San Fernando there are five producing wells, and the gross product of crude oil daily is about 40 or 50 barrels.

It should be stated that the oil of the San Fernando district is of a much finer grade than the Ventura article. It refines much more satisfactorily than the latter, and yields a much larger percentage of illuminating oil.

There is a lively demand for the petroleum of the southern California in San Francisco and throughout the State at large. As refined by J. A. Scott, it is regarded as superior to any oil imported from the East. The oil producers at San Fernando labor under a disadvantage from which their Ventura brethren are free, notwithstanding the lighter gravity and consequent greater value of the Los Angeles product. A pipe is now being laid from Ventura to Wheeler's canyon, a distance of 27 miles, and its owners promise to pipe oil to Ventura for \$1 a barrel. From Ventura it is carried to San Francisco for 75 cents a barrel by ocean vessels. Thus the whole cost of its transportation there from the spot where it wells out of the ground to its market in San Francisco, is \$1.75. It costs the San Fernando producer, on the other hand, just \$3 a barrel to get his oil transported to San Francisco via the Southern Pacific Railway.

The Los Angeles and Ventura oils, as refined by Mr. Scott, command about 40 cents a gallon. As there are about 45 gallons to the barrel, a barrel of this oil is worth in the San Francisco market about \$18. Mr. Morrison, an experienced oil refiner of Pennsylvania, has been sent for to take charge of the San Fernando refinery, and he will doubtless obtain results as satisfactory, in the manipulation of the crude petroleum of that section, as those achieved by Mr. Scott.

The outlook for oil production in southern California is emphatically promising. We have a better record from our oil wells to-day than the Pennsylvania wells showed at the same stage of development. Experienced Pennsylvania oil men assure us that the probability of a yield quite as prolific as that of Pennsylvania, at some time, is great. Patience, perseverance, and some outlay in sinking the wells to the required depths, are all that are needed. One or two failures should not dispirit prospectors. The fortune of the Pennsylvania, Ohio, and West Virginia pioneers was the most variable thing in the world. One man would strike it and a man 50 feet away from it would fail. Until some wells have been sunk to a depth of 1,400 or 1,500 feet we cannot be said to have begun to prospect for oil. The kind of well boring that has hitherto prevailed in Los Angeles and Ventura counties bears the same relation to well boring in Pennsylvania that a claim "hogged" on the Mexican principle has to the superbly developed mines on the Comstock lode. It is much to have learned that we have in this section reliable oil wells. Their development will be certain to follow in time, just as the development of every other capability of this section has surely taken place. And we think development has fairly set in now.

PIPES FOR GAS AND OTHER PURPOSES.

(Continued from SUPPLEMENT, No. 62.)

Mains.

The various joints in use for connecting gas main-pipes may be conveniently classed under six separate heads—viz., flanch or flange, clip, collar, screw, spigot and faucet or socket, and ball and socket joints.

When flanged pipes (Fig. 4) are employed, a ring of felt, and sometimes of lead or iron, covered with yarn or flax, and smeared with red or white lead, is usually placed between the ends, and bolts are inserted through the holes cast in the flanges.

The bolts vary in number, being four, six, eight, or more, according to the size of the pipe, and range in diameter from one-fourth of an inch to seven-eighths of an inch. On

FIG. 4.

the nuts being screwed up, the two ends of the pipes are drawn together as closely as the intervening packing will allow.

The space left between the flanges, when a metallic ring has been interposed, is generally about one-fourth or three-eighths of an inch wide, which is filled in to the level of the rims of the flanges with iron or other cement.

When lead rings are used for jointing, they are best made of one-fourth or three-eighths inch piping, the ends being soldered together evenly, and the whole covered with flax, coated with red lead of the consistency of thick paint. The ring of lead pipe should not be beaten flat, but left in its round form, so that when the joint is screwed up the lead may bed into any irregularities in the surfaces of the flanges.

Sometimes a projection of the metal, about a quarter of an inch thick, is cast on the ends of the pipe, Fig. 5, and this, being truly faced in a lathe, admits of a tight joint

FIG. 5.

being made, without the interposition of a washer, by simply painting the two surfaces with white-lead paint, and drawing them together by means of the bolts, the intervening space being caulked with cement, as in the previous instance. Or the whole of the front surface of the flanges may be turned true, and the joint completed without the necessity of a cement packing. The faced joint, however, can only be employed when the line of pipes is perfectly straight. As a further precautionary measure against leakage, the bolts used for jointing flanges should have a gummet of flax or tow, smeared with red or white lead, placed round their neck, and under the washer at the nut end, to bed on the flanges when screwed up.

The common flange joint is but rarely adopted for gas-

mains. In the earliest days of gas lighting, when cast iron was first employed in the manufacture of pipes, this was the

FIG. 6.

FIG. 7.

only joint in use; but it was soon found that numerous fractures occurred in the line of mains, owing to its rigid, unyielding character, no allowance having been made for the expansion and contraction of the metal due to changes of temperature. The extra labor and expense attending its use are also considerable. For steam-pipes its adoption is very general, and, of course, provision is made for the contraction and expansion, by the interposition of sliding-joints at proper intervals. When well made, and supplemented by some compensating arrangement to allow for the effects of temperature, there can be no question of its superiority over all other joints in tightness and durability.

Movable flange joints of different descriptions have been invented from time to time. In 1861, Dr. Normandy patented a mode of joining, as shown in Figs. 6 and 7. According to this method, the pipes to be connected are made plain from end to end, or, at any rate, at each edge of either end, and flanges, provided either with an annular recess or protruding rim, are slipped on to the pipes. Rings of vulcanized india-rubber, or other suitable packing material, are also slid over the ends, and then a short cylinder or thimble, made to fit loosely on the exterior diameter of the pipe, and having flanges cast on if thought desirable, is placed between the two rubber packings. Screw-bolts are introduced into the flanges, which, on being drawn together, form a tight joint.

Another plan of movable flanges and india-rubber rings is that of the "universal joint" of M. Marini (Fig. 8). It resembles the one just described, the difference consisting in the shorter length of the thimble, admitting of greater flexibility. In this case there are also two loose flanges, two

FIG. 8.

vulcanized caoutchouc rings, and a small cast iron band. The joint is made by putting on the end of each pipe the flange and the caoutchouc ring which belong to it, and then, over the end of one of the pipes, the cast iron band; the pipes are laid in line, and the collar is drawn over the point of junction. The caoutchouc rings are then placed at the opposite sides of the iron band, and they are pressed against it by means of screw-bolts through the flanges.

Petit and Lavril's joint is shown in Fig. 9. In this arrangement there are also two flanges, one being fixed and the

FIG. 9.

other movable. The ears of the flanges are placed horizontally in the trench for convenience in jointing. A ring of vulcanized india-rubber is placed within the groove made to receive it, and the end of the pipe carrying the loose

flange is introduced into the other pipe with the fixed flange, thus pressing the flexible ring to the bottom.

On the bolts being put in and screwed gradually up, the india-rubber ring is squeezed into the conical form shown.

The advantages claimed for these joints, with movable flanges, are economy, perfect soundness, and durability, ease and rapidity of application. They are asserted to be cheaper than the socket and spigot ordinarily in use, inasmuch as they save the gasket, the lead, and the fire necessary for melting it. By the two first described methods of jointing with the loose flanges, a pipe can be taken out and another substituted for it with great facility.

MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY, JANUARY, 1877.

E. W. BINNEY, E.R.S., F.G.S., President, in the chair.

"On the Poisonous Properties of Yew Leaves," by James Bottomley, D.Sc.

In the *Field* for December 23d is a letter from Professor R. V. Tuson relative to the poisonous action of yew leaves on pheasants. At the end of his letter he promises to make an examination of the toxic properties of this tree, which up to the present time do not seem to have been fairly investigated. In November, 1871, a similar case came under my notice. A number of pheasants were found dead on the estate of Mr. Baring, in Hampshire. Four of the birds were sent to me for examination. Three of them contained in their craws considerable quantities of yew leaves along with grain. The craw of the fourth bird contained neither grain nor yew; there was only a little mucus, distended with bubbles of air. The yew had no doubt passed into the alimentary canal and could not be very distinctly recognized. In the course of the investigation I found that apart from botanical characteristics the yew could yield well marked chemical reactions. It became necessary to subject yew leaves to the same process as would be used to separate strychnine from animal tissue, the ethereal extract finally obtained having been evaporated to drive off the ether. There remained on the evaporating basin a thin varnish-like residue which was very bitter to the taste. When treated with cold nitric acid this residue assumed a dark blue color like indigo. Upon the application of heat the color disappeared.

"On the Luminous Sulphides of M. Ed. Becquerel," by William Thomson, F.R.S.E.

My object in bringing this communication before the Society is to show what I consider to be some most interesting substances, viz., the sulphides, principally of the alkaline earths, the luminous properties of which were studied many years ago by M. Edmond Becquerel and others. These samples which I have I received some time ago when in Paris through my friend M. Auguste Guerout, Préparateur au Muséum d'Histoire Naturelle. They were prepared by M. André, the laboratory assistant of M. Ed. Becquerel, who has devoted much attention to the peculiarities of manipulation required to produce the greatest degree of luminosity in the sulphides after holding them for a few seconds before the sun's light, or a piece of burning magnesium wire or other source of light, and then placing them in the dark; doubtless many present will be familiar with the results arrived at by Becquerel and others, but a short *resumé* of some of them may not be out of place here.

When these sulphides, which must be kept in hermetically sealed tubes to prevent oxidation, are exposed to the rays at different parts of the spectrum, these rays have very different actions in rendering the sulphides luminous, and also in some cases of producing slightly different shades of color. The visible part of the spectrum has little or no power to render these bodies phosphorescent; the violet part, however, has greatest action, and the ultra-violet rays produce the maximum effect. M. Becquerel found, then, in these sulphides, an interesting method of examining the invisible parts of the spectrum, which furnished an addition to those employed, viz., the thermometer, silver compounds, etc.; these sulphides may be compared to chords which have the power of absorbing vibrations whose wave-lengths are too small to affect the organs of hearing—too shrill to be heard—and of changing them into vibrations of greater wave-lengths, and emitting them, so that they may be distinctly heard.

When these sulphides are held before some source of light, the sun's rays for instance, and then placed in a dark room, they gradually, after many hours, lose their phosphorescence—if, however, they be then heated a few degrees above the temperature at which they have remained, say from 60° to 80° F., they again become faintly luminous, and if kept for some time at that temperature they gradually lose their phosphorescence again; if allowed to cool in the dark to 60° F., and again heated to the same temperature, they show no phosphorescence; but if heated to a still higher degree of temperature, say 100° F., they again become luminous, and so on; this power may be regained and lost any number of times by placing them for a few seconds before any bright source of light and then removing them to a dark room—an electric current from a Ruhmkorff's coil passed through vacuum tubes containing these sulphides also develops their different colors.

The interesting point with respect to the sulphides which I show here this evening, is that they have been prepared by a special mode of manipulation by M. André, and that the luminosity or phosphorescence capable of being produced by them is greater than that from any which hitherto have been prepared.

The following gives the composition of the different sulphides which show the differently colored phosphorescences:

Green is composed of sulphide of calcium.

Orange is composed of sulphide of calcium which has been heated with 1 or 2 per cent. of binoxide of manganese.

The lime for the preparation of the above mentioned two colors was produced by the calcination of oyster shells.

An orange-colored phosphorescence is also produced by sulphide of barium.

Blue and violet are each sulphides of calcium which have been prepared from precipitated carbonate of lime.

Yellowish green is simply sulphide of strontium.

Yellow is sulphide of strontium which has been calcined with 4 or 5 per cent. of sulphide of antimony.

TO ELECTROTYPE INSECTS, FERNS, ETC.

IMMERSE the object in a solution of nitrate of silver in wood naphtha. When partially dried, the object should be treated with ammonia, the result being a double salt easily reduced. After thorough drying, expose the article to the vapor of mercury, when the surface becomes completely metallized in a few minutes. It may then be placed in the bath, and metal deposited in the usual way.—*Photo. News.*