plaster models of other existing treasures, and so good are the imitations that only a practiced eye can detect the real from the sham, handling being, of course, prohibited.

THE THIEF AND DETECTIVE PUZZLE.

The puzzle shown in the accompanying cut has been patented by Mr. Oscar Beisheim, of New York City. It consists of a shallow box, which is divided by thin partitions into a series of streets and squares, whose arrangement will be seen in the illustration. All the partitions are perforated to allow passage from one street or square to another, the perforations being of two sizes to match the sizes of two balls which are supposed to respectively represent a detective and a thief, the thief being able to traverse all the streets and openings, the detective being restricted to movement in a predetermined path. Within the side street, on



THE THIEF AND DETECTIVE PUZZLE.

one side of the box, two coverts are arranged, having perforations in the roofs, through which the thief only will pass, and within the side street on the opposite side is provided a spring keeper, adapted to cover and retain the detective. A money vault or safe is supposed to be located in the central square. The box is provided with a glazed top, which allows all of the interior to be seen, except the four side streets. The puzzle is handed to the player with the thief inside the covert and the detective held by the keeper. To solve it he has to start the thief on his way to the bank, and set the detective after him in pursuit. This is done by inverting the box, when the thief will roll out of the hole in the covert, and by slightly raising the corner of the lid, which will release the keeper and permit the detective to roll into the street. To solve the puzzle, the player must now bring the thief and the detective together in the central square or bank.

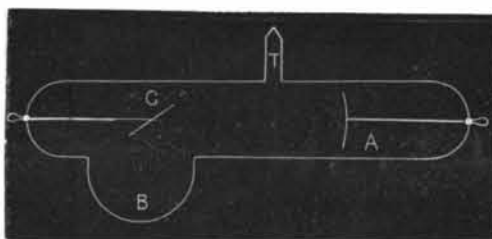
IMPROVEMENTS IN CROOKES TUBES.

BY C. C. HUTCHINS AND F. C. ROBINSON, BOWDOIN COLLEGE.

During the last two months every college, high school and private individual that could procure an induction coil and a Crookes tube has been making pictures of hands, coins, keys and such things in endless variety.

At Bowdoin College a long series of experiments has been in progress with a view to improving the tubes.

We have made and tested every shape and variety



IMPROVED CROOKES TUBE.



MADE WITH ONE-HALF SECOND EXPOSURE THROUGH PLATE HOLDER.

that seemed to give any promise of success, and are convinced that the ordinary spherical or bulb form is about the worst possible, while a comparatively small tube has so far given the best results.

The window intended for the passage of the rays must be as thin as possible, because glass, as is well known, is more or less opaque to them. At the same time it must be thick enough to bear the pressure of the atmosphere when the tube is exhausted.

Of all the forms of tube that we have tried, the one shown in the annexed diagram is the most effective. Here the anode, C, is an inclined plate of thin platinum. This is placed at or beyond the focal point of

the cathode, A. This piece of platinum becomes red hot, and is, as far as can be judged, the source of the ray. It is a curious fact that the anode, C, if made in the form of a thin plate, may nearly fill the tube without in any way obstructing the passage of the rays out at the bulb. The bulb is filled with an intense green fluorescence, and sparks can be drawn from it by approaching the finger.

Not only do these tubes give remarkable results in the way of intensity of rays, but also extremely fine definition.

The cellular structure of the bones is clearly brought out and the course of the tendons can be traced along the arm. Good pictures of the bones of the fingers can be obtained in from five to thirty seconds, and of the hand and wrist in from one to ten minutes.

Mr. Edison, in the current number of the Century, states that a good tube should give a distinct impression upon the photographic plate through eight inches of pine in fifteen minutes.

We have photographed metallic letters through ten inches of pine in five minutes; while such objects as keys and coins can be satisfactorily done in one-tenth to one second through the slide of the plate holder, using only the ordinary induction giving a five or six inch spark.

With the fluoroscope the bones of the arm, leg, etc., can be minutely examined, and clear light obtained through the trunk and chest.

[The pictures to which reference is made show the texture and cellular structure of the bones, and are remarkable for sharpness and clearness. They are far in advance of the usual X ray silhouettes, and we regret that the distinctive features could not be reproduced in half tone. In response to our query as to the ability of the tubes to retain their efficiency, Prof. Hutchins informs us that "if the vacuum becomes too high by use, it is only necessary to heat the tube a little."—EDS.]

Signs Among Savages.

If no serious writer tells of a people actually dumb, plenty even at this time assert that there are races which cannot converse among themselves without the assistance of gestures. We hear of them east of Cape Palmas, in Tasmania, Ceylon, Brazil, South Africa, North and South America, and upon excellent authority. But confirmation of the report does not arrive in such volume as we should expect at the present day, when thoughtful and observant travelers swarm in every quarter of the world. The most striking case is that of the Arapahoes, because it has the guarantee of Sir Richard Burton, not because it is most impressive in itself. He says that these red Indians must rise and sit by the camp fire when they wish to talk at night, or must kindle a fire for the purpose. But Burton could not possibly have been speaking of his own knowledge, for he spent a very short time—six weeks, if we remember right—in galloping through "the plains." His account of all such matters as this must have been hearsay. But there is no doubt that many savages would be embarrassed if they could not assist the transmission of their ideas by gesture. One could hardly fancy a Bushman talking without grimaces and motions at every syllable. But the serious interest of gesticulation lies in the identity or the difference of its forms in various parts of the world. Such strange and unaccountable resemblances have been noted among races as far remote from one another as could be, and so many of them appear in deaf mutes of civilized Europe that one may almost be tempted to think mankind had a natural language after all, but one—or perhaps two—of gesture, not speech. It may be confidently assumed that some earnest and laborious student will go into this subject thoroughly one day; perhaps he is now at work. It would be his task to gather lists of signs used by divers people, and compare them. Burton collected some; a vast number of travelers record a few. Dr. Tyler has noted many which coincide with those used by deaf and dumb persons—either their own individual discovery or adopted into their system of education. Thus he found that the signs for hiding, seeing, mother and sister, yes and no, truth and lie, food, think, trade, day, etc., recorded by Burton among the red Indians, were quite intelligible to deaf mute children in Berlin, where his studies were made. This is most extraordinary, if one think of it. And he gives some practical illustrations upon the authority of American experts. A native of Hawaii was taken to an asylum, and forthwith began to "chatter" volubly, telling the inmates all about his country and his voyage. A Chinaman who could speak no language but his own had fallen into a state of melancholy. Introduced to a number of deaf and dumb children, he became quite vivacious, talking and answering. And we have a letter from a deaf and dumb boy taken to see some Laplanders. He spoke to the woman by signs, "and she understood me. . . . She did not know we were deaf and dumb, but afterward she knew, and then she spoke to us about reindeer and elk, and smiled at us much."—London Standard.