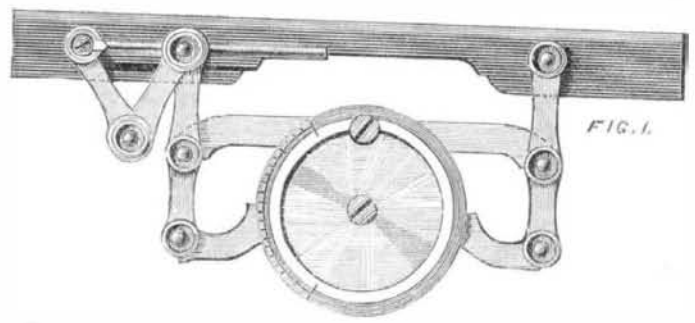
IMPROVED DRAFTSMAN'S RULE.

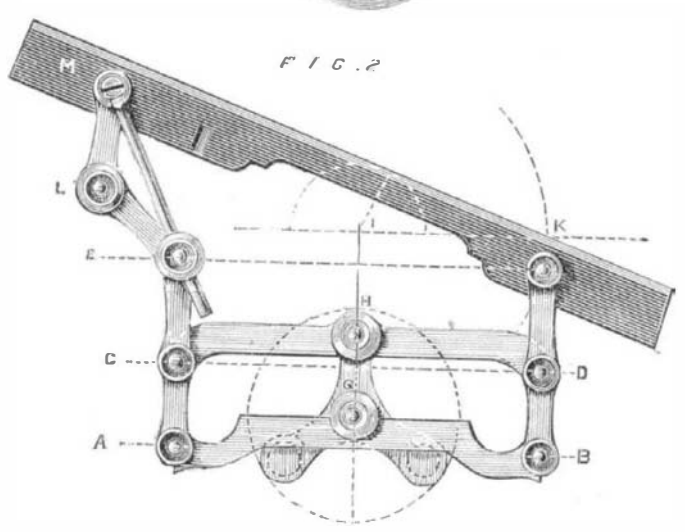
Professor C. W. Maccord, of the Stevens Institute of Technology, has recently published the following in the *American Artisan* :

In making mechanical drawings, it is often required to lay down a series of lines radiating from a single point, as, for instance, in drawing a bevel spur wheel, or a spur wheel whose teeth have radial flanks. This looks like a very simple thing to do with a common straight edge; but the necessity of adjusting the ruler with reference to two points, for every line, renders the task very irksome; and the same is true of drawing a series of lines tangent to a circle, as in the case of the teeth of a ratchet wheel.

These operations are facilitated by the use of the centrolinead, the common form of which consists merely of an arm carrying a needle point, to which the ruler may be clamped at any desired angle, so that the prolongation of its edge shall either pass through the needle point or be tangent to a circle of which the needle is the center. This is very simple and convenient, but it is open to the objections that lines cannot, by its aid, be drawn *through* the center, and that there is danger of defacing the drawing by wearing a hole in the paper; and it evidently gives no assistance in the division of the circle, which must be effected previously by independent means.

The instrument here shown, which may be called a protracting centrolinead, is designed to obviate the objections above named, and to add to the utility of the apparatus by enabling the user to divide the circle and draw diameters at the same time. This is effected by jointing the ruler, by transverse pieces, to two parallel bars, which, rotating about fixed centers, compel the ruler to move in a similar manner.





MACCORD'S PROTRACTING CENTROLINEAD.

Fig. 1 shows the instrument complete, adjusted for drawing radial lines; Fig. 2 shows it as set for drawing tangents, and with the graduated disk removed. From the latter figure it will be seen that since E and F are the extremities of two similar and parallel transverse bars, the line E F will be always parallel to the center lines, A B, C D, of the parallel bars to which ACE, BDF are jointed; also that as these center lines can only turn about the centers, G, H, which are similarly situated with respect to them, the line EF, and consequently any rigid body pivoted to E and F, must rotate about a corresponding center, I. The ruler is pivoted directly to F; and if it be placed, as in Fig. 1, with its edge passing through I, the action as a centrolinead requires no further explanation.

In order to render the instrument capable of adjustment, E is pivoted to the triangle, ELM; this triangle is composed of the two bars, EL, LM, and a radius rod, E M, the latter sliding through a socket pivoted to E; M is pivoted to the ruler; and by means of binding screws at E and L, the triangle may be made rigid at pleasure. This, with the ruler, constitutes a rigid triangle, MEF, every part of which must, therefore, like EF, rotate round the center, I. Consequently, the edge of the ruler may be inclined to EF, or its parallel, I K, at any desired angle within limits; and when this is done, it must, in all positions, be tangent to a circle of which I is the center, as shown in Fig. 2.

The centers, G and H, are fixed in a three armed plate, seen below A B and CD; the under side of this plate is provided with elastic pads, by which adhesion is secured without defacing the paper with holes.

Above the bars, A B, C D, is a disk, held in place by the screws, G and H, which pass through short ferules supporting the disk; the screw, G, is in the center of this disk (which is indicated by the dotted circle in Fig. 2), and the bar, AB, has its upper edge passing through G, thus enabling the user to read with ease the angles measured by the divisions on the chamfered edge of the disk shown in Fig. 1. These divisions extend through only one third of the circumference, since the range of motion in the instrument, shown in Figs. 1 and 2, is limited to 60° in each direction from the position here given. This, however, is sufficient to make it a most convenient addition to the labor-saving devices at the draftsman's command, which, at best, are but few enough; since, besides enabling him to draw tangents at any required intervals, it is at once a centrolinead and a protractor, with the center of the circle always accessible—an important feature not possessed even by the separate instruments heretofore used for the purposes accomplished by the one which we here present for his consideration.

Pre-Glacial Man in England.

The human remains found in Kent's Hole, in deposits attributed to pre-glacial times, have a rival in antiquity in the human bone discovered in Victoria Cave. The Committee of the British Association for assisting in the exploration of this cave describe minutely the condition under which the bone was found, and express the "inevitable conclusion" that man lived in Yorkshire with *elephas antiquus*, *rhinoceros tichornus*, *ursus priscus* and *spelæus*, hyæna, bison, and red deer long before the existence of the great ice sheet in Northern Britain and Ireland.

Local Remedy in Diphtheria.

Dr. James A. Hopkins, of Milton, Del., in *The Physician and Pharmacist*, says: Many have been the remedies used in the local treatment of diphtheria. Some have vaunted *argenti nitras*, in solid form. Others advise the preparations of potassa and its combinations. Carbolic acid has its votaries, as well as muriatic acid and the muriated tincture of iron; externally the oakum poultice has some reputation, and no doubt is of more importance than we are ready to admit. Terebinthine liniment, as well as kerosene oil, stands prominent in the list of external remedies.

But above and before all is the acid tannate of iron. This is a remedy not known to the pharmacopœia, yet it stands second to none among local remedies, and I believe is the only one that bears a shade of semblance to a remedy in this fearful disease, and thus far exceeds any that has become known to the professional world. It may be prepared by the addition of one ounce of the muriated tincture of iron to one of a strong solution of tannin, and applied by means of a brush to the diseased throat, or elsewhere, as the case may be; or, what I believe to be a better way, apply the muriated tincture of iron in full strength to the diseased part with a brush, wait a few moments, then apply the solution of tannin in the same way, thereby forming a union of the two at the point of disease, having at the same time the advantage of chemical action, if there be any. On examination a few hours after, you will see the line of demarcation distinctly drawn by the discoloration of the diseased tissue, showing exactly the extent of the disease, the very thing desired, with a tendency to reparation, which will go on rapidly if the system be properly treated with a nourishing diet and tonic and stimulating remedies.

A SIPHON FOR POISONOUS LIQUIDS AND ACIDS.

In starting the ordinary siphon, by sucking on the longer leg or on a tube attached thereto, it is almost impossible to avoid inhaling the vapors of the liquid, even if the liquid itself does not enter the mouth. A new form of siphon, invented by Professor Weinhold, avoids this difficulty, inasmuch as the suction is produced by blowing, somewhat on the principle of the Sprengel air pump.

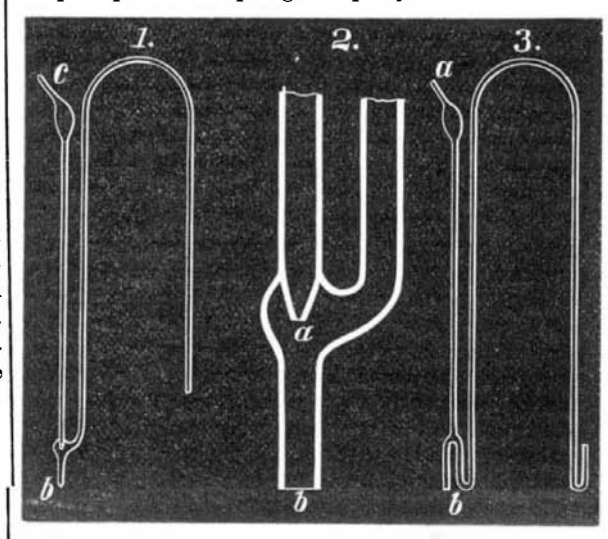


Fig. 1 represents a section of Weinhold's siphon on a reduced scale; Fig. 2 is a full sized drawing of the essential portion of the apparatus. By blowing strongly into *c*, the liquid will flow out of *b*, provided the pressure to be overcome is not more than 12 inches of water, and that the diameter of the siphon is not too great. It is very important that the dimensions be exactly right; the opening at *a* should be 1·5 millimeters (one sixteenth of an inch); the opening at *b*, as well as the diameter of all the tubes, should be 5 millimeters (one fifth of an inch), and the distance from *a* to *b* should be 25 millimeters (one inch).

The so-called French siphon has legs of equal length, turned up at the bottom to prevent its emptying itself when taken out of the liquid. This would probably be more used than it is, were it not so difficult to fill; besides, it gives a spirting or oblique stream. Both disadvantages may be avoided by giving it the form shown in Fig. 3. This siphon is started by closing the opening, *b*, and sucking on *a*, as in the old-fashioned poison siphon. The stream is, of course, delivered downward from *b*. The three pieces of tube at the lower end of the left leg are not arranged in one plane, as shown in the engraving, but in the form of a triangle, ∴, so as to be as close together as possible. A French siphon must be lifted out of the liquid slowly and carefully, to prevent the liquid running out.

English Enamel for Cast Iron.

A brilliant white and very adhesive enamel is formed on cast iron articles in the following way: After heating them to a red heat in sand, and keeping them thus for half an hour, they are allowed to cool slowly, and are then carefully cleaned with hot dilute sulphuric or hydrochloric acid, rinsed with water and dried. A ground is then laid on by coating them with the following mixture, afterward drying them at a high temperature, and then heating them in separate muffles to vitrification of the coating: 6 parts of flint glass, 3 of borax, 1 of minium, 1 of oxide of zinc, mixed and finely pulverized, and heated for four hours up to a red heat, and finally rendered semi-fluid by increase of temperature; the mass is then quickly quenched in cold water, and one part of it is mixed with two parts of bone meal, and formed into a pap by triturating finely with sufficient water. Upon this ground the two following mixtures, prepared like the first, are then laid in succession, the first of 32 parts of calcined bones, 16 of kaolin, 14 of felspar, 4 of potash stirred up with water, dried, calcined, and suddenly cooled in water, and the powdered mass triturated with water to a fine paste with 16 parts of flint glass, 5½ of calcined bones, and 3 of calcined quartz; after this has been laid on and well dried, a second coating is laid on of 4 parts of felspar, 4 of pure sand, 4 of potash, 6 of borax, 1 of oxide of zinc, 1 of saltpeter, 1 of white arsenic, 1 of the best chalk; these ingredients are mixed, calcined, suddenly cooled in water, and triturated with 5½ parts of calcined bones, and 3 of quartz. The dried article is finally heated in a muffle, in a furnace similar to a porcelain furnace, when both coatings fuse and mix, thus forming the enamel.

More Fulgurites.

We recently published in the SCIENTIFIC AMERICAN the results of certain analyses, by Professor Albert R. Leeds, of a curious mineral which was forwarded to us from Fayetteville, N. C., and proved to be a "lightning tube," or "fulgurite."

A correspondent from Orange, Texas, Mr. W. D. Street, sends us fragments of two more fulgurites. While closely resembling the Fayetteville fulgurites, Professor Leeds states that they have some interesting points of difference. Like the former, one side is highly vitreous, curved into innumerable small, semi-globular forms, stained with bluish black streaks, and presenting, in its glassy and vesicular character, the appearance of complete fusion. The Orange fulgurite differs in being almost white, and very slightly stained with oxide of iron. The rugosities on their exterior or convex sides, where the sand was remote from the source of heat, are somewhat hidden by the greater mass of partly cemented, adherent white sand. The fragments are of two sizes, the thicker pieces, whose interior surfaces are stained black, coming from one lightning tube, and the thinner, unstained pieces coming from a second, located in the sand at a distance of six feet from the former. The tube-like character of these fulgurites has so strongly impressed our correspondent that he is surprised to find nothing visible coming through them. If other correspondents will forward specimens or information concerning these remarkable phenomena, we shall shortly be in a position to know more about them than has been known hitherto.

A New Theory of Electricity.

Professor Edlund, a Swedish physicist, expounds in a recent work a new theory of electricity, the substance of which is as follows: He supposes the existence of a highly subtle and elastic ether, everywhere present both *in vacuo* and in ponderable matter. Two molecules of this ether are mutually repelled along the line of their connection and in inverse ratio to the squares of the distances. In good conductors, the molecules are displaced easily from point to point, it being presumed that they can be moved with little force. If the body be a non-conductor, this mobility is arrested and depends on the molecules of the material body. A molecule is at rest from the moment when it is equally repelled on all sides. If the repulsion be less at one side than at the other, the body will move if it be free in the direction of the resulting forces.

An Ancient Chip.

At the recent meeting of the British Association, Professor H. A. Nicholson exhibited and described a silicified chip of wood from the Rocky Mountains. At the Brighton meeting, the same specimen was shown, the opinion then being that its woodlike appearance was due to mineral structure, that it was in fact merely a specimen of the hornblendic mineral known as rockwood. Subsequent examination has shown conclusively that it is a genuine chip of wood, silicified. The age of the chip and the circumstances of its production were thought to present many points of interest, the accepted conclusion being that it is a prehistoric relic, produced by the stroke of a copper ax, such as the mound builders used to hammer out of native copper.