USEFUL AND SCIENTIFIC NOTES.

HOW TO SUN A BATH.—The following method is far better than the old way of sunning in a clear glass bottle as it saves much time. Having neutralized the bath with carbonate of soda, or otherwise, place it in a large, flat, white porcelain dish. After a few hours a black scum will appear on the surfase; this is removed by means of strips of blotting-paper, and the light is once more free to act on the solution in an unobstructed manner. The bath should be skimmed every few hours unt l it is found to remain permanently clear, or nearly so, when it is ready to be filtered and to have its strength diluted by the addition of water, for, as will readily be perceived, an exposure in a flat dish, such as that to which the bath has been subjected, necessarily causes a considerable quantity of the water to evaporate, carrying with it much of the ether and alcohol. After being diluted to the proper degree of strength the bath is filtered, and acidified, if necessary, when it will be found to work as well as ever it did, free from streaks, stains and pinholes.—*Photographic News.*

—The extraordinay plague of moths which has visited Central Europe shows littie sign of abatement. From Saxony and the provinces of Eastern Germany the Plusia gamma has made its way westward, and has now been noticed in large numbers in Westphalia and Rhineland. It has made its appearance in gardens in the suburbs of Cologue and in Mulheim and other places on the Rhine. In the neighbourhood of Iserlohn. Westphalia, moths have abounded since the middle of August, especially in the clover-fields, and have very largely diminished the quantity of honey the bees usualty bring home from the heather, which is in flower and very plentiful in the vicinity. In Antwerp, too, and, indeed, it is believed throughout Belgium, the gamma has shown itself in large numbers since the end of May. In the Belgian port just mentioned it is so numerous that, according to a correspondent of a Cologne paper, it is a great nuisance to people sitting in the public gardens or open air, especially after the gas is lit. There it has never before been known to show itself in such numbers as during the present summer.

CAST-STEEL.—A London metallurgist claims to have produced a high quality of cast-steel at a considerably reduced cost by re-carbonizing fused metal. The Siemens of Bessemer process furnishes the required kind of metal, which, after being forged, rolled, and brought to the desired size and form, is submitted to a re-carbonizing process in closed vessels of any adequate heat-resisting material, and the carbonizing substances may be such as are employed in the usual cementing process. Wrought-iron vessels about five-eights of an inch thick, and of such a form as will best suit the purpose for which the steel is intended, are preferred. The covers project beyond the sides of the box, in order to admit of their being firmly fixed with keys or wedges, and the interstices are then tightly filled with clay. An ordinary gas or reverberatory furnace may answer for the process.

BELT LACING, ETC.—Among the recent practical inventions is one patented by Mr. A. C. Krueger—a process for tanning rawhides for belting, lacing, etc. Mr. Krueger's process for prepreparing the hides for unhairing is by steam. After being unhaired, thoroughly flesh and passed through the fresh water soak, they are removed to a bath containing a chemical solution which readily unites with the component parts of the hides. In due times the hides are taken out of the bath, thoroughly dried, and then placed in the stuffing wheel, where they are made to receive a due proportion of grease, and become very mellow. They are then placed on the stretcher and thoroughly stretched, and from there to the grease coursing table for the last finishing touch. Goods made from this material are said to give great satisfaction everywhere.

A PERFECT MARKING INK.—Mr. Albert Smith, of Essex-road, has sent us a specimen of markigg ink which can be used with any pen, does not require heating, and will not injure the most delicate fabric. The new ink writes with a green tinge, and turns an intense black on the first washing. Mr. Smith infoms us that the ink cannot be removed by any known chemical means—chloride of lime, cyanide of potassium. caustic soda, and potash having no effect upon it. We can testify that it flows easily from a steel pen, and turns an intense black when submitted to the washer-woman's soapsuds, but we have not yet tested its durability. We have, however, no reason to doubt Mr. Smith's statement.

—The increasing use of arsenic in the manufacture of paper collars and cuffs will assuredly bring those articles into disrepute. The medical officers of Coblenz recently analysed a number of these articles, which are largely used by the middle and lower classes in Germany, and the result of the investigation shows that a strong admixture of arsenic is present in the paper collars, &c., as now made at Leipsic. The doctors declare that under cerain conditions the use of such articles is highly dangerous to the wearers.

NUT-SAWING MACHINE.—A new machine for sawing iron nuts has been invented in Springfield, Massachusetts. The saws—two are used—are of soft steel and make 3,000 revolutions a minute, the periphery travelling nearly four miles a minute. The machine will slot a ton of nuts averaging 4,000 in number, in a day.

TO PREVENT THE CRACKING OF GLUE.—Glue frequently cracks because of the dryness of the air in rooms warmed by stoves. An Austrian paper recommends the addition of a little chloride of calcium to glue to prevent this.

TUBULAR PILES.

A novel and ingenious system of constructing and driving piles has of late been introduced into practice by Messrs. Le Grand & Sutcliff, of London, artesian well engineers. It involves a considerable departure from ordinary practice, inasmuch as the piles are driven internally and at the bottom, instead of externally and at the top. The invention originated with the senior member of the firm, whilst the credit of some of the applications of the principle is due to the junior member. The piles, says *Engineering*, are tubular, and can be made of either wrought or cast iron, and the thickness of the metal can be proportioned to suit the varying circumstances of construction. The lower end of the pile, as shown in Figs. 1 and 6 of our engravings, is made solid and pointed, and is generally of wrought iron and steel tipped. The piles are made in sections, which are screwed together by strong steel sockets or joint covers, which are barrel shaped on the outside in order to diminish friction when being driven.

The method of driving these piles is as simple as it is novel. Instead of the blows being delivered on the head of the pile, the driving force is expended just where it is wanted, namely, at the point. This result is attained by using an elongated cylindrical *driving weight, which travels easily inside the tube.* The weight is raised by means of rope or rods, and is allowed to fall on the flat head of the solid point, the pile thus forming its own guide for the driving weight. The effect of each blow is to drag rather than to drive the pile down. It will be seen that the point is swelled, and is of sufficient diameter to effect a clearance for the joint covers which have to follow it down. The form of the joint cover is seen in Fig. 5. A considerable experience in driving tubes into the ground has shown the inventors that, thus made, the point does all the real work, and that a very slight strain is brought on the joints above. An increase of stability is given to these piles in cases where the depth to which they have to be driven is previously known by the use of a flange which is proportioned to suit the nature of the soil into which the pile has to be driven. This flange is shown at Fig. 2, and is so placed that at the final driving it just embeds itself on the river or sea bottom. The tubes forming the pile are screwed into the flange, which in this case takes the place of the usual steel socket, and unites the two lengths of the pile together. It thus in no way diminishes the strength of the pile as it would if screwed on to the tube below an ordinary socket.

With this system of piles it is not necessary to test the ground previously to driving them, inasmuch as lengths can always be added until a firm foundation is reached, failing which the pile can be withdrawn. In prospecting for a site small tubes can very rapidly be driven to ascertain the nature of the soil. Another advantage the system possesses is that piles can be driven in deep water with great facility, and they can be of extreme length. Their strength, moreover, can be increased by filling them in with concrete after they have been driven, if desired. When meeting with obstructions, screw piles have a tendency to become diverted from their position, and are liable to loosen the ground around them. The tubular pile, on the other hand, is not open to this objection, as it will fracture and pass through minor obstructions until it reaches a solid foundation, and being forcibly driven into the ground, the earth firmly surrounds it. These piles are applicable to all classes of engineering work, and they are now being tried by the Royal Engineer Committee, under instructions from the Under Secretary of State for War.

The principle of internal driving has been applied by Messrs. Le Grand & Sutcliff to the sinking of tube wells, driving the foundations for telegraph posts (as shown in Figs. 3, 7, and 8), flagstaffs, and the like. When used in connection with the wells