Improvement in Bridle Bits.

This invention consists in making the cheek pieces by which the bit is hung to the cheek straps, independent of the bit, to a certain extent, so that the latter may be rotated in the horse's mouth to bring the curb chain to bear upon the jaw without moving the cheek pieces. Also in placing small metal rollers on the bit, to prevent the horse from seizing the bit in his teeth.

A in the engraving represents the bit, and B the small metal rollers. The side pieces, C, have square holes in them by which they are fastened upon the ends of the bit. The extremities of the bit outside the square shoulders, are cylindrical, and upon these cylindrical portions are loosely placed the lower ends of the cheek pieces, D, where they are retained by nuts, spaces wider than the cheek pieces being left between the nuts and side pieces by means of which the bit and side pieces are allowed to freely rotate.

The spaces are partially closed by flanges projecting from the side pieces and inclosing the lower ends of the cheek pieces, with the exception of a recess in which the side pieces rotate. This arrangement enables the rider to tighten the curb, without interfering with the cheek pieces

The bit is more particularly designed for cavalry use, and is the invention of Col. Thomas B. Hunt, Quartermasters' Department, Austin, Texas.

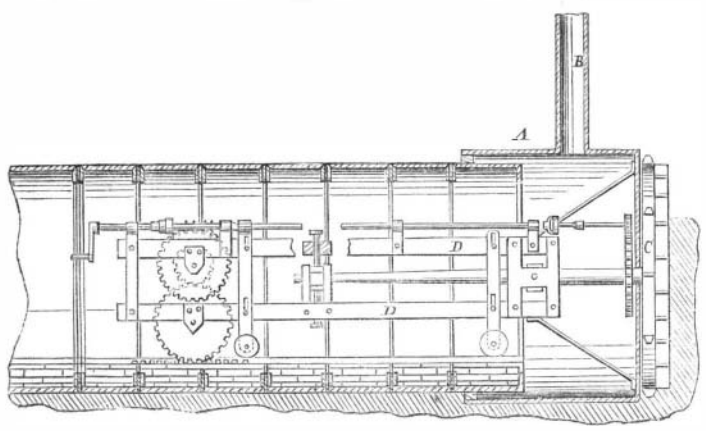
Patented in France through the Office of the Scientific American.

Important Patent Decision.

In the United States Circuit Court, Judge Blatchford has granted an injunction in the important suit of Isaac P. Frank against Charles F. Jacobson and Charles E. Mabie (known as the United States Refractor Company), in which great interests are involved, restraining the defendants from infringing on the plaintiff's patent for glass-lined reflectors, such as are used for lighting stores, churches, theaters, and public buildings generally.

TUNNEL EXCAVATOR.

Our engraving illustrates an appliance for excavating tunnels, patented by Theodore A. Fisher and Anson F. Fisher, of Beardstown, Ill. It consists of a sliding coffer, A, provided with an excavating disk, C, supported by a car, D, arranged on a suitable way in a cast-iron tube. By means of suitable gear the excavating disk is kept advanced to its work. Those familiar with the excavation of the tunnels by the use of coffers, will need no further description to understand the general principle of the device, which is designed to lay submarine tunnels, the cast-iron tubing to be laid in sections as the work proceeds. Air is supplied to the coffer through the tube, B.



Manufacture of Champagne.

As the greater part of the champagne country has been overrun by the German army and the exportation of genuine wine can hardly take place for sometime to come, the artificial production of this beverage is likely to receive a new impulse. For those who prefer to manufacture their own champagne we append a number of approved recipes:

8 Parts of the best West India sugar are to be dissolved in 4 quarts of distilled water, and boiled, and while still hot, 2 quarts of rectified spirits added. This affords what is called champagne liquor to serve as stock in the manufacture.

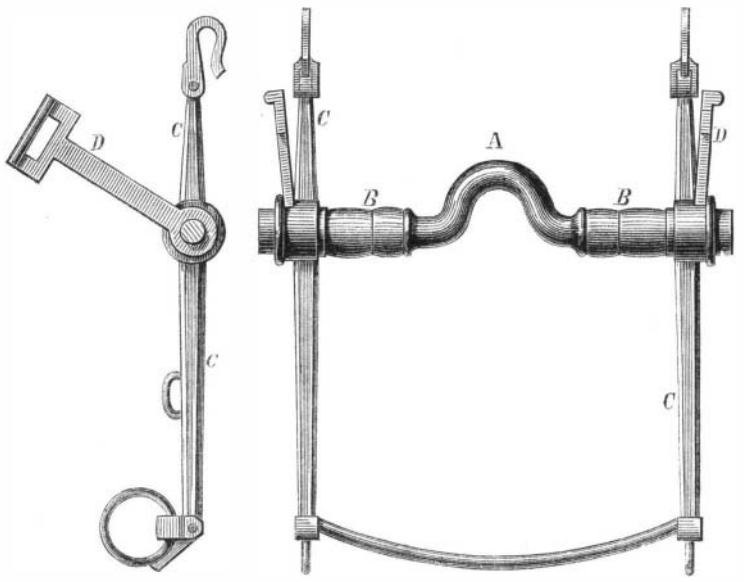
To prepare the Roedern brand with green seal and bronze cap, take one portion of the above liquor, 1 anker white wine, 1 bottle cognac, and 4 drops of the oil of wine beer dissolved in cognac.

For Heidsick, 1 portion liquor, 1 anker white wine, and ½ quart cognac.

Other varieties are prepared in a similar way, the chief difficulty being to provide the proper bottle, sealing-wax, and labels. In default of white wine, cider is found to answer every purpose, and glycerin can be substituted for sugar.

Plaster Casts of Natural History Objects.

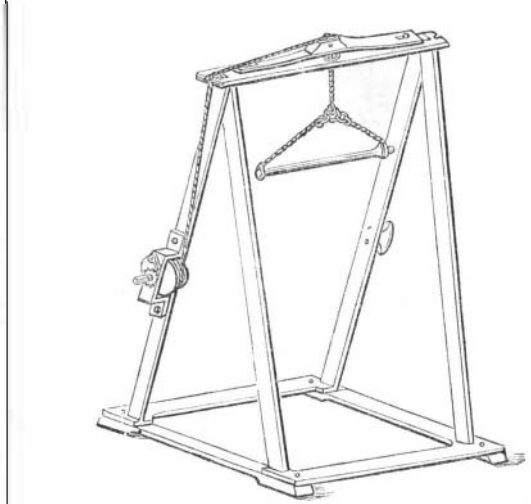
At a recent meeting of the Manchester Philosophical Society, Mr. Boyd Dawkins, F. R. S., exhibited a number of casts in plaster of Paris, of various objects of natural history, and explained the process by which any one can make them for himself. The material of the mold is artists' modeling wax, which is a composition akin to that which is used by dentists. And as it becomes soft and plastic by the application of heat, though in a cold state it is perfectly rigid, it may be applied to the most delicate object without injury. As it takes the most minute markings and striations of the original to which it is applied, the microscopic structure of the surface of the original is faithfully reproduced in the cast. The method is briefly this: 1. Cover the object to be cast with a thin powder of steatite, or French chalk, which prevents the adhesion of the wax. 2. After the wax has become soft, either from immersion in warm water or from exposure to the direct heat of the fire, apply it to the original, being careful to press it into the little cavities. Then carefully cut off the edges of the wax all round, if the under cutting of the object necessitates the mold being in two or more pieces, and let the wax cool with the object in it, until it be sufficiently hard to bear the repetition of the operation on the uncovered portion of the object. The steatite prevents the one piece of the mold sticking to the other. The original ought to be taken out of the mold before the latter becomes perfectly cold and rigid, as in that case it is very difficult to extract. 3. Then pour in plaster of Paris, after having wetted the molds to prevent bubbles of air lurking in the small interstices, and if the molds be in two pieces it is generally convenient to fill them with plaster separately before putting them together. 4. Then dry the plaster casts, either wholly or partially. 5. Paint the casts in water colors, which must be fainter than those of the original, because the next process adds to their intensity. The delicate shades of color in the original will be marked in the cast by the different quantity of the same color which is taken up by the different textures of the cast. 6. After drying the cast, steep it in hard paraffine. The ordinary paraffine candles, which can be obtained from any grocer, will serve the purpose. 7. Cool and polish the cast by hand, with steatite. The result of this process is far better than that obtained by any other. The whole operation is very simple, and promises to afford a means of comparison of natural historys pecimens in different countries, which has long been felt to be a scientific need. Casts of type specimens may be multiplied to any extent, at a small cost of time and money, and are as good as the original for purposes of comparison, and almost as hard as any fossil. Mr. Dawkins has employed it for copying flint implements, fossils, and bones and teeth, which can scarcely be distinguished from the originals.



HUNT'S BRIDLE BIT.

EXERCISING APPARATUS.

A portable apparatus for gymnasiums and private use, and which combines the horizontal bar with the swing, is shown in the accompanying engraving. It is the invention of Geo. W. S. Hall, of Baltimore, Md. On the upright of the frame is a device for taking up or letting out the rope, which latter passes over a pulley hung in the middle of a spring, and descends to support the bar, as shown in the engraving. The whole can be taken in pieces for transportation, and easily set up for use when wanted. The utility of apparatus of this kind to those leading sedentary lives, has not been hitherto properly appreciated by the American public, but we are glad to say that the disorders which our general lack of proper muscular exercise has entailed upon a large class of our population are gradually teaching us its value.



SIEMENS' PYROMETER.

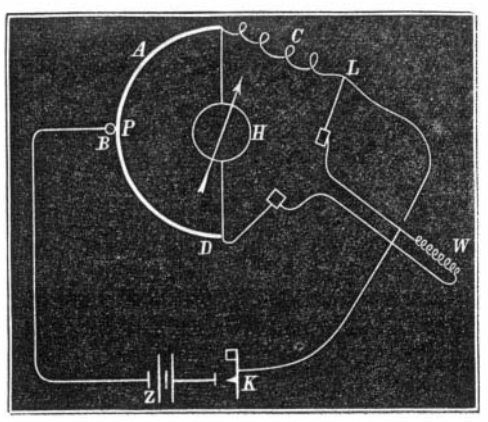
[Condensed from The Mechanics' Magazine.]

This instrument can be used to indicate high temperatures, such as those met with in blast furnaces; it can also be used to measure moderate temperatures, but its chief feature is that the indicating part of the apparatus may be several yards, or miles even, away from the place of which the temperature has to be ascertained. Hence it was used by Dr. Carpenter to learn the temperature of the deeper portions of the Atlantic, and it enables ironmasters and colliery proprietors to see in the office of the works the temperature of their pits or furnaces which are at a distance from the place of observation.

The principle of the instrument is simple. When a plati-num or iron wire rises in temperature it offers more resistance than before to the passage of a current of electricity. Hence the variations in the conductivity of the wire serve to indicate the variations in temperature, which variations may be read off by means of suitable galvanometric appliances.

The apparatus for indicating high temperatures, such as those of furnaces, consists in a coil of fine platinum wire wound round a cylindrical clay pipe, which pipe is about 3in. long by ½in. in diameter. The wire lies in a spiral groove made upon the surface of the clay cylinder; this grooving prevents the convolutions of the platinum wire from touching each other, in consequence of which the electrical current must pass along the whole length of the wire, or about three yards. The exact length through which it must pass is regulated by a small platinum adjusting clamp, the position of which may be shifted. In this way all the instruments made by Mr. Siemens are adjusted to give the same indications. The ends of the fine wire which measures the temperature are connected with two thick platinum wires, each about 18in. long; as the further ends of these thick wires are at a tolerable distance from the source of heat when the instrument is in use, they in their turn are connected with thick copper conducting wires. All these wires are protected by clay pipes. The whole of this arrangement is placed in a protecting tube of iron about 4ft. long. The platinum spiral pyrometer is then in the closed end of the tube; the other end of the tube has a wooden cap on which two brass terminal screws are fixed, and these screws are connected with the conducting wires to and from the spiral.

When temperatures above the melting point of iron have to be measured, the end of the tube which is subjected to the heat must be made of platinum. In some instances, where moderate furnace temperatures have to be measured, the end of the tube may be made of copper. The metal is very thick at a point some few inches nearer the cold end of the pipe than the platinum spiral, in order that the cooler part of the outer pipe may not draw off the heat by conduction too rapidly, and thus affect the reliability of the indications. The short clay cylinder carrying the platinum spiral has a projection at each end, which prevents any part of the spiral touching the sides of the iron pipe, and thus interfering with the accuracy of the indications by increasing the electrical conductivity of the whole arrangement.



When the end of the great metallic pipe is pushed into a furnace, the temperature of the platinum spiral rises and its electrical conductivity consequently decreases; the decrease in conductivity is measured by electrical appliances, and thus the temperature of the furnace is read off.

Conducting wires are connected with the terminal screws at the cold end of the iron pipe, and thus the hot spiral becomes a part of the electrical circuit. The change in the electrical resistance is then measured by apparatus, the principle of which may be explained by the aid of the accompanying diagram.

The current goes from the zinc pole of the battery, Z, to the movable contact wheel, B, which wheel may be moved to any part of the arc, A D, which is a very fine platinum wire fixed round the edge of a disk of ebonite. When the little wheel is in the position shown in the diagram, the current enters the platinum wire at P, and splits into two parts, one portion of the current going to A, and the other to D. Midway between A and D, the galvanometer, H, is fixed. From the two ends of the platinum wire, A D, the current passes on one side into the constant resistance, C, and at the same time into the galvanometer; on the other side it passes to the other terminal of the same galvanometer, and at the same