

(No Model.)

A. TORNAGHI.

APPARATUS FOR PULVERIZING AND AMALGAMATING.

No. 515,453.

Patented Feb. 27, 1894.

FIG 1.

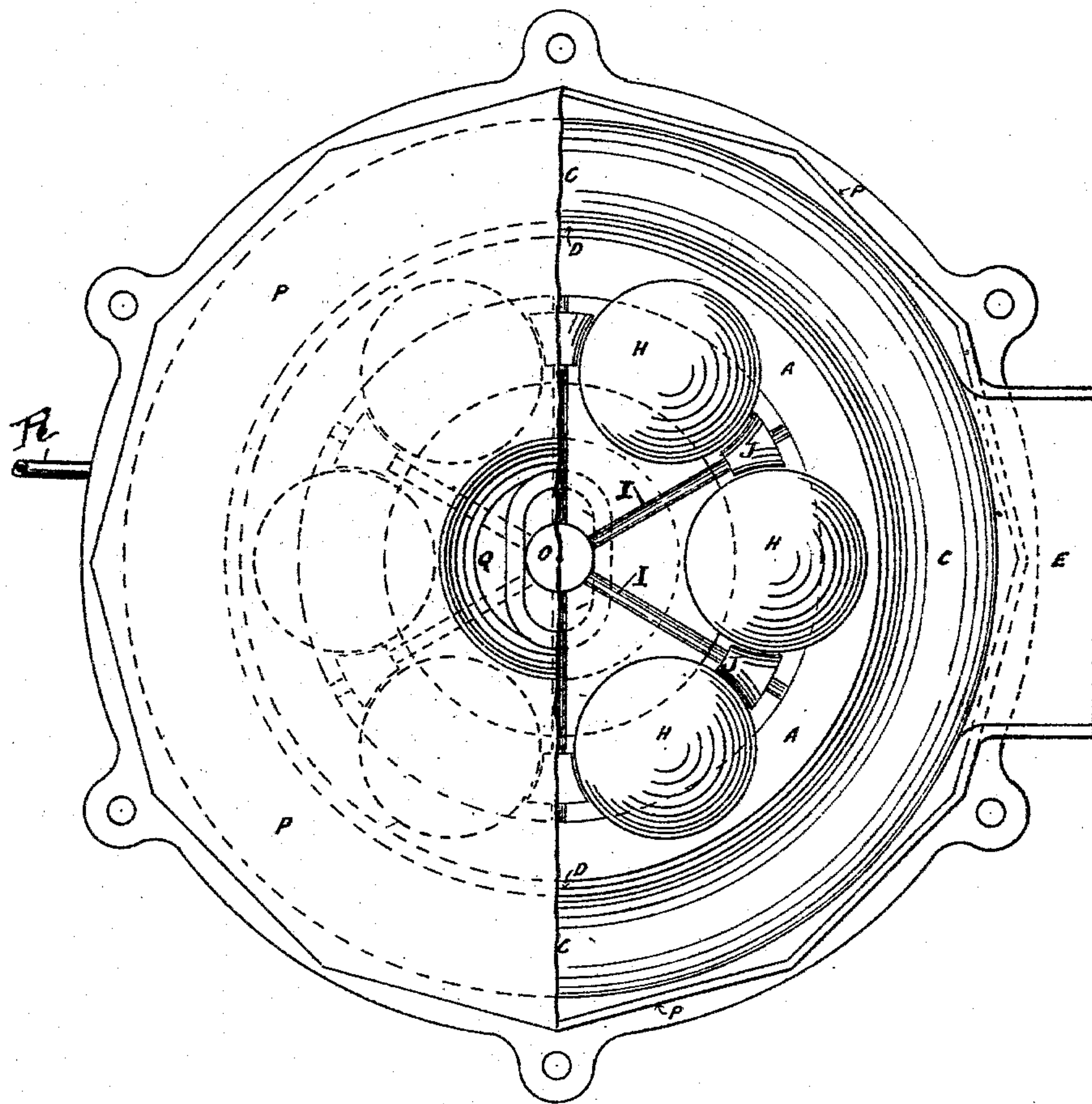
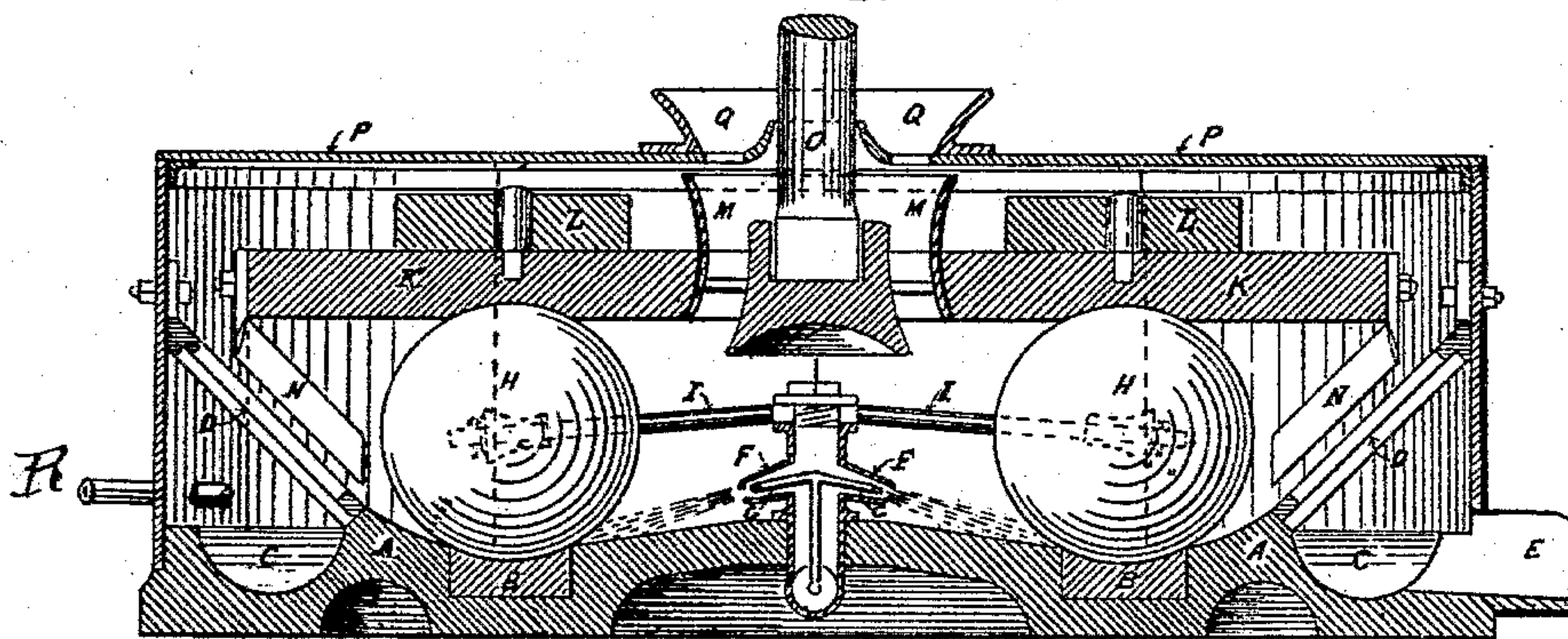


FIG 2.



Witnesses

H. Medley

W. Dwyer

Inventor

A. Tornaghi

UNITED STATES PATENT OFFICE.

ANGELO TORNAGHI, OF SYDNEY, NEW SOUTH WALES.

APPARATUS FOR PULVERIZING AND AMALGAMATING.

SPECIFICATION forming part of Letters Patent No. 515,453, dated February 27, 1894.

Application filed October 17, 1890. Serial No. 368,438. (No model.) Patented in New Zealand March 21, 1890, No. 4,304; in New South Wales March 26, 1890, No. 2,109; in Queensland March 31, 1890, No. 1,130; in Victoria April 9, 1890, No. 7,636, and in South Australia May 1, 1890, No. 1,585.

To all whom it may concern:

Be it known that I, ANGELO TORNAGHI, mathematical-instrument maker, of Hunter's Hill, Sydney, in the Colony of New South Wales, have invented a new and useful Apparatus for Pulverizing and Amalgamating for Saving Gold and Silver, of which the following is a full, clear, and exact specification.

This invention has been patented in New South Wales March 26, 1890, No. 2,109; in Victoria April 9, 1890, No. 7,636; in South Australia May 1, 1890, No. 1,585; in Queensland March 31, 1890, No. 1,130, and in New Zealand March 21, 1890, No. 4,304.

The object of my invention is to combine the processes of pulverizing and amalgamating in the treatment of all kinds of ores more particularly those containing pyrites (or pure pyrites itself) for the purpose of extracting the gold and silver contained therein. I use two machines of special construction herein-after described; the ore to be treated having been previously broken into suitable sized pieces and passed through a furnace is delivered in a hot state into one of these machines where it is further crushed and reduced to powder. While the operation of grinding is proceeding steam and mercury are injected thereon so as to impregnate the ore. The introduction of the steam has the effect of softening the ore and cleansing the metals, the mercury is rendered very active by the presence of the steam and therefore readily absorbs the gold or silver freed from the ores. The crushed material is made to pass through suitable screens while the machine is in operation and deposited in an outer trough where it is subjected to the action of hot water by means of which it is conveyed to a second machine of somewhat similar construction to the first but without the steam and mercury pipes. In this it is further pulverized and passed through screens and with the aid of cold water is conveyed to copper plates for the purpose of collecting the amalgam.

To carry out the object of my invention I construct my machine or apparatus in the following manner:—First I form a tray or dish, preferably circular in form (it may be

polygonal) of cast iron or other suitable metal having inserted therein, in a convenient position, a bed plate whose upper surface is of a concave form. Upon this bed plate crushing balls are made to revolve their motion being actuated and accelerated by means of an actuating plate or driver of similar form to the bed plate. This actuating plate or driver may either be made heavier or lighter by the addition or removal of weights which I use in conjunction therewith, and which in practice I have found to be desirable when treating tailings, concentrates or such like material which has been previously subjected to other pulverizing processes.

To the actuating plate or driver is attached a vertical spindle, on any convenient part of which I place the ordinary driving gear used for imparting a rotary motion, other known forms of imparting motion may be employed such as; placing a cog wheel upon the periphery of the plate and driving with a spur pinion; or: a worm wheel and diagonal teeth may be another form of gearing used. I form apertures in the actuating plate and place therein a suitable hopper to receive the material prior to its being passed into the crushing chamber. The actuating plate is provided with deflecting plates or stirrers so placed that the material under treatment is kept perpetually upon the path traversed by the crushers. It will be observed that this actuating plate is self adjustable and will vary its position according to the quantity of material under treatment, its rise and fall being regulated by the exit of the material crushed, or the ingress of the material to be treated, consequently no damage or disarrangement of the mechanism can ensue from over feeding or carelessness. The crushing balls or rollers I make of any convenient size, shape and weight and of any suitable hard material. The number of balls to be used is not material and will vary according to the size of the apparatus and the quantity of material to be treated within a given time. For the purpose of minimizing the friction which would be the result of the crushers running in contact with each other, I place distance rollers, much smaller in diameter, between

them; these rollers being placed upon radial arms or attached to the actuating plate. The surface of the lower tray or dish of the apparatus I construct in the form of a cone for the purpose of diverting the material from the center, and the outer edges are made to slope toward the concave path upon which the crushers travel. If the shape of the crushers is varied, the path upon which they travel and the diverting edges may also be varied in form or the whole surface of the tray and crushers may be perfectly flat if desired. In any convenient position (I prefer the apex of the cone of the lower tray) I place a steam pipe, the exit of which consists of two or more bent pipes whose apertures point toward the path upon which the material is being treated by the crushers. In any convenient part of the said bent pipes I insert mercurial tubes for the purpose of conveying small globules of mercury which commingle with the steam as it passes from the bent pipes, it is thus directed in the form of a mist or spray upon the material which is being operated upon by the crushers.

My invention is illustrated by the accompanying drawings in which similar letters apply to similar parts throughout the views; and in which—

Figure 1 is a plan and part section of one form of my apparatus. Fig. 2 is a transverse section of the same.

The various parts comprising the apparatus are marked as follows:—A, A, is the lower tray or dish; B, B, the bed-plate fitted in said tray or dish to form a path for the crushing balls or grinders to run on; C, C, trough to receive the pulverized material and water; D, D, grids or screens through which the pulverized material passes into the trough; E, outlet tray; F, steam pipe inserted in the center of lower tray; G, mercury tube placed within the steam pipe; H, crushing balls or grinders for pulverizing the material placed upon the

lower tray; I, radial arms supporting anti-friction rollers; J, antifriction rollers to keep the crushing balls apart; K, actuating plate to move the crushing balls; L, weights for loading actuating plate; M, hopper formed in actuating plate; N, N, deflecting plates or stirrers attached to actuating plate; O, driving spindle; P, P, outer casing of machine to cover up working parts and to prevent egress of steam; Q, Q, hopper formed in top part of outer casing and placed over hopper in actuating plate; R pipe to convey water to trough C, C.

Having thus described the nature of my invention and the manner in which the same is carried out, I desire to state that what I claim is—

1. In combination with the base plate A, the crushing rollers H, the actuating plate K for the rollers, the central feed opening, the screens D arranged at an angle around the periphery, the trough C beneath and the scrapers N secured to the actuating plate K and projecting inwardly beneath the same substantially as described.

2. In combination with the plate A, the actuating plate K, the rollers interposed between, the central feed opening for the material, the steam and mercury pipes arranged centrally at the bottom of the machine, the screens and the trough C beneath the screens, substantially as described.

3. In combination with the base plate A the actuating plate K, the central feed opening, the rollers H interposed between the plates A and K and the radial arms I supporting rollers J interposed between the rollers H for keeping them apart, substantially as described.

Dated this 12th day of March, 1890.

ANGELO TORNAGHI.

Witnesses:

H. A. SMEDLEY,
W. DWYER.