

preferred for this work. In crushed coke, four sizes, as of egg, stove, small stove, and nut, are made, for use by manufacturers of safes, chains, axles, shovels, files, bolts, agricultural implements, brass foundries, maltsters, for blacksmithing and by steel manufacturers. It is also used for domestic purposes in grates and base-burning stoves.

At present there are some 10,171 ovens in the Connellsville coking region of Pennsylvania; it is a growing industry, and therefore the B. & O., the Pennsylvania, and the Vanderbilt lines are each anxious to secure a share of this tonnage. Of the location of other coke makers in Pennsylvania the book noticed elsewhere will give the details. Prices of coke are quoted at many places by our trade reports. For the distances traversed the prices are not high. We have given more particular attention to the Connellsville because it is the most important district. On the New River, in West Virginia, on the line of the C. & O. Railway, coke is being made quite largely, as also in Tennessee, in Colorado, in Illinois, and in Alabama. In the Reynoldsville district and in the Blossburg district of the Pennsylvania soft coal region, we find the production of coke, as a commodity for sale, to the greatest extent outside of the Connellsville district.

There is a tendency toward the control of the output of the Connellsville coke, and of the details and progress of this matter our readers have been kept fully posted.

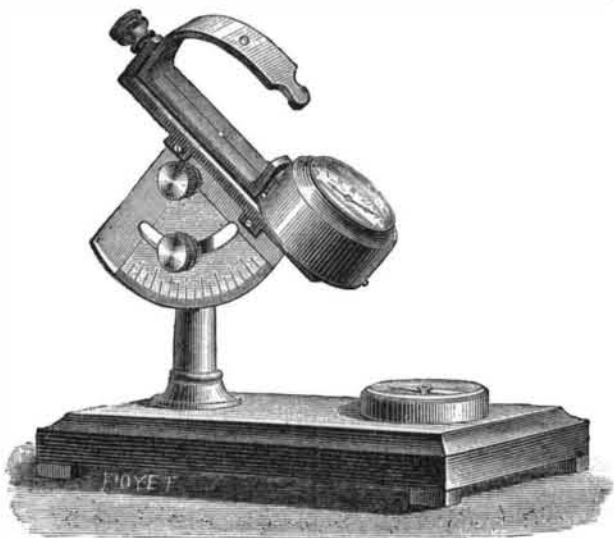
Connellsville coke is quoted at \$1.00 per ton at the ovens for furnace, \$1.25 per ton for foundry, and crushed coke at \$1.75 per ton.—*Coal Trade Journal*.

A NEW SOLAR REGULATOR.

AMATEURS and owners of country seats who like to consult the hour by the sun, and are satisfied with but relative accuracy, have long needed an apparatus that had a neat appearance externally and was easy of management. This want is now supplied by the solar regulator, an apparatus constructed according to data furnished by its inventor, Mr. Corneloup, a manufacturer of clocks.

A description of the apparatus will be easily understood by the aid of the annexed figure, which represents it half the actual size.

Upon a pillar carried by a quadrangular base there is mounted a support which has its extremities bent at right angles, and which revolves in a vertical plane and on a center at which ends the apex of a graduated sector. This latter



A NEW SOLAR REGULATOR.

gives the measurement of the inclinations that the support can take, and which should always correspond to the latitude of the place. The sector, having been brought to the proper point, is fixed by means of an adjusting screw. At the base of the support there is fixed a small case which is provided with a dial and hands.

The style, and the plate upon which the noon line is traced, are independent. The plate pivots between the two upturned extremities of the support. Upon the prolongation of the lower pivot, which enters the dial case, there is adjusted a pinion which, through the intermedium of wheel work, causes the hands to revolve.

A compass fixed on the base of the apparatus serves to place it in proper position. The instrument is regulated when the aperture in the style, the solar noon line, and noon as shown by the hands on the dial are exactly in the same vertical plane.

The instrument having been regulated, it will be only necessary to incline the style to the right or left so as to bring the luminous point upon the noon line; and, as the hands will follow its motion, the hour will be read upon the dial.

While traveling, the owner may regulate the apparatus by the aid of a good watch, having seconds hands, which has been set by observatory time, or by the aid of a good chronometer. The instructions that accompany the instrument indicate the inclination to be given the sector to make it correspond with the latitude.

What will bring this little apparatus into favor with amateurs is the fact that, unlike the sun-dial, which is always fixed, it may easily change place and the hour be read upon it just as is done with a watch.—*La Nature*.

THE OIL INTEREST OF SOUTHERN CALIFORNIA.

Few persons who have not given especial attention to the oil interest in this portion of the State realize its importance. A casual trip only through the region in which the oil developments are being made gives no idea of the results already accomplished. Take the Newhall or Pico district, for instance. The oil output of this district has averaged during the last year more than 1,000 barrels per day, of an average value of \$2 per barrel, or in round numbers 365,000 barrels per year, of the total valuation of over \$700,000. All this has been derived from a very limited area of territory, not over 1,000 acres all told.

So great has been the success of the parties who have inaugurated this enterprise at Pico, that they have determined to enlarge to an enormous extent their field of operation, and take in the whole of the Santa Clara Valley, containing an oil area of many hundreds of thousands of acres. Already

have they formed corporations for pipe lines down the valley to Ventura, and the pipes are laid from Santa Paula down to the sea. In addition, there are piled up at Newhall large stacks of pipe, which would seem to be more than enough to pipe all the way from Newhall to Santa Paula and connect the wells already productive with the sea.

Companies of parties from Pennsylvania have been formed for putting down additional wells, and derricks are rising in all directions on the mountain sides of the Santa Clara. There are also piled up at Newhall large piles of pipe, six, seven, and eight inches in diameter, to be used in casing wells now being put down, or to be put down in the immediate future. The indications now are that more than one hundred wells will be put down in this valley alone in the next six months, and the output more than doubled.

Already is this the second oil-producing field in this country, and with the energy and pluck now being shown, it will not be many years before Pennsylvania, so long the oil monarch of the world, will be obliged to look to its laurels.

This increased development can be of incalculable value to our sister county, Ventura, and to its principal port, San Buenaventura. With a million or more of dollars flowing into it from its oil exports, with the increased valuation given to its productions by a home market established by the oil industry, Ventura County must, in the immediate future, receive a boom which will add a greatly increased value to its lands and prosperity to its people.

Without any jealousy of Ventura and its riches, we can call attention to the fact that the surface indications of oil in Santa Barbara County are every whit as good as those in Ventura, and that beyond question oil lies within the limits of this county, only needing stirring activity and business energy to bring it forth. Who will inaugurate this enterprise and put down a well, not 200 feet deep, but 2,000 feet, if necessary? There may be risk, but if successful the result will more than compensate for the risk run.—*Santa Barbara Independent*.

COLLODIO-CHLORIDE PAPER.

In a glass beaker dissolve eight grammes of nitrate of silver in six grammes of distilled water by heat; drop this solution into a bottle containing 135 c. c. of alcohol. In cold weather it is better to put the bottle in a vessel containing warm water; then add eight grammes of soluble cotton, and, after thorough shaking, 160 c. c. of ether. On further shaking a grayish-white collodion will form itself. In another bottle dissolve one gramme of chloride of lithium in thirty-five c. c. of alcohol, together with one gramme of tartaric acid. This solution is to be dropped into the argenteous collodion, which must be shaken all the while. This collodion will keep for any time if preserved in a well-corked black bottle or in a fitting dark cover.

Have a thin piece of wood, same size as the paper that is to be coated, with a knob fastened at the underside; pin the lichtdruck paper on it at three of the corners, so that the right and lower edge project a little over the wood (this will cause the collodion not to run under the paper), and the left edge of the paper may be turned up a little; but this will not be found necessary after some practice. Now hold the wood with the left hand by the handle, as you would take a glass plate fixed to a pneumatic plate-holder, and pour the collodio-chloride upon the paper just as you would coat a glass plate with collodion. Having returned the surplus of the collodion to the bottle, take the pins away and hang up the paper to dry. The paper will keep for several weeks.

Some prefer to use a pink-colored lichtdruck paper, whose color will obliterate any trace of yellow that might form by keeping it for a longer period.

As to the printing: it must be done in the shade, and weak negatives are better covered by thin, white paper during printing. Toning may be done in an old gold bath that is not too strong. German photographers prefer the following: Make two stock solutions—one of one gramme of chloride of gold in 1,500 c. c. of water; and one of twenty grammes of sulphocyanide of potassium, three grammes of hyposulphite of soda, and one gramme of carbonate of soda in 1,500 c. c. of water. Before going to work mix equal parts of these solutions, but be sure to pour the gold into the sulphocyanide solution, not *vice versa*.

After having washed the prints in water three times changed put them in the gold bath. If it work too quickly it will give gray tones. I usually dilute it with water that it may act more strongly; and for weak negatives I pass the prints before toning through a two-per-cent. solution of sulphocyanide of potassium, the prints becoming of a much richer tone by this. Fix in a five-per-cent. solution of hyposulphite of soda (five minutes will be sufficient), and wash for one hour in water frequently changed.

Now, to make the prints look like enameled silver prints: clean a sheet of glass, a little larger than the print, and rub it with French chalk; after dusting it off with a brush, lay the print, film side down, on the glasses; put some filtering-paper upon it, and go over it with the hand to make the print adhere and to remove air-bubbles. Allow it to dry, and the print will come away with a very high gloss. A part of this it will lose on mounting; but if you mount it at the corners only, as is sometimes done with enameled prints, it will retain it all.—*E. Liessgang, Ph.D., Br. Jour. of Photo.*

THE TONIC SOL-FA METHOD OF TEACHING TO SING.

By PROF. C. F. KROEH, of the Stevens Institute of Technology.

WITHOUT claiming to speak with authority on musical matters in general, I may be permitted to say a few words with regard to the educational aspects of a method which has interested me very much.

The scarcity of vocalists that can read at sight suggests the thought that there must be some fundamental error in the prevailing methods of instruction. There is nothing surprising in this; for the same phenomenon may be observed in the teaching of languages—our own as well as foreign ones—and it is only within comparatively few years that the mental processes involved in learning to read and to speak have been analyzed, understood, and made available for teaching. In the same way it may be that teachers of music do not realize the necessity of understanding mental processes to enable them to impart the skill which they possess.

All the instruction books according to the old method, that have come under my observation, begin by an explanation of the cumbersome and complicated method of musical notation, which many a scholar gives up in discouragement. Here is an educational error at the outset, which all students of the art of teaching will understand at once. It is beginning with the sign instead of the thing itself. Now,

it so happens that in music the "thing itself" is intangible; it consists of sounds having different characteristics and of their intervals. Any method that does not begin by cultivating the ear and inculcating the habit of forming and recalling tones and intervals can never be generally successful. The old method—and this applies to instruments as well—looks upon music as though it consisted of black spots with tails, and as though it were the learner's chief task to decipher what these spots mean in different positions under varying circumstances. I submit, that this is not *music*; nay, that it is not even a good way of *denoting* music. Yet many instructors of music seem to hold this view, or we should not hear them speak disparagingly of those who ought to be their best pupils. "They play by ear, and will never make good musicians." It seems to me that if such players do not make good musicians with reasonable efforts, the fault lies somewhere else. Everybody that has no organic defect in his auditory apparatus ought to be able to master the elements of music sufficiently to give pleasure to himself and to others; and of two learners equally diligent, the one with the better ear should accomplish his object most rapidly.

If all musical instruction—instrumental included—began with such training of the ear as would make the learner familiar with the tones and their intervals by leading him to imitate them by singing or even by whistling until he could accurately reproduce them from memory, we should find fewer people possessed of the idea that music is a mechanical thing, consisting mainly in skill in fingering, and that it is an accomplishment to strum a few tunes painfully acquired by rote.

We are living in a good age for getting rid of the ways of doing and viewing things which have come to us as a legacy from the middle ages. If the decree went forth that the present musical notation together with the Chinese characters and the English system of spelling should be abolished, we should bow in thankful submission and envy the generations to come.

It is indeed a subject for profound surprise to an unprejudiced student, how so simple a matter as the sequence of twelve definite sounds which follow each other in unvarying intervals, no matter at what pitch the first one may be chosen, could be denoted in so mysterious a way as by the present staff with its additional lines, and transposition signs. The Rev. J. C. Curwen, an English clergyman, has succeeded in inventing a more simple, natural, and successful notation for vocal music which is adapted to some extent also for instruments. Mr. Curwen's fundamental idea was that it is more advantageous to denote intervals than the absolute pitch of every note. A very satisfactory description of the system is found in the appendix of "Die Lehre von den Tonempfindungen" by Helmholtz, the greatest living physicist and highest authority in all acoustical subjects. The following is a translation of his remarks:

The Tonic Sol-Fa associations which are represented in all the large cities of England, and which numbered 150,000 members as early as 1862, designate the notes of the major scale by means of the syllables, Do, Re, Mi, Fa, So, La, Ti, Do, where Do always stands for the key-note. Their songs are not printed in notes but in ordinary type, the initials of the above syllables representing the note.

If the tonic or key-note is changed in the course of a piece of music, the new key-note is again called Do; and this is indicated by giving two names to the note at which the change occurs. By this means the relation of every note to the key-note is always brought out, while the absolute pitch is given only at the beginning of the piece. As the natural intervals are the same in all the major keys, no tempering is necessary. (By tempering the author means the adjustment of our pianos by which the 12 chromatic intervals of the octave are equalized at the expense of the purity of certain chords.) The fact that in modulating from C major to G major, the Mi of the latter corresponds exactly to the Ti of the former and the Re of the latter very nearly to the La of the former is not denoted, but it is taught later in the course.

There is no doubt that this method of denoting vocal music has the advantage of bringing out prominently what is most important in aiding the singer, namely, the relation of any given note to the key-note. Few only are gifted with an extraordinary talent for remembering the absolute pitch of notes and for finding them again, especially when other notes are sounded at the same time. Now, the ordinary notation indicates only the absolute pitch of notes, and this only for tempered instruments. Any one that has sung much at sight knows how much more easily this can be done from the piano-score, in which the harmony may be seen, than from the score for a single voice. In the former case it may easily be perceived whether the note called for is the fundamental note, the third, the fifth, or the discordant note of each chord, and the right pitch is easily found; in the latter case, the only way is to ascend and descend according to the intervals required, and trust to the accompaniment and other voices for assistance in forcing one's own voice into the proper pitch.

The Sol-Fa notation on the other hand shows directly to the initiated what a vocalist conversant with the theory of music can get from the piano score. I have convinced myself that the use of this notation enables one to learn much more easily to sing correctly from the score for one voice than from the ordinary musical notation. I have had the opportunity of hearing more than 40 children between the ages of 8 and 12 sing exercises in the public schools of London, and they astonished me by their certainty in reading the notes and by the purity of their intonation.

Helmholtz then goes on to commend the habit of singing according to the natural rather than the tempered intervals, and to state that there will be little difficulty in making the various instruments agree with the voice. The brass instruments already have the natural intervals; the string instruments can make them as easily as they can the tempered ones; there will be no difficulty in adapting the flutes, clarinets, etc.; organs have been built especially for this purpose, and the only obstacle remaining is pianos.

It would seem as though the Tonic Sol-Fa method ought to recommend itself to the common sense of mankind without such high indorsement as that of Helmholtz; but there will always be found many to whom the old way has become a second nature. They have mastered it and object to a change. It is so with all innovations. The objectors are right so far as it concerns themselves—but let us give the children a chance.

THE Penobscot Indians, who have been a part of the history of Maine for 300 years, have intermarried until they have become almost white. Oldtown, the seat of their mission, has decreased from a population of 8,000 in 1625 to a mere hamlet of a few hundred souls in 1883.