SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXXIX.—No. 18. [NEW SERIES.] NEW YORK, NOVEMBER 2, 1878. [$3.20 per Annum. [POSTAGE PREPAID.]

Chard's Lubricene and Cups.

The secret of economical lubricating lies in the application of a durable lubricator exactly when and where it is needed, without failure and without excess. This end appears to be very happily attained by the lubricating cups manufactured by Mr. R. J Chard, 134 Maiden Lane, New York city, and illustrated in our issue of August 17 last. The cups are charged with "lubricene," prepared from oil by a patented process, and the feeding is so arranged as to secure the uniform lubrication of bearings without waste and at the lowest cost. As was shown in the engraving referred to, page 100, a copper feeder passes through the lubricene in the cup and rests upon the bearing. Copper being a good conductor of heat, the feeder will be warmed by friction enough to secure a sufficient flow of the lubricant while the bearing is comparatively cool. The spring to the feeder is regulated by a screw cap so as to increase or diminish the feed according to the requirements of the bearing, thus giving a perfectly automatic friction feeding cup.

It is often asked how one man can run his mill and make money while his neighbor, who works just as hard, falls behind. The difference may often be found in the single circumstance that the one takes advantage of every real improvement bearing on his work, and reaps a benefit that the other misses. In the items of economy, proper lubrication is not insignificant. With every diminution in friction there is an equal saving of power, and very often a not less important saving in time. We are informed that the test of everyday use sustains the decision of the American Institute, in 1875, as to the superiority of this lubricant, as well as that of the judges of the Centennial Exhibition in regard to the unequaled excellence of Mr. Chard's lubricating cup and compound.

THE FORSTER-FIRMIN AMALGAMATOR.

In our issue of December 22, 1877, we illustrated the system of amalgamating the precious metals patented by Messrs. Forster and Firmin, of Norristown, Pa., which brought to the inventors inquiries from all parts of the world.

In this process the mercury is atomized by steam, compressed air, water, or other equivalent medium, and forced, after the manner of the well known sand blast, through a stream of falling ore, which may be either dry or wet.

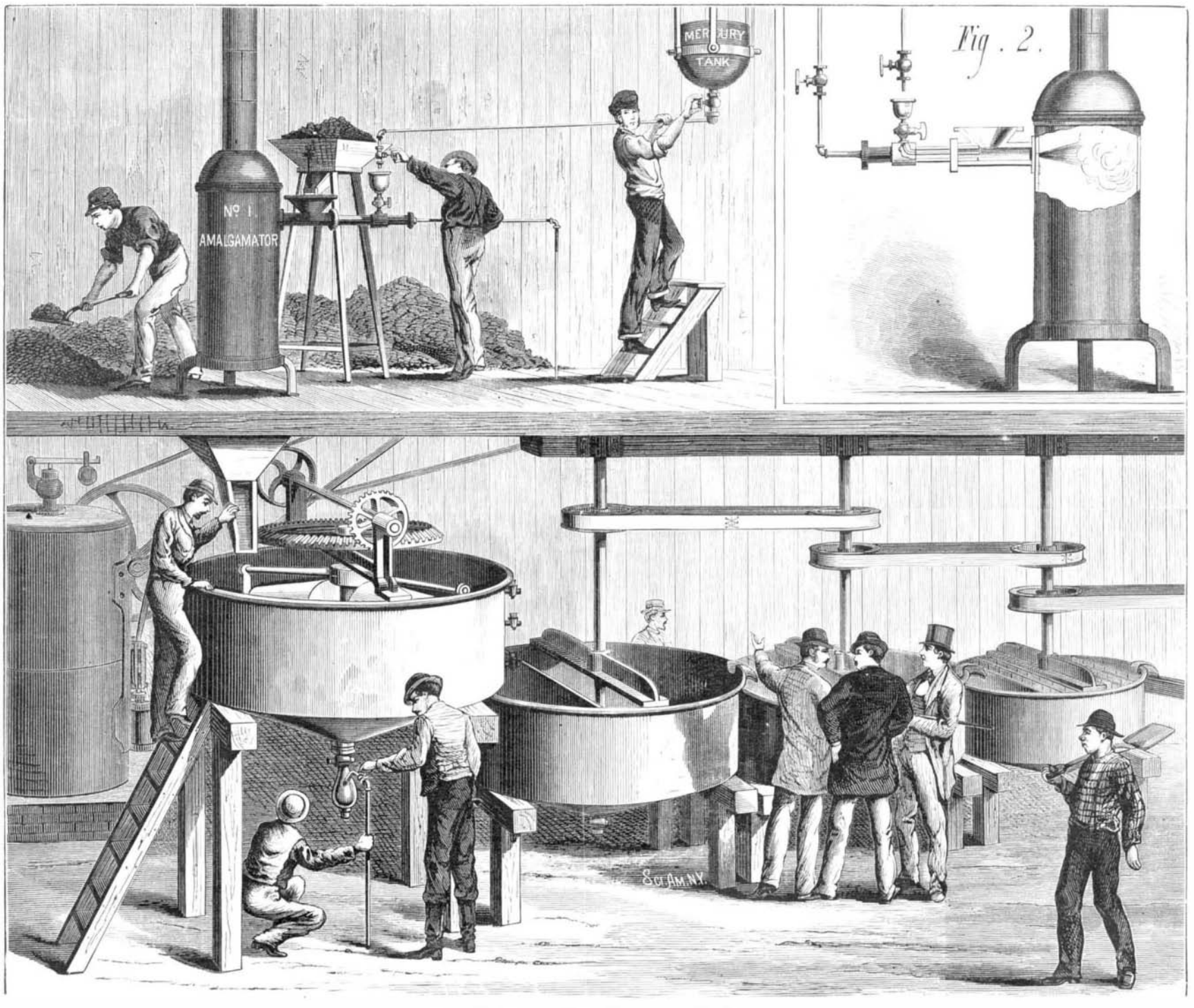
Since the description above referred to the inventors of this amalgamator have been conducting practical experiments which have resulted in important modifications and improvements, which increase the efficiency of the machines and reduce both the time and expense of working. In addition to the improvements in the amalgamator proper, Messrs. Forster and Firmin have perfected and patented a system of settlers, the advantages of which will be obvious to the practical miner. These settlers are arranged as shown in the engraving below, and each consists of a cylindrical vessel with a conical bottom, containing an agitator, and having a partition extending from the top of the vessel nearly to the upper side of the agitator. The pulverized ore, containing free gold or silver, is fed from the hopper to the horizontal tube which leads to the large vertical tube or chamber, shown in section in Fig. 2.

While in the act of falling the ore is impinged upon by a stream of mercury which escapes from the small receptacle at the rear of the hopper through an inner pipe. The flow of ore and mercury is broken up and carried forward by steam or air pressure. The ore which flows from the amalgamator is discharged into the washer, where it is heated by steam and worked for a short time until it is mulched sufficiently to flow evenly. Water is then injected into the chamber at the bottom of the washer, when the bulk of the mercury and amalgam is withdrawn, and the waste flows into the first settler of the series, and the water passes on until it finally escapes from the lower settler. The mercury is deposited in the central conical space in the vessels, from which it is removed occasionally through the discharge cocks. One of the settlers is provided with amalgamated copper plates, which are vibrated by the action of the water. This effects the arrest of the fine particles of gold or mercury carried in the water as it passes between them, while any gold leaf which may float on the surface is retained by the partitions. The process of amalgamating in this apparatus is continuous.

Fig. 3, page 271, is a modification in the amalgamator, in which three or more jets of mingled ore and mercury meet in a common center in the receiver or chamber, and intimately mixed.

The inventors state that with their apparatus they have obtained the entire quantity of metal contained in the ore, and have recovered from 98 to 100 per cent of the mercury used, the whole operation from the commencement to the

[*Continued on page* 274.]



THE FORSTER-FIRMIN AMALGAMATOR.