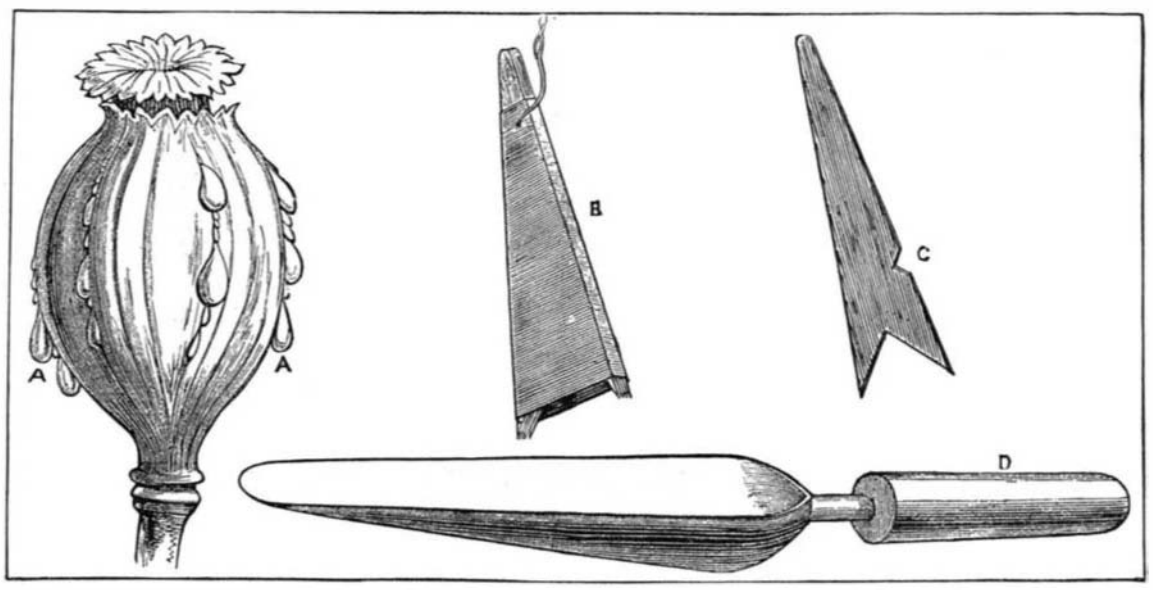
[FROM THE LONDON GRAPHIC.]

THE MANUFACTURE OF OPIUM.

Our engravings are from drawings by Lieut.-Colonel Walter S. Sherwill, late Boundary Commissioner, Bengal. They were made by him during a visit to the Patna factory, and were afterwards lithographed, with accompanying descriptions, in a volume printed for private circulation. They are of especial interest at the present time, when a number of persons, more or less influential, regard it as an immoral proceeding on the part of the Indian Government to derive a revenue from what they hold to be a baneful drug. Opinions greatly differ on this subject, and men of high authority and experience (Sir George Birdwood, for example) declare that opium is as much a necessity for the natives of the East as wine, spirits, and beer are for the natives of the West, and that the evils arising from its use are altogether less than those caused by the use or abuse of alcohol. We shall not here attempt any argument on the subject, preferring to summarize the official statement of Major Baring. For three years past the Indian opium crop has been short, and, coupled with this deficiency, there has been an increase in the production of Persian and Chinese opium. If the government monopoly of opium were abandoned, India would not only lose a revenue which would have to be made up by some other tax, but the extent of the poppy cultivation would almost certainly be largely increased in the hands of private growers. If the government went further than this, and altogether forbade the poppy cultivation, they could not stop the Chinese demand, which would then be supplied by inferior qualities of Persian and native Chinese growth.



A, A. Crude opium exuding from the green poppy-head.—B. Knife of four double-pointed blades for scratching the green capsule.
C. One of the blades of the knife, B.—D. Iron spoon for collecting the drops of opium.

We will now turn to the drawings of Lieut.-Col. Sherwill, who informs us that between 12,000,000 and 13,000,000 pounds of poppy juice (or upwards of 5,000 tons) are yearly gathered in Bengal. This yields a gross revenue of £6,500,000. The poppy is grown in the broad valley of the Ganges, and principally in those districts near Patna and Benares.

In the examining hall the consistency of the crude opium as brought from the country in earthen pans is simply tested, either by the touch, or by thrusting a scoop into the mass. A sample from each pot (the pots being numbered and labeled) is further examined for consistency and purity in the chemical test room.

In the mixing room the contents of the earthen pans are thrown into vats and stirred with blind rakes until the whole mass becomes a homogeneous paste.

The crude opium is then conveyed to the balling room, where it is made into balls. Each ball maker is furnished with a small table, a stool, and a brass cup to shape the ball in, a certain quantity of opium, a certain quantity of opium and water called "Lewa," and an allowance of poppy petals, in which the opium balls are rolled. Every man is required to make a certain number of balls all weighing alike. An expert workman will turn out upwards of a hundred balls a day. In the drying room the balls are placed to dry before being stacked. Each ball is placed in a small earthenware cup. Men examine the balls, and puncture with a sharp style those in which gas, arising from fermentation, may be forming.

In the stacking room the balls are stacked before being packed in boxes for Calcutta, *en route* to China. A number of boys are constantly engaged in stacking, turning, airing, and examining the balls To clear them of mildew, moth, or insects, they are rubbed with dried and crushed poppy petal dust.

Lastly, we see an opium fleet of native boats conveying the drug to Calcutta. The fleet is passing the Monghyr Hills, and is preceded by small canoes, the crews of which sound the depth of water, and warn all boats out of the channel by beat of drum, as the government boats claim precedence over all other craft. The timber raft shown in the sketch has been floated down from the Nepal forests, and will be used in making packing cases for the opium.

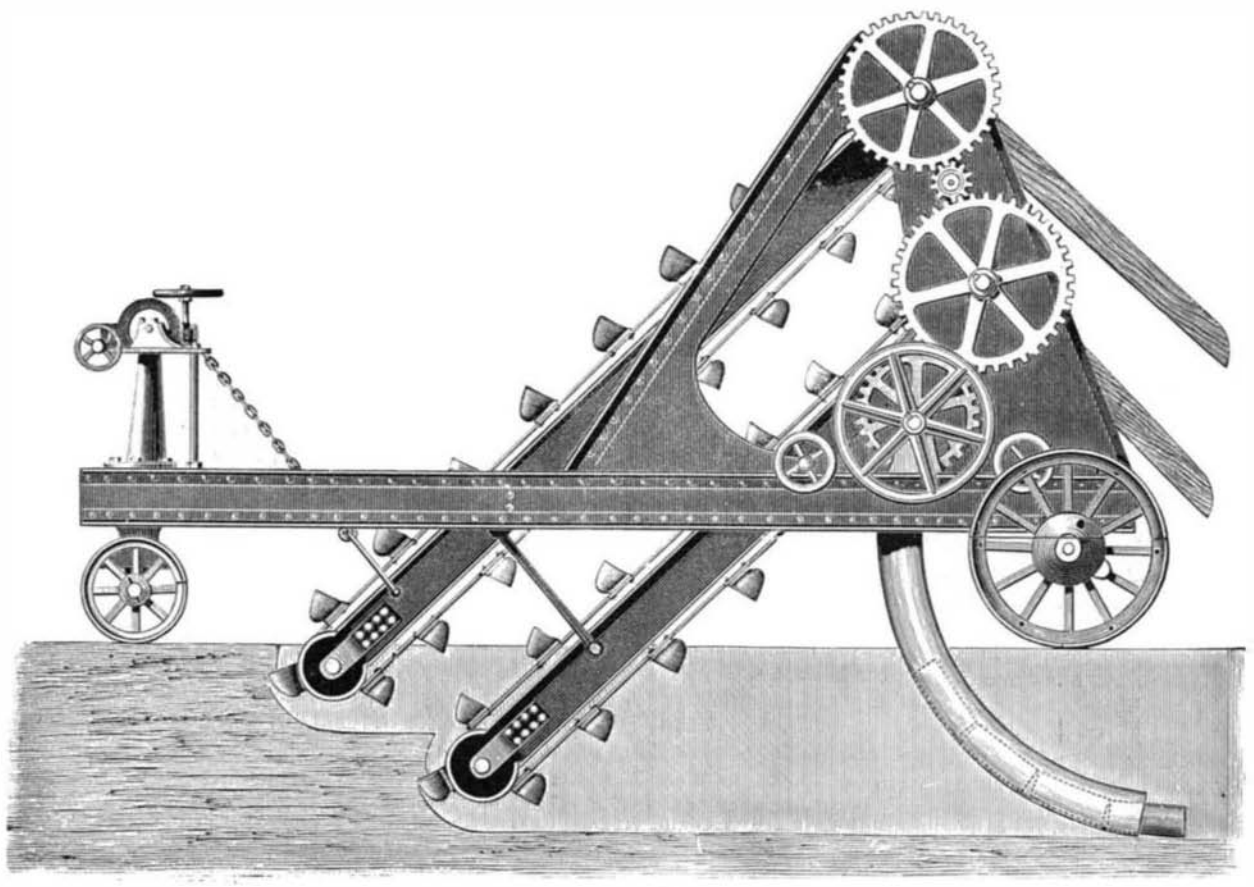
The drawings of the poppy head and the knife are of the natural size. The spoon is half the natural size.

A Tree with 200 Birds' Nests.

An old elm stands near the depot in Fair street, Kingston, N. Y., which is a favorite building place for birds. More than 200 nests have been counted among its branches this season, and the birds fill the old tree with song. It is the admiration of every visitor. Many go to hear the singing of the birds in the morning.

CUTTING DRAINS BY MACHINERY.

Numerous attempts have been made to supplant or assist manual labor by machinery in the cutting of drains. At the royal show at Derby, a machine for forming drains was exhibited by the Victoria Foundry Company, of Newark on-Trent. It was manufactured by Messrs. Abbot & Co., under the patent of Messrs. Robson & Hardman, and attracted a good deal of attention. The accompanying illustration, reproduced by permission from the Journal of the Royal Agricultural Society of England, will convey an idea of the construction of the machine.



DRAIN CUTTER.

Mr. John Coleman, the reporting judge, in describing the machine, says:

"The motive power is a wire rope from an ordinary plowing engine fixed on the headland. The drain is excavated by a series of revolving buckets cutting to the required depth and fall. These buckets are sharp-edged and very strong, as they have to act as scoops to remove as well as carry the soil. They are driven from the hind traveling wheel by a series of toothed wheels. Under the machine is a pipe conductor, by means of which the pipes are laid in the drain in front of the shoots, which deliver the soil cut out of the drain and brought up by the elevators, so as to cover up the pipes and fill the drain. This is very ingenious, and, provided the proper fall can be insured, which has always been a great difficulty with draining plows, this machine may prove of great value. The lower elevator, which takes out the bottom of the drain, deposits the material first, thus replacing the soil in the same relative position as it is removed. This is not always or usually desirable, and, if necessary, the process can be reversed. The frame is composed of strong iron plates, to which flange pieces are riveted. The motion is necessarily very slow. This machine was not in a sufficiently perfect state to admit of a trial—a matter of regret, as nothing in the way of mechanical aid to suffering agriculture at this juncture can be conceived as more valuable than a really efficient labor and money-saving drainage tool. Without a very exhaustive trial it is impossible to pronounce any opinion upon its present or possible future utility.

Mining Cables.

A valuable report by a French Government commission, on the rupture of cables in mines, appears in a recent number of the *Annales des Mines*. Among other points we note the affirmation that metallic cables, both steel and iron, may be used with as much security as cables of textile material, proper care being taken in providing and maintaining them (and more is needed). In very moist pits, especially with acid water, aloe cables are preferable; in pits, with return of air, and somewhat high temperature, metallic cables. Where flat cables are used, the textile allow of better equilibrating the motion of the engine than the metallic. Round metallic cables are more easy to make well than flat ones, and with conical or spiraloid drums, admit of regulating the engine's motion very conveniently. (French managers, it is stated, do not, in ordering cables, specify details and conditions of working sufficiently.) The resistance to rupture of hempen or aloe cables varies largely with choice of material and mode of manufacture, and careful experiments should be made with the yarn or cable (the cable should not contain more than 20 per cent of tar). The wires of a metallic cable should likewise be tested, both for flexure and torsion. Marks of fatigue of a cable generally appear outside; but with metallic cables, long used, it is well to make direct experiments on isolated wires, or on the ends. The importance of diameters of winding being as large as possible is greater for metallic than for textile cables, and for steel than for iron cables. The minimum diameter for iron cables should be 1,300 to 1,400 times that of the wire, and 2,000 for steel. It should be 80 to 100 times that of the cable diameter in metallic cables, and 50 times in textile. Thick metallic cables should not be worked beyond a tenth of the force required to break them; small round cables, a sixth; good aloe cable, a seventh, or an eighth. Cutting off the ends of a cable (too much neglected in France) should be done every two or three months. Once a week, at least, a cable should be passed for examination slowly up and down before the eyes of a competent agent. (Directions as to conveyance of personnel and various other topics are also given by the commission.)

ACID PROOF CEMENT.—Make a concentrated solution of silicate of soda, and form a paste with powdered glass. It will be found invaluable in the operations of the laboratory where a luting is required to resist the action of acid fumes.