

## NEW GRADUATING APPARATUS.

This apparatus was designed to facilitate the accurate graduation of glass tubes—burettes used in volumetric analyses, technical assays, pharmaceutical work, etc.

The tube, A A, to be graduated is secured by brass clamps, *e e*, to the wooden frame, P. The piston, S, of brass, loosely packed with rubber, is rigidly connected by the brass rod, F, with the block, *b*. The smaller end of the glass tube, A', is tightly connected by a piece of rubber tubing with the glass tube, G, which joins, at right angles, the small upright graduated glass tube, E E'. This tube is continued downward, and connected by a short piece of rubber tubing with the feathered delivery tube, B, a pinch cock serving to stop the tube at O. The upper part of the tube, from *e* to *c'*, is graduated to contain one cubic centimeter of water, and this space is subdivided into tenths of a centimeter. Water from D is introduced into the tube through the small funnel. The hard-wood rod, T, has a fine steel point rigidly affixed at *i*, the other end being similarly fitted with a wedge-shaped blade, *p*.

In using the apparatus the tube to be graduated is uniformly coated with a thin film of white wax or collodion. A small quantity of water is then put into it, the piston adjusted so as to fit snugly but loosely, and the tube securely clamped in position, connection having been made with the tube, G, the pinch cock at O is opened, and the piston forced up to the end, A, of the tube, expelling the water (and air) through G and B. The pinch cock is then closed and water (at 60° Fah., or 16° C.) let into the tube, E, from D, until it is filled to the mark, C, any excess being drawn off through B.

The block, *b*, is then grasped and slowly drawn back until the water in E E' has fallen to *a*, the first mark on the scale. The steel point, *i*, on the rod, T, is then inserted in a fine hole, nick, or cut line on the upper side of the block, *b*, and held in position, while the blade, *p*, at the other end of the rod is brought down on the coated tube, and a fine line cut through the coating to the surface of the glass. The block, *b*, is again drawn back until the water in E E' falls to the next line on the scale, when the rod is brought into requisition, as before, and another mark made on the tube. These operations are repeated until the water in the tube, E E', falls to C', when it is again filled to C, from the reservoir, D, and so on, until the graduation of the tube, A A', is completed.

The lines are etched in by exposing the tube to gaseous hydrofluoric acid—evolved from a mixture of powdered fluor spar and warm oil of vitriol contained in a suitable leaden dish or by the use of liquid hydrofluoric acid. Wherever the film of wax or collodion has been cut so as to admit of contact between the acid and glass, the glass becomes sufficiently etched in a few minutes.

The wax may be removed from the glass by washing with benzine, the collodion by hot water and a brush.

Tubes graduated in this way are much more accurate than those graduated by the usual methods, or where variations in internal diameter of the tube are not taken into consideration. The time required in the operation is reduced nearly one half over the older methods of volumetric graduation.

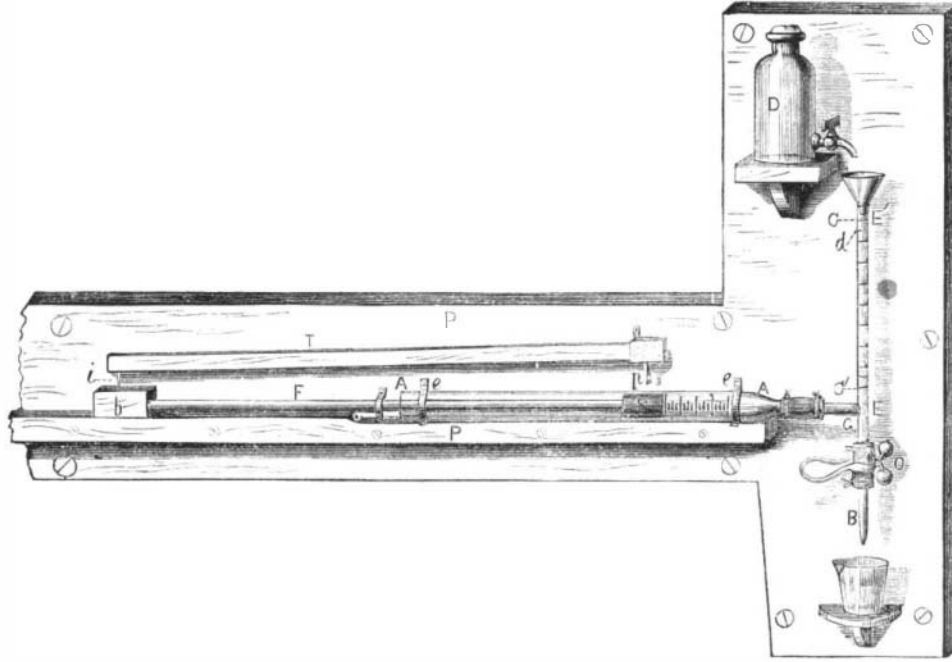
## Statue of Marco Polo in Venice.

A statue of Marco Polo, discovered in Canton, has been received at his native city, Venice. It is life-size, made of wood, and gilt. According to a foreign contemporary, the famous Venetian traveler is represented seated, wearing the Chinese attire, although the cloak and hat are after the European fashion. His moustache and beard, which surround his face, are tinged dark blue, and while the Chinese artist has given him a peculiar form, the features in no way resemble those of a Mongolian type. Opposite the large, red, easy armchair upon which Marco Polo is seated is placed a porcelain bowl, intended to receive perfumes, with which he was honored in the same manner as is the protecting genius of Chioa in the temple of Canton. The statue has, at the foot, an inscription in Chinese characters.—*Builder.*

## The Faure Battery and the Electric Light.

Some experiments of considerable importance have lately been carried out by Mr. Keates, the Consulting Chemist to the Metropolitan Board of Works, in which a Faure accumulator has been employed in the production of the electric light. The lamps used on this occasion were respectively those of Maxim and Swan, one of each description being attached at a time. M. Faure states that in these experiments 40 cells represent about half an available horse power for three hours. The Maxim light being placed in connection with the accumulator, 30 cells were found to give the light of 16 candles. With the same number of cells the Swan lamp gave the light of 22.4 candles; with 35 cells the lights became respectively 45.3 candles and 65.6. With 40 cells the Maxim light rose to 101 candles, and the Swan to

141. Thus far the Swan light gave the greatest amount of candle power. But with 45 cells the Maxim light rose to 229 candles, while the Swan only displayed 204. The capacity of the latter was evidently being overtaxed, for in about a minute the carbon loop broke. A power of 50 cells was then connected with the Maxim light, which then rose to 333

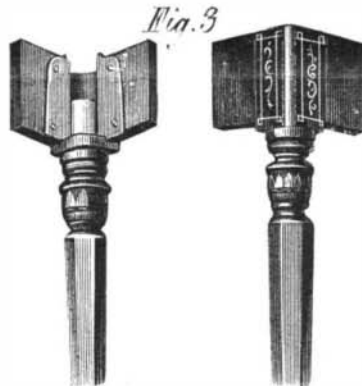


## NEW GRADUATING APPARATUS.

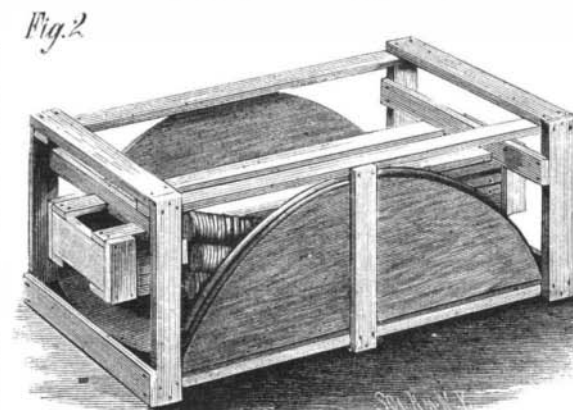
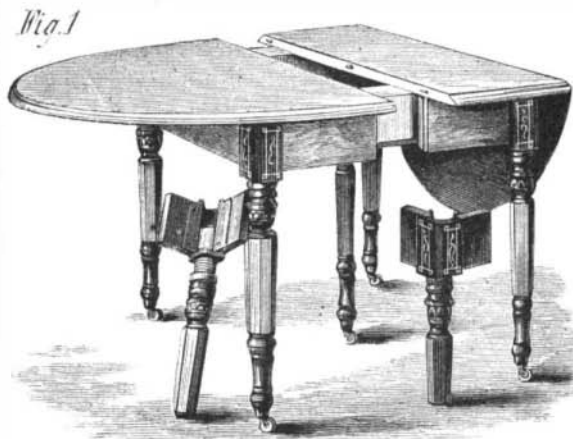
candles, but in about a minute the carbon loop shared the same fate as the Swan. The experiments are also interesting as showing the great increase of light obtained by a comparatively small increment of power. Thus, in the case of the Maxim lamp, taking 31 cells as the standard, an increase of one-sixth nearly trebled the light; an increase of two-sixths augmented the light more than six times; three-sixths increased it fourteen times, and four-sixths twenty-one times.

## IMPROVEMENT IN TABLES.

The engraving represents a simple and inexpensive device for uniting the rails of tables and the legs with the rails to



facilitate the "knocking down" and putting together of the table. The invention is a corner or angle plate provided with vertical wing sockets for the reception of the ends of opposite rails, and with inner central socket for receiving



LANGSTON'S IMPROVED TABLE.

the upper end of the table leg. Fig. 1 in the engraving shows a complete extension table having the improved corners attached. It also shows the inside and outside of the corner piece in detail. Figure 2 shows the table "knocked down" and ready for shipment, and Fig. 3 is an enlarged view of the angle plate. The

table corner is a casting having an outer corner or angle plate that fits against the outside of the table rails. To the inner angle of the plate, and forming an integral part of it, is attached a socket having opposite projecting side wings to fit against the inside of the table rails; these wings completing the sockets for receiving the ends of the table rails.

The cylindrical socket that extends upward from the lower edge of the angle brace, and within it, is of sufficient length to hold the table leg firmly, and the table is made fully as solid as with mortises and tenons. This socket may be screw-threaded and the table leg screwed in; or it may be plain inside, or fluted. From the upper edges of the wings sharp studs project for firmly holding the table top.

A table made in this way can be more readily put together or taken apart, knocked down for packing, and be more easily transported than those of ordinary construction, while at the same time it is strong, durable, and cheap.

Further information may be obtained by addressing the inventor, Mr. H. J. Langston, Garrettsville, Ohio.

## NEW INVENTIONS.

An improved stove mat for coffee pots and other utensils has been patented by Elizabeth C. Zumwalt, of Port Orford, Oregon. The invention consists in a mat made of a plate of sheet metal, having apertures and a handle to adapt the mat to be placed upon the top of a stove to receive a coffee pot or other utensil, the object being to prevent the bottom of the vessel from burning.

An improved balance for obtaining the lea of yarn has been patented by Mr. Thomas Finigan, of Mechanicsville, N. Y. The invention consists in a balanced scale beam provided at one end with a graduated scale, indicating the number of leas, and at the other end with a graduated scale with larger subdivisions, indicating the ply or number of strands of the thread, a movable unit weight being suspended from the latter end of the beam; whereas a certain length of the thread or yarn to be tested is suspended from the other end of the beam.

Mr. Curtis Griffin, of Middlefield, N. Y., has patented an improved adjustable frame as a substitute for the poles in raising hops. The invention consists in an upright having two crossed bars, with two cross pieces at the ends fastened to its top, which cross pieces have hooks at the ends to receive rings at the upper ends of a series of rods having rings fitting over the tops of a series of short posts around the upright, or on hooks at the upright, attached to their lower ends. The hop vines grow up on these rods, and the latter need only be unhooked when the crop is to be harvested.

An improved wagon brake has been patented by Mr. Robert Rutter, of Dillon, Montana Territory. The object of this invention is to facilitate the reversing of the brake roller, to allow the brake lever to be placed at the left-hand side of the wagon when the brake is to be put on by a man riding the near wheel horse, and to be placed at the right-hand side of the wagon when the brake is to be put on by the driver riding in the wagon.

Mr. Edward Ebi, of Cedar Rapids, Iowa, has patented an improved brake rod. The invention consists in a rod passing through journal bearings on the under side of the car, and provided at the ends with pivoted connecting bars having spring catches for keeping them united, which connecting bars are locked to the brake rods by means of a lever pivoted to the connecting bar and passing into notches of a loose and a rigid circular plate on the brake rod, so that all the brake rods of the several cars of a train will be revolved together and the brake shoes will be drawn against the wheels simultaneously.

An improved harrow has been patented by Mr. William J. Campbell, of Reed's Gap, Pa. The object of this invention is to provide means whereby the center bars of the harrow may be weighted by the side bars, and thus caused to make deeper cuts; and also to provide a harrow the tooth bars of which may be readily detached from each other for convenience in transportation and stowing away.

Messrs. Reuben R. James and Mirabeau N. Lynn, of Rising Sun, Ind., have patented an improvement in grain meters. This invention relates to apparatus for weighing and measuring the amount of grain that passes through it by devices actuated solely by the weight of the grain, and hence automatic in its operation. The invention is an improvement on the grain meter for which Letters Patent were granted to the same inventor February 22, 1881, No. 238,122.

An improved mail bag catcher has been patented by Mr. Calvin I. Kimball, of Portland, Me. This improvement relates to apparatus used on mail cars for catching mail bags, and have for their object to allow adjustment of the crane to the direction in which the car may be moving without removing the crane from its supports.

An improved tire tightener has been patented by Mr. Russell Jennings, of Sedalia, Mo. This invention relates to the class of tire tighteners which consist in a threaded bar or screw having a vertically movable clamp and a nut, by which, with the assistance of a winch, the said clamp is brought to bear against the fellies, and thereby separates the fellies from each other and from the spokes, where they have shrunk, the spaces thus created being filled with wedges.

Mr. Benjamin O. Branch, of Friar's Point, Miss., has patented a novel construction and arrangement of devices, for displaying in the cars the names of stations on a railway.

Mr. Carl A. Türpisch, of New York City, has patented an improved brooch formed of a wire bent in the form of a ring or in a similar manner, so that the two ends will be pressed against each other by the spring of the wire. To one of the ends a cap is attached in such a manner that it overlaps the point of contact of the ends of the ring, upon which ring a short sleeve is loosely mounted, and has a pin attached to it, this pin being passed through the article to which the brooch is to be attached, upon which the end of the pin is forced through between the ends of the wire into the cap, in which it is retained as the ends of the ring snap together, thus locking the point of the pin between the cap and the ends of the ring.

An improved attachment for seed drills has been patented by Mr. Howard M. Fordham, of Great Bend, Kan. The attachment has a rotary shaft with spirally arranged rods attached to the shaft which pass between the drill feet and push off collected rubbish, and springs are placed upon the rods to keep them clear of rubbish.

An improved astronomical clock has been patented by John L. Blair, of Clear Spring, Md. This invention relates to certain improvements in what are known as "astronomical clocks," designed to show by object lesson the minutes and hours of the day, the day of the week and month, the daily revolution of the earth, the yearly revolution of the earth, the phases of the moon, the time for the different longitudes on the earth, the lunar revolution, the signs of the zodiac, the tides, and synodical as well as periodical time.

An improved sulky attachment for plows and harrows has been patented by Mr. Edwin M. Carroll, of Pittsford, Mich. This invention consists in the peculiar construction and arrangement of the parts, which cannot be described without engravings.

Mr. Clinton O. Rockwell, of Roaring Branch, Pa., has patented an improved machine for cutting or pruning the runners from strawberry vines. This machine is provided with revolving knives which act against a hooked blade and cut the runners which are drawn upward by revolving hooks.

**JOINTED PITCH-BOARD FOR SQUARES.**

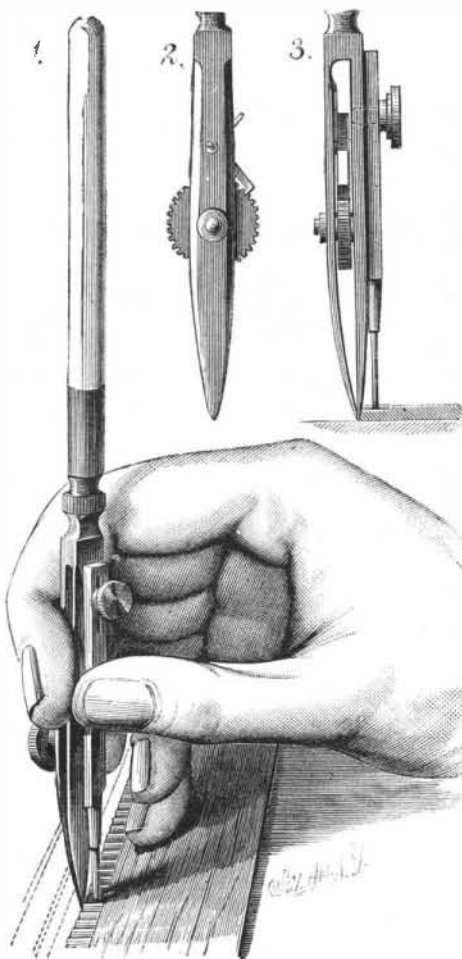
The engraving shows a carpenter's square provided with a middle jointed rule slotted in both sections, and connected by clamp bolts and wing nuts with the slotted arms of the square. The form of the instrument is clearly shown in Fig. 1. The square as well as the jointed rule are made of steel and have suitable scales engraved on them.

This instrument can be used for laying out miter boxes in the usual way, as shown in Fig. 2. It may be used for finding the length and bevel of rafters, as shown in Fig. 3, and it is found very convenient when used as a pitch board in laying out stairs, as shown in Fig. 4. It can be used for laying out dovetails on timber, as shown in Fig. 5; and it may have a straight-edge attached to it, so that it may be used as an extended square, and it will be found very convenient in solving many other problems in carpentry and joinery. The arms of the rule can be set respectively parallel with the blade and tongue of the square; then be used to size or box timbers. The arms of the rule can be adjusted to the blade of the square and used as a double bevel. The pitch board can be used to find the diagonal of a square; can be used to solve problems in proportion, such as finding the length of stair-string from the pitch-board; can be used to find the lengths and bevels of hip and jack rafters; can be used to find the sides and angles of hoppers and splayed work. It is the only instrument known to us that solves the right-angled triangle without calculation or drawing, that is, approximately. This useful invention was recently patented by Mr. Frederick N. Marvick, of Palatka, Fla.

**CEMENT FOR REPAIRING GLASS.**—Dissolve fine glue in strong acetic acid to form a thin paste,

**IMPROVED DRAWING PEN.**

The shading lines of a drawing must gradually increase in width toward the darker part of the drawing, and this is accomplished by increasing the distance between the points of the drawing pen a trifle after a line is drawn and before drawing the next line. This adjustment of the pen is not accurate, as the operator has no gauge to guide him, and relies entirely upon his judgment, and errors can hardly be avoided, except by using a drawing pen provided with some



**NEW DRAWING PEN.**

suitable gauge for adjustment, such, for instance, as is shown in the annexed cut.

Fig. 1 is a perspective view showing the method of making dotted lines. Figs. 2 and 3 are respectively front and side elevations.

The adjustment wheel is cogged, and its circumference is divided into a number of equal parts, which are numbered. An angular pawl is pivoted between the blades of the pen in such a manner that one end rests on the cogged adjusting wheel and the other end projects from between the blades, so that it can be depressed by the finger, raising the other end of the pawl from the surface of the wheel, which can

undulations of the rule. The pen has been patented by Wissmann & Wallegg, of Vienna, Austria.—*Wiener Technische Blätter.*

**The Ruby Gravel Company's Tunnel.**

There is no part of the world where so much tunnel work is carried on as in California. There is, of course, more or less tunnel work in quartz mining, but in drift mining operations very long tunnels are necessary in many cases for "bottoming" the gravel channels. Long tunnels have often to be run in hydraulic mining work also. As an instance of quick work in this line may be cited the tunnel being run by the Ruby Gravel Company, in Cariboo ravine, one mile south of Rock Creek, Sierra county. It is thus briefly described by the local paper, the *Mountain Messenger*:

Work was commenced last December, and since that time 2,050 feet of tunnel have been made. In round numbers the tunnel, all but a few hundred feet of the outer end, is 10 feet square, nearly all through hard rock that required blasting, and that stands without timbers. For 1,950 feet, the tunnel follows an air line, the course being a little north of east. The last 100 feet is turned to the south 17° from the former course. The grade of the tunnel is half an inch to 12 feet. At the mouth of the tunnel the company have a substantial engine house, and a powerful engine which drives the air compressor and a Struve two-plunger ventilating pump. From the compressor the air passes to a large upright reservoir of heavy boiler iron, about 10 feet in height and 4 feet in diameter. From this reservoir the air is taken, under a pressure of 50 lb. to the square inch, in 4-inch wrought iron pipe, to the drills, running along the bottom of the tunnel.

The air from the ventilating pumps is taken in a 12-inch air pipe and boxes to near the face. The last 150 feet of tunnel is in softer rock, a species of quartzite, so hard as to require blasting, but not hard enough to stand long without timbering and spiling. About 150 feet from the face a shaft has been started, and is now up about 40 feet in blasting rock. It is designed to test the question as to whether or not there is gravel overhead. Mr. H. Jennings is now superintendent of the works, Mr. H. Wallis acting in the capacity of consulting engineer. Mr. Edge is the engineer in charge of the machinery. For rapidity of construction and size of tunnel, there is probably nothing in California that exceeds this work. From its inception until within a few weeks H. Wallis has been superintendent in charge, Hamilton Smith, Jr., being superintendent-in-chief.

**The First Electric Railway in Great Britain.**

Ground was broken the last of September at Portrush, Ireland, for an electric railway to the Giant's Causeway. Dr. Siemens is said to be a large contributor to the new enterprise. It is estimated that the expenses for haulage on a tramway such as this with horses would be twenty-three cents per mile, and by steam about fifteen cents, while it is supposed that the working expenses by an electrical motor will not reach two cents per mile.

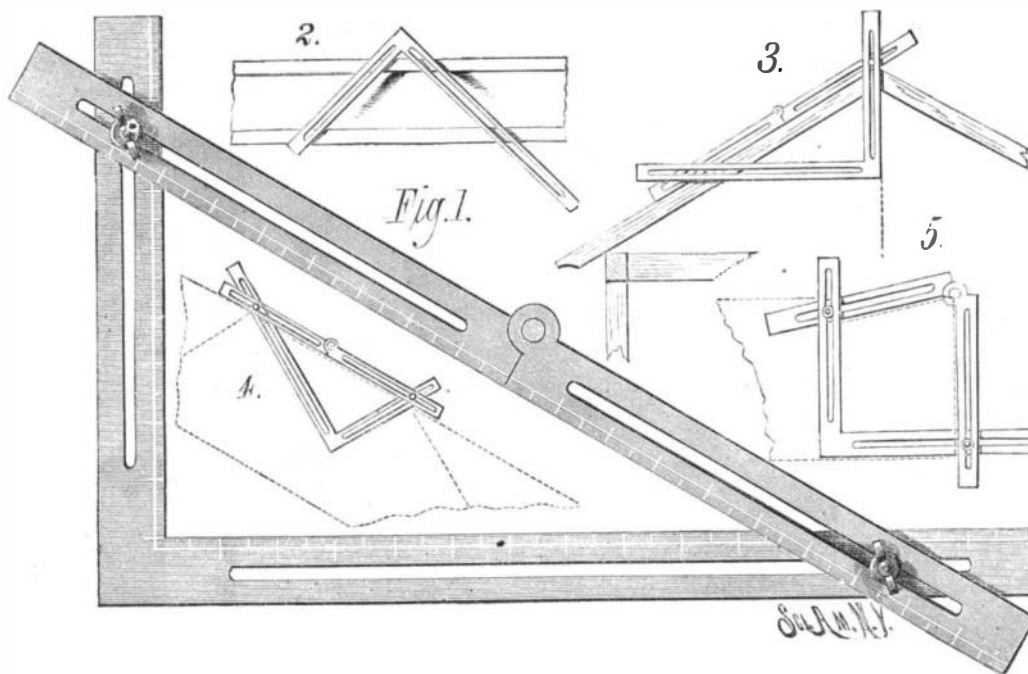
**New Columbia.**

The hitherto inaccessible northern land known as Wrangell Land was "occupied" and claimed for the United States, August 13, by Capt. Hooper, of the U. S. Revenue steamer *Corwin*. In a letter to the Chief of the Revenue Marine Bureau, Capt. Hooper says: "We took possession, planted the American flag, and now we want to give it a new name, as I believe we are entitled to do. I propose to call it 'New Columbia.' The land north of the continent, to the east, is all named for the English, and the islands further west are called New Siberia, so it seems to me that to call it New Columbia would be appropriate, and less likely to give offense to those who are interested in the old names on the different charts than to give a name of a less national character. Wrangell never saw the land, and after trying for three successive years to get a sight of it, refers to it as the 'problematical land of the north.' Neither was he the first to report the existence of it. The object of his cruise was to investigate the truth of the reports to that effect brought by previous travelers. Kellet, after whom it is called on the English charts, only dimly saw what he supposed was a small island, and which he

called Plover Island. That is where we landed, at the mouth of a good sized river on the east end, which now appears on our chart as Clark River."

The new land is crossed by the meridian of 180° from Greenwich, the shoresurveyed lying three or four degrees to the eastward of that meridian. Its southern point is about 71° north latitude.

**TO REMOVE INK STAINS.**—Take of muriate of tin, 2 parts; water, 4 parts. To be applied with a soft brush, after which the paper must be passed through cold water.



**MARVICK'S JOINTED PITCH-BOARD FOR SQUARES.**

be turned the distance of one or more subdivisions, as the desired increase in width of the line may require, upon which the pawl is released and locks the adjusting wheel.

If dotted or broken lines are desired a rule is used having undulations in its upper surface along the edge, and a pin or stylus is attached to that side of the pen toward the edge of the rule, the point of this pin resting on the undulated part of the rule. If the pen is drawn along the rule it will be raised and lowered alternately, and there will be corresponding breaks or interruptions in the line. The size of the blanks in the dotted line is governed by the size of the