No. 721,293. PATENTED FEB. 24, 1903.

M. J. FUCHS.

APPARATUS FOR THE DESINTEGRATION OF METALS.

APPLICATION FILED OCT. 28, 1901.

NO MODEL.

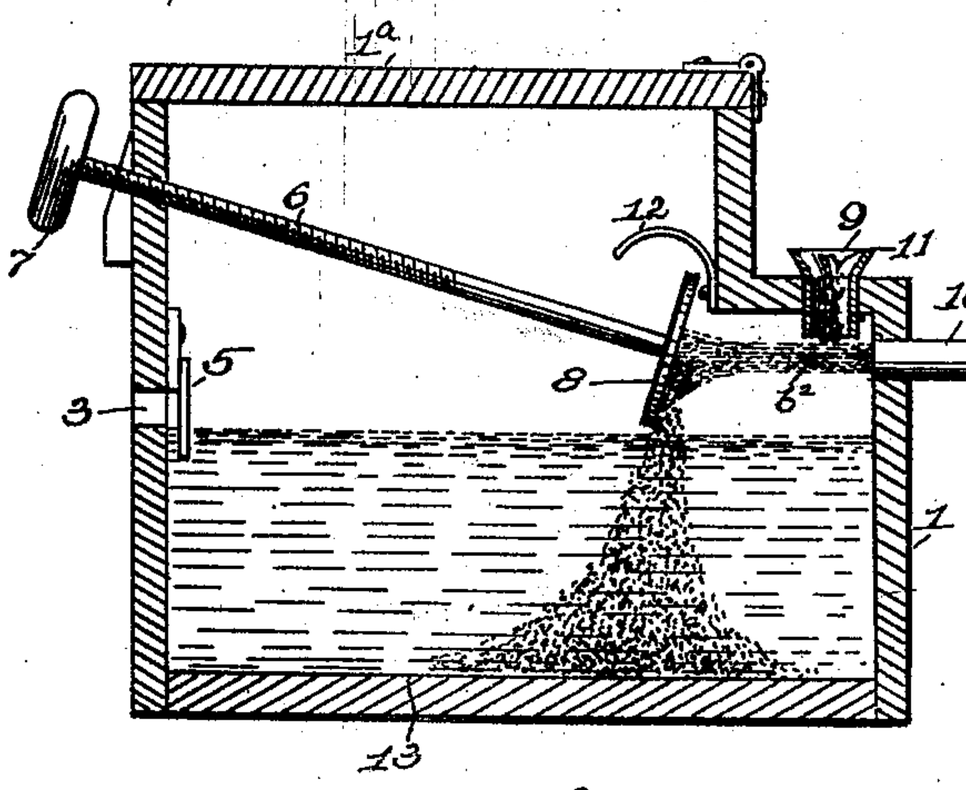
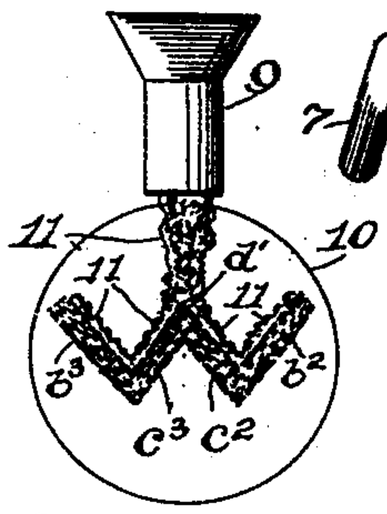


Fig. 1.

Fig. 6.



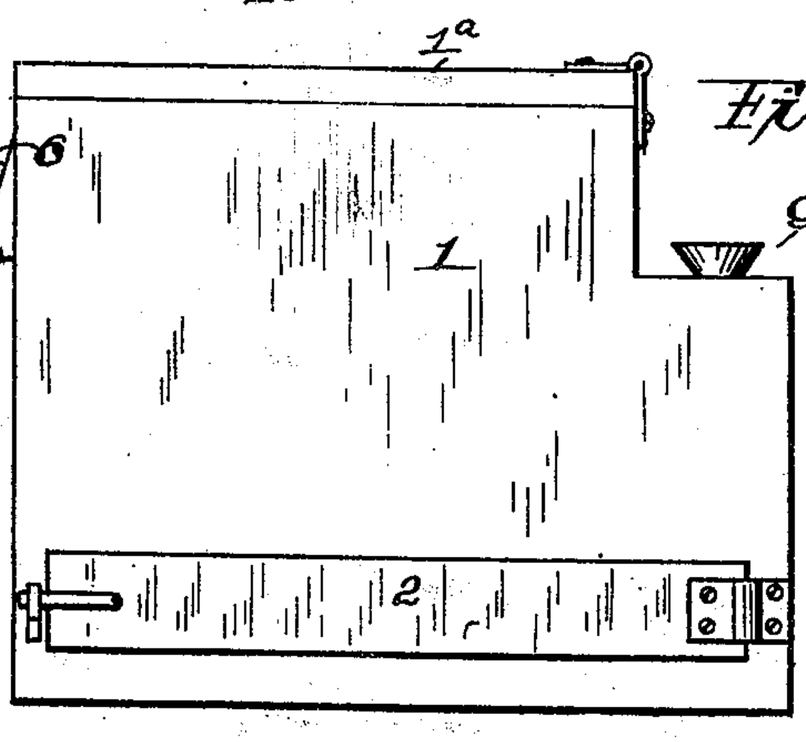
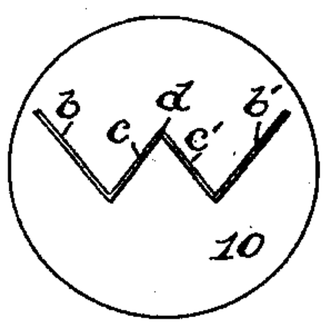


Fig. 2.

Fig. 4.



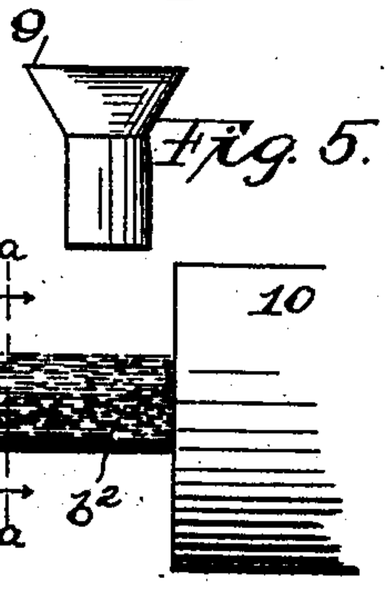


Fig. 5.

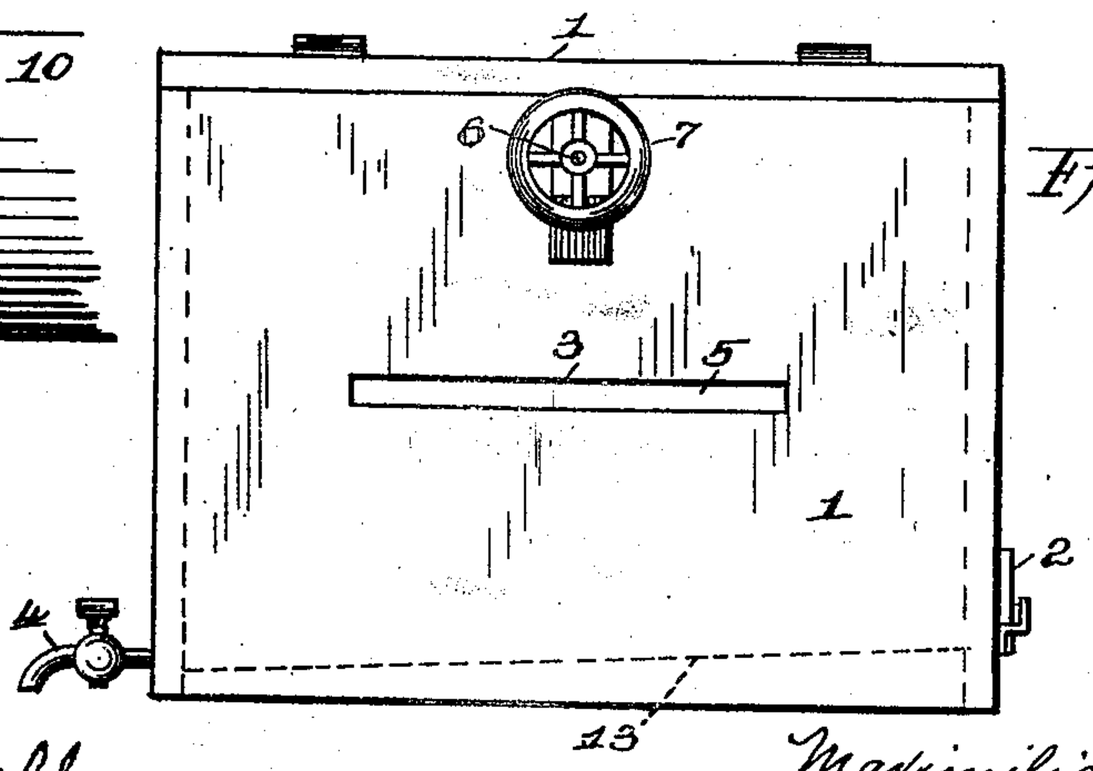


Fig. 3.

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APPARATUS FOR THE DISINTEGRATION OF METAL.

SPECIFICATION forming part of Letters Patent No. 721,293, dated February 24, 1903.

Application filed October 28, 1901. Serial No. 80,199. (No model.)

To all whom it may concern:

Be it known that I, MAXIMILIAN J. FUCHS, a citizen of the United States, and a resident of Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improved Apparatus for the Disintegration of Metal, of which the following is a specification.

My invention relates to an improved apparatus for reducing molten metal into fine granulated particles by means of a stream of water under high pressure, said operation being a preparatory step in the manufacture of bronze-powder.

Heretofore metal from which bronze-powder is made is first rolled to a proper thickness, then hammered before it is ready to be put into the mortars to be beaten into commercial bronze-powder. As all metals except aluminium have to be rolled many times and annealed between each rolling, then hammered, it makes an expensive way of preparing the metal for the beaters. Besides, there is more or less of the metal lost during these various operations. Then, too, more or less oil will become mixed with the particles of metal, and the result is a discolored and inferior grade of bronze-powder.

With my device rolling and hammering is done away with, and the particles are entirely free of oil. Besides, the small particles of metal when ready for the beaters are porous, light, and fluffy, and therefore more readily reduced to powder and of a higher grade than the solid particles produced by the old method.

To enable others to understand my invention, reference is had to the accompanying drawings, in which—

Figure 1 represents a sectional end elevation of the apparatus and the funnel for carrying the molten metal into the apparatus and a broken view of the water-pipe. Fig. 2 is an end elevation of the apparatus. Fig. 3 is a rear elevation of the same. Fig. 4 is an enlarged detail view of the end of the water-pipe. Fig. 5 is an enlarged broken side elevation of the water-pipe with a jet of water emerging from the orifice thereof, and a view, on a reduced scale, of the funnel immediately over the water-jet through which the molten metal is poured. Fig. 6 is an enlarged end elevation of the water-pipe, funnel, and section of the water-jet through line *a a* of Fig. 5, the funnel being shown on a reduced scale.

Its construction and operation are as follows:

1 represents a tank of any suitable material, having the lid 1^a, door 2 for the removal of the metal, opening 3 at the rear to provide for the overflow of water in the tank, which water is always kept sufficiently high to thoroughly chill the metal before it reaches the bottom.

4 is a cock by which the water is drawn from the tank preparatory to the removal of the finished metal.

5 is a shield over the opening 3, which shield projects into the water far enough to prevent the escape of any of the light particles of metal with the water overflow.

6 is a threaded rod engaging a threaded hole in the rear wall of the tank and is provided with the handle 7, by which said rod is manipulated from the outside. 8 is a disk or plate on the opposite end of this rod to serve as an impinging-surface against which the molten metal is thrown by the water in a manner presently to be described.

9 is a funnel or feed-guide through which molten metal is poured.

10 is the pipe through which the water is carried. The inner end of this pipe is closed, and in this closed end there is formed a narrow angular orifice through which the water is forced under great pressure. The superior quality of the granulated metal that I am able to produce in my apparatus is largely due to the angular formation of this orifice, which is shaped like the letter **W**, having the outwardly-diverging legs *b b'* and the inner converging legs *c c'*, which form the apex *d*. The jet of water emerges from this narrow orifice with such force that it will maintain the same angular formation as said orifice for a considerable distance.

The funnel through which the molten metal 11, Fig. 6, is poured is located slightly in advance of the nozzle end of the pipe and directly over the apex *d'* of the water-jet, so that the gravitating metal will be intercepted

by said water-jet. The force of this jet of water is so strong that the stream of molten metal will not pass through when it strikes the apex d' of the jet; but such stream of metal will be divided, part flowing down the inclines c^2 and c^3 and up the legs b^2 b^3 of said jet, and in this divided and broken condition it is readily carried forward and impelled forcibly against the impinging-plate 8. The force of this impact will granulate the metal, whence it will fall through the water to the bottom of the receptacle. The inclination of this plate will greatly assist in directing the granulated metal to the bottom of the receptacle. Any tendency, however, of the metal to fly over the top of the plate is counteracted by the curved guard 12.

The rod 6, as before mentioned, is operated from the outside through the medium of the handle 7, by means of which the proper distance of the impinging-plate 8 from the inlet-pipe 10 is maintained. This distance may vary to suit the different kinds of metal used.

The inner surface 13 of the bottom of the tank is inclined toward the cock 4 to more readily draw off the water.

As before mentioned, my improved apparatus will not only produce the granulated metal for the manufacture of bronze-powder much cheaper and cleaner than the present methods, but the grains being of a porous or fluffy nature are much more easily and quickly beaten into powder than the hard compact grains now produced.

What I wish to be understood by the terms "impinging-plate" or "impinging-surface" is any unyielding surface placed in line with the water-jet and at a suitable distance from the pipe-nozzle, against which the water and metal impinges for the purpose of disintegrating the metal into small particles. In the drawings the tank is made too wide for the rear wall of the tank to serve this purpose. Therefore I use a plate set in advance of such wall. However, the tank could, if desired, be narrowed up, so that the rear wall could be used for an impinging-surface.

I do not wish to be confined strictly to any particular irregular shape of the orifice in the end of the force-pipe; but such orifice must be of an irregular shape, as a circular orifice would only throw the metal to one side and a straight one would to a certain extent do the same thing. Besides, the molten metal would fall through a long thin flat jet of water, while it would be impracticable to make the jet thick enough to hold up the metal and carry it against the impinging-surface.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An apparatus of the class described, comprising a tank, a pipe for projecting a stream of water therein, said pipe having a single discharging-orifice of angular shape, whereby the stream projected from said pipe is of solid angular cross-sectional area, means for guiding molten metal to said stream to be intercepted by the latter and supported thereby, and an impinging-surface arranged in said tank opposite to said pipe and against which the molten metal is forced by said stream for granulating said metal.

2. An apparatus of the class described, comprising a tank, a pipe for projecting a stream of water therein, said pipe having a single discharging-orifice of angular shape, whereby the stream projected from said pipe is of solid angular cross-sectional area, means for guiding molten metal to said stream to be intercepted by the latter and supported thereby, and an impinging-surface against which the molten metal is forced by said stream for granulating said metal, said impinging-surface being adjustable relatively to said pipe for regulating the impact of the water and metal against said surface.

3. An apparatus of the class described, comprising a tank, a pipe for projecting a stream of water therein, said pipe having a single discharging-orifice of angular shape, whereby the stream projected from said pipe is of solid angular cross-sectional area, means for guiding molten metal to said stream to be intercepted by the latter and supported thereby, and an inclined impinging-surface arranged in said tank opposite to said pipe and against which the molten metal is forced by said stream for granulating said metal.

4. An apparatus of the class described, comprising a tank, a pipe for projecting a stream of water therein, said pipe having a single discharging-orifice of angular shape, whereby the stream projected from said pipe is of solid angular cross-sectional area, a feed-guide arranged above said pipe and in advance thereof for delivering molten metal to said stream to be intercepted by the latter and supported thereby, and an impinging-surface arranged in said tank opposite to said pipe and against which the molten metal is forced by said stream for granulating said metal.

5. An apparatus of the class described, comprising a tank, a pipe for projecting a stream of water therein, said pipe having a single discharging-orifice of angular shape, whereby the stream projected from said pipe is of solid angular cross-sectional area, a feed-guide arranged above said pipe and in advance thereof for delivering molten metal to said stream to be intercepted by the latter and supported thereby, and an impinging-surface against which the molten metal is forced by said stream for granulating said metal, said impinging-surface being adjustable relatively to said pipe for regulating the impact of the water and metal against said surface.

6. An apparatus of the class described, comprising a tank, a pipe for projecting a stream of water therein, said pipe having a single discharging-orifice of angular shape, whereby the stream projected from said pipe is of solid angular cross-sectional area, a funnel ar-

ranged above said pipe and in advance thereof for delivering molten metal to said stream to be intercepted by the latter and supported thereby, and an impinging-surface arranged in said tank opposite to said pipe and against which the molten metal is forced by said stream for granulating said metal.

7. An apparatus of the class described, comprising a tank, a pipe for projecting a stream of water therein, said pipe having a single discharging-orifice of angular shape, whereby the stream projected from said pipe is of solid angular cross-sectional area, means for guiding molten metal to said stream to be intercepted by the latter and supported thereby, a screw-threaded rod fitted in said tank, and an impinging-plate carried by said rod and arranged opposite to the discharging-orifice of said pipe, whereby the molten metal is forced by said stream against said plate for granulating said metal.

8. An apparatus of the class described, comprising a tank, a pipe for projecting a stream of water therein, said pipe having a single discharging-orifice of angular shape, whereby the stream projected from said pipe is of solid angular cross-sectional area, means for guiding molten metal to said stream to be intercepted by the latter and supported thereby, a screw-threaded rod fitted in said tank, an impinging-plate carried by said rod and arranged opposite to the discharging-orifice of said pipe, whereby the molten metal is forced by said stream against said plate for granulating said metal, and a guard arranged above the impinging-plate for preventing the granulated metal passing over said plate.

Signed at Stamford, in the county of Fairfield and State of Connecticut, this 25th day of September, A. D. 1901.

MAXIMILIAN J. FUCHS.

Witnesses:

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