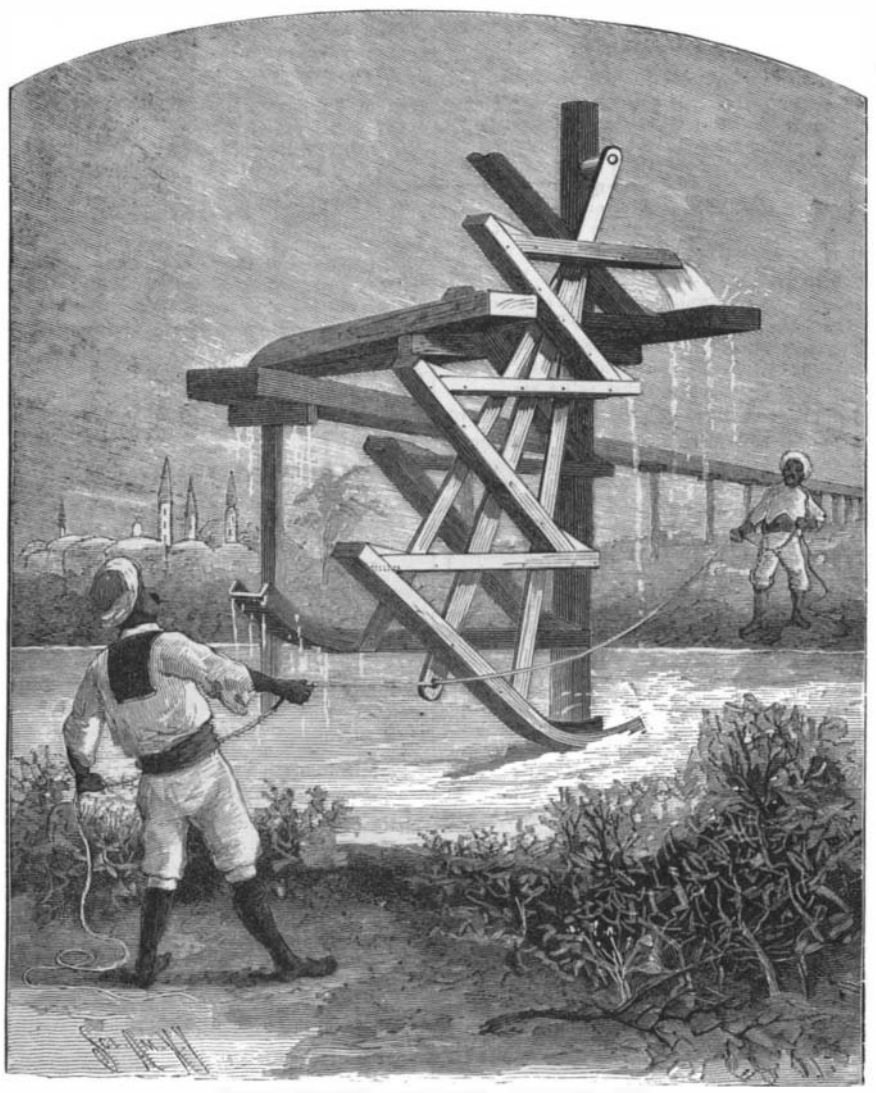
AN ANCIENT WATER ELEVATOR.

In Egypt and other countries where irrigation is practiced to a greater extent than elsewhere, the inventive mind has been alert for centuries, contriving devices of various kinds for elevating water. Some of these are so simple that they must have been obvious, while others show an amount of inventive genius worthy of our own century; in fact, as is well known, the fundamental principles of hydraulics were discovered ages since, and some of the early machines have never been materially changed or improved upon.

The Egyptian shadoof is a form of water elevator that has been in use from time immemorial, not only in Egypt, but almost all over the world. A device fully as simple as this, but not so old, is a gutter, which was made both single and double. It consisted of a trough pivoted at one end above the level of the water, the free end being alternately dipped in the water and raised, so as to cause it to discharge into a sluice leading away from the machine.

The pendulum water elevator shown in the engraving is a curious modification of the swinging gutter. A number of gutters arranged in two series are secured to opposite sides of a swinging frame, each series of gutters being arranged on a zigzag line, and the two series of gutters are oppositely arranged with respect to each other, so that while one end of the lower gutter dips in the water, the lower gutter of the other series discharges into the next gutter above, and a flap valve retains the water while the device is swung in the opposite direction. In this manner the water is advanced step by step at each oscillation, until it is finally discharged into the sluice, which carries it away for use. Each of the gutters, except the first of each series, is provided with a valve, which retains the water as it moves forward and upward.



PENDULUM WATER ELEVATOR.

Vaseline.

The lack of communications concerning vaseline and its manufacture leads us to imagine that a few remarks on this subject may be of interest to chemists and others.

In a previous number of the *Chem. Tech. Cent. Anzeiger* (1881, 42) two methods of manufacturing vaseline are given, one of which is specially prepared for official inspection, the other being entirely devoted to the excellent article made by L. Meyer, of St. Johann. No special points in the manufacture are brought out, and there is no space devoted to the theory of the manufacture, which is specially necessary for the explanation of this industry. It should also be noticed that several expressions in the descriptions above referred to appear more suited for a technical society than for a scientific journal.

That "sulphuric acid produces particles of carbon in oil" is, to say the least, not an expression which can be recommended as a model of scientific accuracy.

It is also difficult to understand why the last traces of the chemicals employed cannot be removed from the oils; we, in the mineral oil industry, remove the very last traces of reagents, and so do those vaseline manufacturers who use chemicals, and do not confine their purification to filtration through a charcoal filter.

It is now generally known that every vaseline manufacturer has his own secret process, and preserves it as closely as he can; any one not belonging to a works being thus compelled to make his own investigations.

Leaving unregarded the two methods previously mentioned, the following process has been devised, similar to that usually employed in the manufacture and purification of brown coal tar.

In commencing such an investigation, it is necessary to first of all definitely settle two points: "What is the quality of the new material?" and "What impurities are to be removed, and how can this best be done?" Knowing this, the outline of the process to be adopted is more than indicated. The nature of the raw material varies greatly. It usually consists chiefly of the residues of the so-called American petroleum, or it may be Russian oil, especially from Baku, under Galician oil and even bitumen itself, or natural asphalt, either in the solid state under this name, or of the consistency of tar, under the name of mine tar. It is, of course, obvious that no fixed method of preparation of the article termed vaseline can be given, and, in fact, the processes employed are very numerous.

The paraffins, as is well known, are hydrocarbons of the marsh gas series, and are classified into normal and iso paraffins, the corresponding members of which have the same percentage composition, but different structure. The American raw material—the viscid residue left on the distillation of the petroleum—is indispensable for the manufacture of yellow vaseline. The American petroleum, as obtained by boring, contains both classes of paraffins, of which the normal can only be brought to crystallization by the distillation of the petroleum, whereas the iso paraffin remains dissolved in the oil. According to the extent to which the oils are distilled off, a more or less liquid or pasty product is obtained—lubricating oil and vaseline. The distillation therefore effects the separation of crystallizing from amorphous paraffin, and only such raw materials as contain the latter, which therefore cannot pass or can only partially pass into the crystalline state, are fit for vaseline making.

Saxon brown coal tar, as is well known, deposits soft paraffin in scales in the cold, and contains no amorphous paraffin; these oils cannot, therefore, be used for the manufacture of lubricating oil and vaseline.

The case is quite different with American petroleum.

The residues from the distillation of American petroleum, which, as already mentioned, form a viscid or even soapy mass, are heated by steam and then well agitated with sulphuric acid to remove the resin which is still present.

At the close of this operation, after running off the resin by a tap, the excess of acid is neutralized with caustic soda or sodium carbonate solution, and the oil thoroughly washed with hot water until all the soda is removed. The material is then decolorized by animal charcoal, the liquid vaseline being stirred up with the charcoal by the aid of steam, and is then filtered hot. The only difficulty which has to be overcome in purifying the distillation residue lies in the correct proportion of soda solution to acid, which must be closely adhered to, since an excess of the former may emulsify the whole mass. The animal charcoal which is employed to decolorize the hot vaseline contains, as is well known, many inorganic salts, especially calcium phosphate and magnesium phosphate, as well as potassium chloride, sodium chloride, etc., so that it must be washed out with hot water, then with hydrochloric acid, then again with hot water, and finally dried; it thus acquires the property of retaining any caustic soda which has not been removed by washing.

The Russian oils are of special interest because of the "vaseline oil" which is made from them. After the light oils and normal paraffin have been removed from the oils, the heavy oils are purified by pressing, whirling, and decolorization, and then form the "paraffinum liquidum" of the pharmacopœia, which is also, probably, a solution of the iso paraffin in mineral oil.

Messrs. Hill, of Troppau, in Austrian-Schlesien, have for some time been producing a so-called "viscous natural vaseline." This product is of a darker color than the American quality, and is manufactured from so-called "blue oil," obtained in the distillation of Galician petroleum, directly after the light oil. It is an almost buttery mass, which deposits scales of paraffin in the cold, and is, therefore, also a mixture of heavy oils and solid paraffins. If, however, the distillation be stopped immediately after the lightest oils have come off, the residue in the retort, after treatment with sulphuric acid, etc., forms a homogeneous, fatty, lustrous mass—vaseline. This "viscous natural vaseline" is, therefore, the residue of the so-called "blue oil," which still contains amorphous paraffin, to which it owes its viscosity.

In making some experiments on the manufacture of vaseline, an oil was selected which had been obtained from the natural asphalt of Bentheim. The latter was submitted to distillation over a fire, and the oil fractionated according to its specific gravity. The oil of specific gravity 0·856 appeared the most suitable for the purpose. It was mixed with 4 per cent of sulphuric acid of 66 deg. B., and the resin drawn off after allowing the oil to stand for about twelve hours. It was then washed repeatedly with hot water until the latter gave no reaction with litmus paper. The clear oil was next thoroughly shaken with caustic soda solution, to remove creosote, the lather drawn off, and the oil again washed and treated while hot with the so-called decolorizing powder, the residues of the potassium ferrocyanide manufacture. The mass was then filtered and distilled until a heavy oil remained in the retort, which, after pouring out, became more viscid on standing, and was a kind of vaseline, since it deposited no crystalline matter even at 10 deg. Unfortunately, the light yellow mass became dark colored again when the oil was redistilled over the flame. However, no apparatus was at hand which would permit of the treatment of the strongly concentrated oils with reagents by the aid of steam, and it was, therefore, necessary to distill the oil after treatment. The vaseline obtained was yellowish brown, and had the well known bluish fluorescence, but was still rather fluid, differing in this respect from the American article, which it otherwise resembled.

The object was to prove that any distillation residue containing iso paraffin is more or less fitted for vaseline making, and this was successful. Whatever special method the individual manufacturers may possess of bringing the oils to the right consistency more rapidly and more simply, or of producing a light colored and odorless vaseline, the main outline of the process adopted cannot vary much, and must lead to the wished for end, provided that the crude material contains amorphous paraffin. Only such a material, which remains without crystalline deposit, even in the greatest cold, can produce the requisite viscosity of vaseline, and it will be found impossible to produce viscous vaseline from an oil which contains normal paraffin. The product will simply be a solution of crystalline paraffin in oils, without possessing the proper viscosity of vaseline, and will crystallize at a low temperature.—*Chem. Tech. Cent. Anzeiger, Chem. Tr. Jour.*

Electrical Utilization of Insects.

An electric apparatus supplies a strong light which attracts the insects and moths; a suction fan worked by the electric current draws them in when they approach the light, and carries them into a small mill, also worked by the electric current, where they are ground up and mixed with flour and thus converted into poultry food of excellent quality. This is said to be a Bavarian contrivance.

Failure in a Noted Case of Skin Grafting.

Mr. John O. Dickerson, of Chicago, on whom was engrafted 144 square inches of human skin, taken from 122 different individuals, in January last, died on February 24. The occasion arose from the removal of a cancer, and it was at first considered the operation was likely to be a success, the new skin having begun to attach itself over the wound, but the stomach of the patient gave out, the system having been overtaxed by numerous operations, and when nourishment failed the wound ceased to heal. Full particulars of the operation will be found in SCIENTIFIC AMERICAN SUPPLEMENT, No. 788.

IN Switzerland a Sunday law has been enacted applying to all railroad, steamboat, and tramway companies and post offices. Working time must not be more than 12 hours a day, even on occasions of increased traffic. Engine and train men must have at least 10 hours unbroken rest, and other employes 9 hours. They must also have 52 days off yearly, and 17 of these must be Sundays. No reduction in wages is to be made for such rest days. All freight traffic on Sunday is prohibited, except live stock.