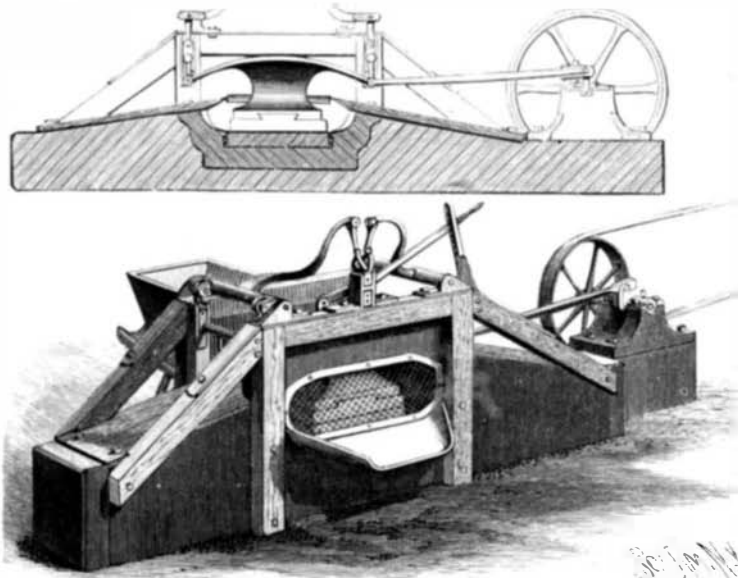


**AN IMPROVED ORE CRUSHER.**

A machine designed to operate as a stamp and pulverizing machine, and which may be nicely adjusted to grind the ore to any desired degree of fineness, is shown in perspective and in section in the engraving. It has been patented by Mr. Joseph Brumbaugh, of Salem, Oregon. Embedded centrally in the base of the machine is a concave bed plate, the cavity carrying the bed plate being partially covered by projecting plates to prevent the ground ore slushing up out of the bed. In the center of the bed plate is the under die, which is vertically adjusted by placing metallic plates beneath it. The upper die is dovetailed into a stamp block which rises above the bed, and has at each end projecting arms pivoted to the lower ends of cranks on shafts extending across the machine above the ends of the bed plate, the ends of the shafts being journaled in vertically sliding blocks moving in slideways in the frame. The sliding blocks are connected by links with other shafts above, turning in boxes carried on top of the frame, and the latter shafts have upwardly extending, forwardly curved levers, to which are pivoted short levers forming toggle joints. The short levers are pivoted at their lower ends to a sliding plate moving vertically in a slide-way of the frame, the plate having a series of holes by which it may be connected at different points to a pivoted lever extending through a toothed rack, and held where placed in the rack by a spring latch. By the adjustment of this lever the upper die carried by the stamp block is held the exact distance desired from the lower die, thus regulating the fineness of the grinding. One of the arms of the stamp block is pivoted to a pitman, by which the stamp is moved back and forth in the central cavity, swinging on the crank shafts, the upper die having a rubbing action as it passes the lower die. An opening in front of the dies is closed by a screen, in front of which is a spout, to which the finer portions of the pulp may pass, although with free-milling ore the greater portion of the metal will remain in the crusher. On the back of the machine is an inclined spout which delivers at two points in the crusher, thus causing an even distribution of the ore, the upper end of the spout being supported in a hanger to which is secured the feed trough, a shovel operated from a shaft pushing the ore delivered by a hopper through the feed trough into the inclined spout, sufficient water being run through the spout to wash down and flush the ore.

**Silk Culture in Germany.**  
The experiments of Professor Harz, of Munich, in the rearing of silkworms by other means than the leaf of the mulberry, have already been noted in these columns, but the subject is sufficiently curious and important to justify further reference. The professor has recently published a pamphlet on the question, from which the following details are extracted. The plant employed is that called in German *Schwarz-wurzel*, or comfrey. The results of feeding with this plant for 1889 were as follows: About 9,000 eggs had been obtained, which were hatched in the incubator at 25° C., and the 2,700 worms which emerged in the first three days were taken for rearing purposes. Although



**BRUMBAUGH'S ORE CRUSHER.**

cold and damp weather and want of food exerted an unfavorable influence, yet Harz obtained, after an interval approximate to that usually observed when the worms have been fed by mulberry leaves (33 days), 755 cocoons, the threads of which could be easily reeled, and which, in length and durability, were equal to those obtained by ordinary means in an average harvest. Thus, after four years of uninterrupted breeding, he succeeded in accustoming the genuine silkworm to the exclusive use of comfrey, so that the worm has increased thereon, and supplied the cocoon filament in a condition which equals that obtained when mulberry leaves are employed. The cocoons obtained in the fifth breeding year, 1889, in most instances left little to be desired as to magnitude and weight. The largest weighed 1.39 grammes, and the thread attained a length of almost 300 meters, while its diameter coincided exactly with that of the original Milan thread, and it possessed almost the same tenacity, breaking with a weight of from five to six grammes; also the gloss of the silk fibers was exactly that of the normal thread yielded by worms fed on mulberry leaves. The last breed, that for the present year, exhibits fresh pro-

**A "Circular Mil."**  
A "circular mil" is a phrase widely used in electrical affairs. By a little inquiry among a certain class of most excellent practical men, we can easily find persons who do not know exactly what the phrase means. This word *mil* is not found in our school books and has no legal status. By the Constitution of the United States, Congress alone has power to regulate all weights and measures. In 1792, Congress enacted that a "mille" should be the thousandth part of a dollar. This word was only a description of one of the terms of our money of account. We never coined a "mille" at our mints. Our forefathers followed the old Latin spelling of the word meaning the one-thousandth part. In modern times we have changed the spelling to "mill." The newly-coined word used in electrical affairs is spelled *mil*, and means, says *Electrical Progress*, the one-thousandth part of an inch. The phrase a "circular mil," as used in giving the sectional area of wires, means the area of a circle the one-thousandth part of an inch in diameter.

Now, let us inquire why we use the area of a circle in giving the size of a wire rather than the area of a square, as is done in all other mechanical calculations. Why not use a square mil instead of a circular mil?  
As far as minuteness in size is concerned, one would answer just as well as the other. A wire of but one-tenth of an inch in diameter has a sectional area of 10,000 circular mils. A circular mil is only about one-fourth smaller than a square mil. If our wires were square instead of round, electricians would have used the square mil instead of the circular mil. So we may answer that as wires are round, and as we frequently desire to compare their respective areas, we can do so most conveniently in circular mils. We can measure their diameters and compute these diameters in thousandths of an inch. As the areas of all circles vary as the square of their diameters, then by having the diameters we can, by one simple act of multiplication, find the number of circular mils contained in each wire. As the electrical capacity of a wire to convey electricity varies as its sectional area, we use this simple method in obtaining the area, which is of great convenience in ordinary electrical calculations.

**Dwellers in the Arctic.**

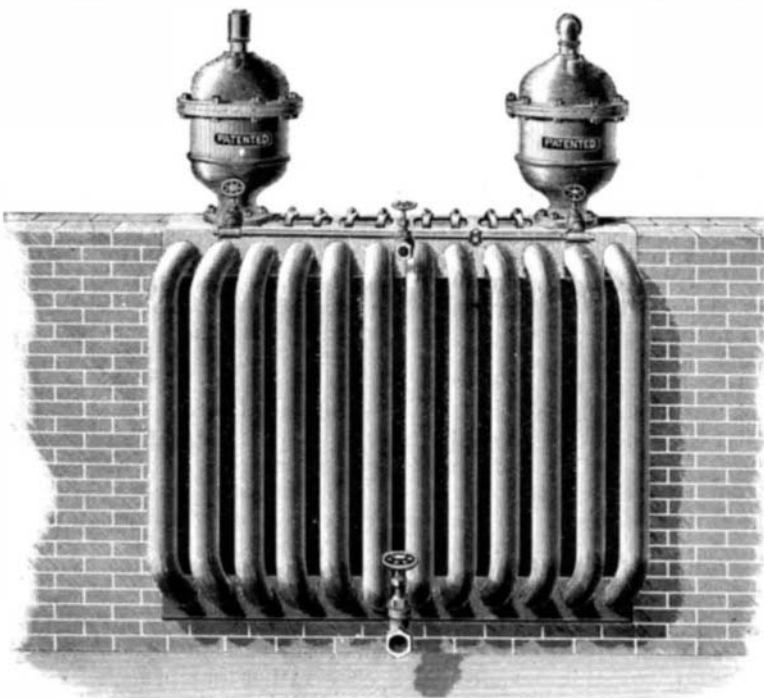
In 1813 Sir John Ross discovered an isolated race of human beings, numbering about two hundred souls, living on the inhospitable shores of North Greenland. To this community he gave the romantic name of "Arctic Highlanders"—a name which unfortunately is misleading; for they are a littoral people and cannot inhabit the Arctic highland, as it is an everlasting ice cap, and, moreover, they will not even visit it, for this inland ice is to them a region of terror, a land where abide their demons and evil spirits. At the present day they number, as near as can be estimated, about the same as when the knowledge of them came to the civilized world; nor have they increased their territory, but live on the narrow strip of mountainous coast, which is left bare during the summer months by the retreat of the winter snows. They could not be more cut off from other human beings did they live on some small oceanic island. Practically, they do live on an island, for they are surrounded by water—by great expanses of solid water; for they never pass the ice barrier of the great Humboldt Glacier, with its sea face of sixty miles; they never ascend to the summer foot of the "ice blink," some two thousand feet above sea level, nor attempt to wander south over the vast ice floes of Melville Bay, one hundred miles in extent. At 79° north latitude, near the southern edge of the Humboldt Glacier, is a collection of huts known as *Etah*, their most northern settlement, while at Cape York, in latitude 75° 55' N., probably their largest encampment, is their southern limit, and which, as near as we could determine by the sign language, they call *Pitanito*. Their country is about 165 miles long and from three to five miles in breadth.—*Scribner's Mag.*

**George the Victorious.**

A new Russian ironclad of 10,280 tons has been finished at the Sebastopol ship building yard. Her length from stem to stern is 340 ft.; breadth of beam, 69 ft.; and depth, 26 ft. The engines are of 16,000 horse power, and the speed of the vessel is from 14 to 17.5 knots. The new vessel, which is named George the Victorious, will be armed with six long range 12 in. guns, mounted *en barbette*, seven 6 in. guns mounted on the battery deck, eight quick-firing guns of the Baranovsky model, six 37 millimeter quick-firing guns for the tops, and seven torpedo-propelling tubes.

**A NEW FEED WATER HEATER AND PURIFIER.**

In the feed water heater and purifier shown in the illustration the chamber on the left contains the cold water filter, the one on the right the hot water filter. In operation the heater and purifier is placed in the flue between the boilers and chimney, and the feed water fed into and through the cold water filter, then into and through the tubes, where it is brought up to a boiling temperature, or over 212°, by the waste heat from the boilers, when it passes through the hot water purifier, where all the sediment and deposit is removed from the hot water, before going into the boiler. The benefit to be derived from this system of feeding is too apparent to need comment. This improved heater is manufactured by the Campbell & Zell Company, Baltimore, Md.



**THE OLSEN FEED WATER HEATER AND PURIFIER.**

**Fast Torpedo Boats.**  
The torpedo gun vessel *Speedy*, which is being built for the Royal Navy by Messrs. Thornycroft, of Chiswick, is expected to be one of the fastest vessels of her class in the service. A member of the firm has stated that he anticipates she will attain a speed of between 21 and 22 knots. In connection with this statement and with the controversy which is now proceeding, the *Times* gives a list of the fastest torpedo boats and torpedo gun vessels of less than 1000 tons displacement which have hitherto been ordered by, or completed for, the leading naval powers. These are: Great Britain, *Speedy*, 21.5 knots; torpedo boat No. 80, 23 knots. France, *d'Iberville*, 21.5 knots; torpedo boats *Coureur*, *Vélocé*, and *Grondeur*, 23.5 knots. Germany, division boats Nos. 5 and 6, 22 knots; torpedo boats Nos. 65 to 74, 24 knots; Nos. 76 to 80, 25 knots; Nos. 75 and 81 to 96, 26 knots. Italy, *Tripoli*, 23 knots; torpedo boats of *Aquila* class, 25 knots. Russia, boats of *Adler* class, 26.5 knots. Austria, boats of *Komet* and *Trabant* classes, 20.5 knots; torpedo boats of *Falke* class, 22.4 knots. United States, *Cushing*, 22.5 knots. Argentine Republic, six 130 ft. *Yarrow* boats, 22.5 knots. Chile, *Lynch* and *Condell*, 21 knots; torpedo boats of *Glaura* class, 22 knots. China, torpedo boat (*Schichau*), 24 knots. Denmark, two torpedo boats, 22.1 knots. Spain, *Destructor*, 21 knots; torpedo boats of *Rayo* class, 24 and 25 knots.

gress, Professor Harz reporting that 34.2 per cent of the worms, which, as before, had been exclusively fed with comfrey leaves, yielded normal cocoons. While the heaviest for previous years weighed 1.39 grammes, those of the present year have a weight of 1.53 grammes, and their thread harmonizes completely as to gloss and tenacity with the usual product obtained by means of the use of mulberry leaves. The period of incubation amounted to from 39 to 47 days. These interesting experiments thus appear to promise very important results.—*The Textile Mercury.*