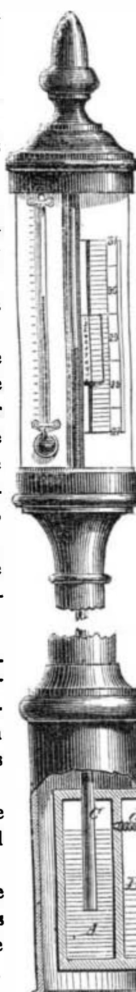
WOODRUFF'S IMPROVED BAROMETER.

Take a glass tube a little more than 30 inches in length, open at one end and closed at the other, fill it full of mercury, place your finger on the open end, invert the tube, insert the open end in a cup of mercury and withdraw your finger, and you have a barometer. The mercury in the tube will settle down till its weight just balances the weight of the air resting upon the surface of the mercury in the open cup. A column of air of the whole hight to which the earth's atmosphere extends (some 45 miles), a column of water about 32 feet in hight, and a column of mercury about 30 inches in hight, are all of the same weight—that is, if they stand on a surface of the same area. In order that the weight of the air in the open cup should hold up the mercury in the tube, it is necessary that there should be no air resting upon the top of the column in the tube; hence the necessity of having the upper end of the tube closed, and having no air in it. It will be seen that all air is excluded by the plan of filling the tube and then inverting it. The vacuum formed in the upper portion of the tube is called the Torricellian vacuum, from its discoverer, Torricelli, of Florence, who invented barometers in 1643. As the air is constantly moving about, gathering clouds, drinking-up water, and depositing water, the weight of a column of air in any place is constantly varying; and as the hight of a column of mercury which it will sustain varies with the weight of the column of air, the barometer is used to measure the weight of the air and to show these constant changes. The column of air over us also grows lighter as we rise above the level of the sea, hence the barometer gives us the means of measuring altitudes. It being necessary to have the cup of mercury always open, so that the air may rest upon it, if the barometer is turned down in a horizontal position the mercury will run out.



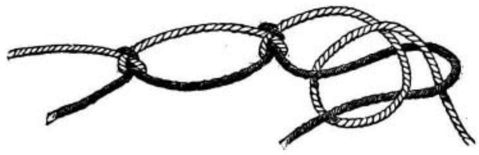
To prevent this spilling of the mercury, and thus to render the instrument portable, is the object of the invention here illustrated. The open cup or cistern, A, of the barometer is made of cast iron, and by the side of it, cast in one piece with it, is the reservoir, B; both of the vessels sealed at both ends. The glass tube, C, of the barometer is sealed air-tight in the upper end of the cistern where it passes through. A conical opening is made from the reservoir, B, to the cistern, A, which opening may be closed by the screw, *d*. Besides the usual supply of mercury for the tube and cistern, an additional quantity is placed in the reservoir, B, sufficient to fill the vacant space in the cistern. When it is desired to render the instrument portable, the screw, *d*, being turned partly out, the barometer is gradually turned down to a horizontal position, care being taken to keep the side on which the reservoir is situated uppermost, thus pouring the mercury from the reservoir into the cistern and completely filling the latter. The screw is now turned inward so as to tightly close the opening from the reservoir to the cistern, which, it will be seen, prevents the escape of any mercury from the cistern or the admission of any air into the tube. When the screw is turned in to its place, it completely closes the opening from the external air into the reservoir; but when it is turned back to render the barometer operative, the air is admitted by a flat place filed on the side of the screw for this purpose.

From the construction of this instrument, as well as from the ample testimonials, both of practical farmers and men-of-science, we are satisfied that it is really a good, practical, portable barometer.

The patent for this invention was granted to L. Woodruff, through the Scientific American Patent Agency, on the 5th of June, 1860, and for State rights, or for any further information in relation to it, persons will please address L. Woodruff & Co., at Ann Arbor, Mich.

DAVIS'S PATENT SEWING MACHINE STITCH.

Is it possible that the complicated knot represented in the annexed cut can be made by machinery? Such, indeed, is the marvelous power of modern mechanism. Hundreds of the stitches are made in a minute, and the same machine, by a very simple adjustment, is capable of making the ordinary loop stitch. This kind of stitch is especially adapted to harness work, and to any other



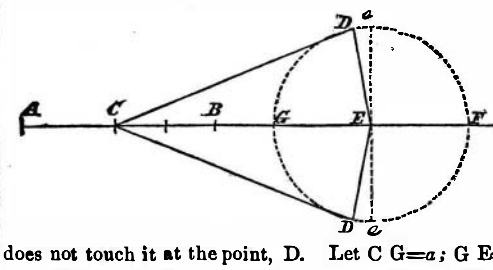
work where the sewing requires to be very strong and durable. It will be seen that each stitch is tied in a complete, firm, and permanent knot, so that even if each alternate stitch is cut, the work still will not rip.

The patent for this invention was granted to the inventor, James Davis, and any further information in relation to it may be obtained by addressing Henry C. Robinson (who owns a part of the patent), at Fayetteville, N. C.

THE CRANK MOTION AGAIN.

On page 102 of the current volume of the SCIENTIFIC AMERICAN, we published a communication from "A Mechanic," of Cincinnati, accompanied with the annexed diagram, showing an irregularity in the motion of a crank when turned by a reciprocating piston; the crank passing through a larger arc of the circle during one-half of the stroke of the piston than it does during the other half. Our correspondent asked how this could be; and we replied that his diagram answered the question very plainly. Professor Byrne, noticing this, sends us the following, which, to do him no injustice, we publish *verbatim*:—

MESSRS. EDITORS:—In your issue of the 11th of August, 1860, you appear to misunderstand "A Mechanic," who wrote to you from Cincinnati on the 6th inst., respecting "A Property of the Crank Motion;" and your correspondent seems to be ignorant of the fact that the line, C D, cuts the circle, G D F, and



does not touch it at the point, D. Let C G$=a$; G E$=r=$E D; and C D$=x$; any two of the three lines, $a+r$, x r, must be greater than the third.

$$AC = CD + DE - CE = (x+r) - (a+r)$$

C B$=$C F$-$C D$=a+2r-x$; but C being the center point, A C$=$C B;

$$a+2r-x = (x+r)-(a+r)$$
$$= x-a$$
$$2a+2r = 2x$$
$$\text{Or, } a+r = x.$$

Hence, the triangle, C D E, is isosceles; that is, the angle, C D E$=$C E D; and hence the angle, D E C, is not a right angle. Nor can the point, D, be at the point, *e*, when C is in the middle between A and B; for C *e*, subtending a right angle, is always greater than C E, which subtends an acute angle.

To correct little errors is a very unthankful piece of work. I seldom meddle unless I am asked; this is an exception to my general rule. Yours, obediently,

OLIVER BYRNE.

Jersey City, N. J., August 13, 1860.

When we received our Cincinnati correspondent's letter, we examined it thoroughly; it seemed to us very simple; we thought we understood it perfectly, and we think so still. We fail to discover the evidence of that "ignorance" which Professor Byrne attributes to "A Mechanic," and we remain of the opinion that the diagram, in connection with the original letter that accompanied it, is a plainer answer to the question than any other demonstration can be. He states that the crank moves through a greater arc during the outer half of the stroke of the piston than it does during the inner half; and Professor Byrne painfully "corrects the little error" by demonstrating that it cannot be otherwise—that it must be so!

THE SETTING AND HANGING OF SAWS.

MESSRS. EDITORS:—I fancy I am better at sawmilling than writing letters for publication; but I would like to say a few words to Mr. Buxton, whose letter was published on page 66 of the present volume of your very valuable paper. I think he is in error in some things; although I agree with him as to there being many different opinions upon this topic. Those persons who cut lumber fast, however, do not differ so widely as those who do not; for those that cut lumber fast, or cut as much at each stroke of the saw as they might or should do, must "dress" the saw so that it will not touch or rub hard enough to cause heat, except at the points of the teeth. The *planing* of lumber should be done with some other tool than a saw; and my experience teaches me that lumber cannot be cut smooth and cut fast at the same time, nor cut smooth and straight and even in thickness.

I agree with the above-named correspondent as to the hanging of his saw, except that I would hang the lower end a little further back, as I would cut more at each stroke than he does, and would want the saw to be clear of the log going up. As for the top of the saw striking first, I think that cannot be so, and would be of no advantage if it did.

I cannot agree with him as to the setting of the teeth. I bend (or "set") them as close to the point as possible; the most of the clearance I get by making the corner or cutting edge project some, which I do with a tool or tools made for that purpose. I think the teeth will throw out the dust better to pass up-and-down in the middle of the cut, without touching the sides. The fibrous wood or sawdust only occurs when the teeth are blunt and present a thick edge; thus not cutting the wood off clear and clean, as a thin edge or slim tooth would; or when the saw is running out of line, in which case the sides of the teeth tear the fibers, as they cannot be kept sharp enough to cut them off.

I agree with him as to the holding of his file, but don't want the teeth to do anything going up; if it was important they should, the circular saw would never do any business, as it does its work but once, having but one motion.

Experience teaches me that lumber cannot be cut smooth and cut fast, nor cut smooth and straight and of even thickness or size, unless cut *very slow*. I do not approve of the two teeth to shave off the sides of the cut. My observations, for the last 10 years, convince me that all saws—gait, muley or circular—must run clear of the wood everywhere except at the immediate edges or points of the teeth. I have used one of each of the above-named classes of saws for about three years, during which time I have sawed all kinds of timber. I am now successfully running a 6-foot circular saw.

W. MILLER.

Woodsonville, Ky., August 13, 1860.

CHARCOAL FOR THE TEETH

MESSRS. EDITORS:—Having recently perused an article bearing the above caption and published on page 120 of the present volume of the SCIENTIFIC AMERICAN, I wish to say a few words in relation to dentifrices in general. The teeth must be cleaned by chemical or by mechanical means or by both. Upon analysis it has been found that tartar and other substances usually adhering to and discoloring the teeth differ from them in substance only in the proportions of their constituents. Chemical agents affecting the tartar will hence affect the teeth also; the degree of their influence alone being different. An alkali or an acid is essential to remove tartar chemically; an alkali or an acid will certainly impair the teeth. *Charcoal* acts both chemically and mechanically; chemically by the highly concentrated alkali it possesses, and mechanically by the extremely brittle and cutting character of its particles, its purifying influence depending upon absorption effected by means of its cellular nature. The discoloration of the gum is the least of the evils occasioned by the lodgment of charcoal between the neck of the tooth and the free edge of the gum; it is indestructible and continues in this position, a foreign body wearing away the gum and exposing the neck of the tooth, which is not covered by enamel, and thus, in time, producing sensibility and decay. Soap is effective in cleaning the teeth in the ratio of its alkaline effects, and it is always prejudicial to the mucous membrane of the mouth, though this may not