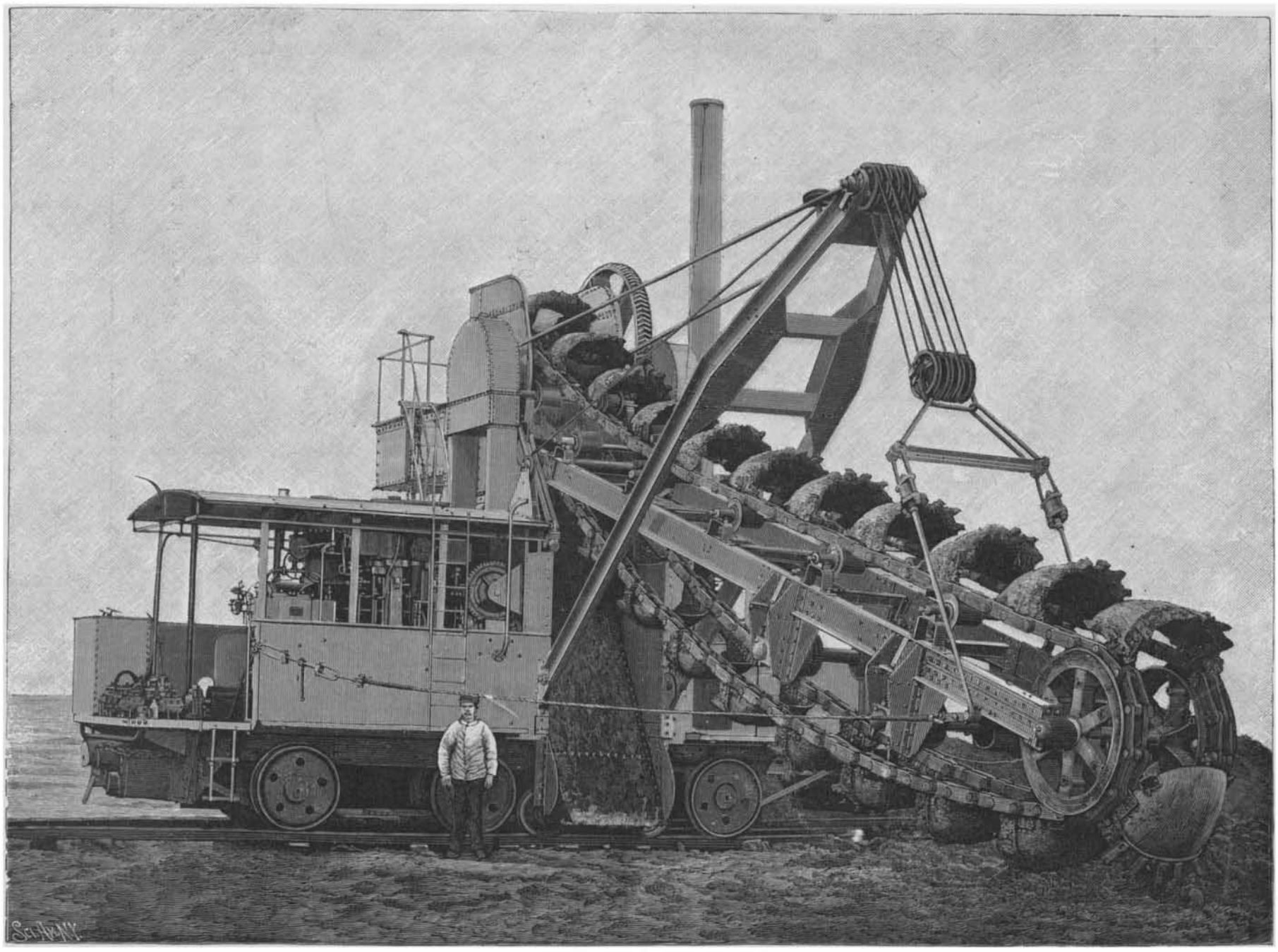
A CANAL EXCAVATOR FOR JAVA.

Messrs. Smulders, the well-known dredger engineers of Amsterdam, have recently completed the construction of a large canal excavator for the Netherlands Colonial Department for the irrigation works of the Solo Vale, Java, Danish East Indies. This excavator, a model of which is at present on view at the Paris Exhibition, is designed to excavate to a depth of 16 feet below the rails along which it travels. If the exigencies demand it, however, it can be operated with a jib, when its range becomes 36 feet in width by 15 feet in height. It has been specially constructed to work the peculiar soil of Java, which somewhat resembles a marl. When dry this earth is exceptionally hard, almost solid like rock, but when wet it is extremely sticky. It will be immediately realized, therefore, that excavation in such soil is a difficult operation under any conditions, and in order to satisfactorily perform the work the appliance has been constructed of unusual strength. The teeth to the buckets are not only provided with sharp points, but are also supplied with a sharp cutting edge, so that the marl may be readily disintegrated, whether it be hard and dry, or wet. When the soil is wet and sticky, the teeth of the buckets are apt to become clogged, but the marl is easily discharged from the buckets when in this condition.

The excavator travels along a broad railway track, so that the buckets may be brought to bear upon any point that the engineer may desire to excavate. The appliance is supplied with four engines: 1, the main engine for actuating the bucket chain; 2, the engine for propelling the excavator along the railway track; 3, the engine for hauling the ballast wagons; 4, the engine for raising and lowering the bucket arm.

The maximum capacity of the excavator is about 30 buckets per minute, which is equivalent to a displacement of about 4,000 cubic feet of earth per hour. Of course, the excavating capacity depends upon the condition of the soil upon which it is working, but from the trials a speed of from 20 to 30 buckets per minute can generally be maintained.

The body of the excavator consists of two heavy longitudinal built-up girders, connected by transverse beams, between which are fixed auxiliary longitudinal girders. The upper face of the frame is covered by a roughened plate at a height of 3 feet 6 inches above the ground. This frame rests upon four axles, three of which carry three wheels each, while the fourth has only two wheels, but in place of the third wheel is supplied with two small wheels which can be employed as an additional support if necessary. The frame is suspended on springs, and is also fitted at each end with buffers and coupling chains for the attachment of the ballast wagons. The excavator travels upon a track, the gage of which is 71.16 inches and consists of three rails, two of which are laid at a gage of 44 inches. The staff necessary to control the excavator consists of the engineer, fireman, and a man to operate the buckets and to load the wagons.



A CANAL EXCAVATOR FOR JAVA.

Assyrian Statuettes, Analysis of Metal.

M. Berthelot has lately made a series of analyses of the metal contained in a number of the statuettes of the Louvre, especially those belonging to the Assyrian collection, and has given his results in a paper read before the Academie des Sciences. It was found necessary to bore out the statuettes at the base so as to fix them upon a support, and this afforded a certain quantity of metallic powder which M. Heuzey, the archæologist, gave to the author to be analyzed. The first of these statuettes represents a woman sustaining a basket upon her head with both arms, and measures eight inches high. The lower part of the body is covered with a garment upon which are a number of inscriptions. The body has no legs, but terminates in a point. This kind of figure has been a current type from the time of Goudea down to that of the king Rim-Sin, covering a period of twenty centuries. The figures seemed to have served as amulets which were buried in the foundations of edifices. The present specimen bears the date of Bour-Sin, a Chaldæan king of the city of Our, near the 26th century B. C. Its color is copper-red and it presents a double layer of incrustation on all parts of the body; the first layer is superficial, of greenish color, and is scaled off in places, while the second is deeper and more uniform, of a reddish color. Several analyses of the metal were made, the first upon a powder extracted at 1½ inches deep in the vertical axis, which had a reddish-white metallic look. This gave, for 100 parts, copper, 76.0; lead, 18.1; sulphur (in considerable proportion), iron and oxygen, 5.9 parts. As this composition was unexpected, the author made a second analysis of a compact fragment, reddish in color, detached from the tail of the statuette, and found copper, 77.4 parts; lead, 17.0; sulphur, 2.3, with a little iron. This confirmed the preceding analysis, with slight differences. The surface layer contained carbonate of copper, with oxidized lead and iron. Thus the statuette consists mainly of an alloy of 1 part lead and 4 parts copper with considerable sulphur, which no doubt came from the native mineral used. This composition contrasts with that of the ancient statuettes of Goudea and Our-Nina, which consist of nearly pure copper, and differs also from a figure of the date 2200 which was previously analyzed and found to contain nearly pure copper. This led to a re-analysis of this latter, with metal taken from the center of the figure, and it gave copper, 95.7; iron, 3.1; sulphur and oxygen, 1.2 parts, showing that it was nearly pure copper. The next analysis was made upon a Babylonian figure of unknown date. It represented a priest or divinity, bearded and wearing a tiara, holding an animal on its breast. The metal was of a reddish color, and the metallic powder obtained seemed to be mixed with carbonate of lime. The analysis gave the following proportions: copper, 79.5; tin, 1.25; iron, 0.8; oxygen, 9.75; carbonate of lime, 8.3 parts. This metal was very much oxidized. The author next analyzed the metal taken from the pedestal of a small Babylonian bull having the appearance of bronze, with silver incrustations. It contained the following: copper, 82.4; tin, 11.9; iron, 4.1; oxygen and residue, 1.6. The metal is thus an ordinary bronze with a considerable proportion of iron. It will be seen by comparing these alloys, which have the same appearance of a reddish metal, that their composition shows a great diversity as soon as a date below 3000 B. C. is reached. This diversity results in part from the nature of the mineral, but the additions of lead and tin are intentional.

The electric fan, which does yeoman's duty during the hot days of July and August, is found to be no less serviceable in winter. The purpose, to be sure, is totally different. It is found that by placing a fan in a store window, frost is prevented from covering the glass, by reason of the constant circulation of heated air. Patents have been taken out on a split-tube arrangement, which is to be placed at the bottom of the pane of glass, and so connected with a fan as to distribute a current of hot air over the surface of the glass. But the ordinary electric fan is said to answer just as well.