2 Sheets—Sheet 1.

H. W. KING.

Ore-Stamping Mill.

No. 220,028. Patented Sept. 30, 1879.

Fig. 1

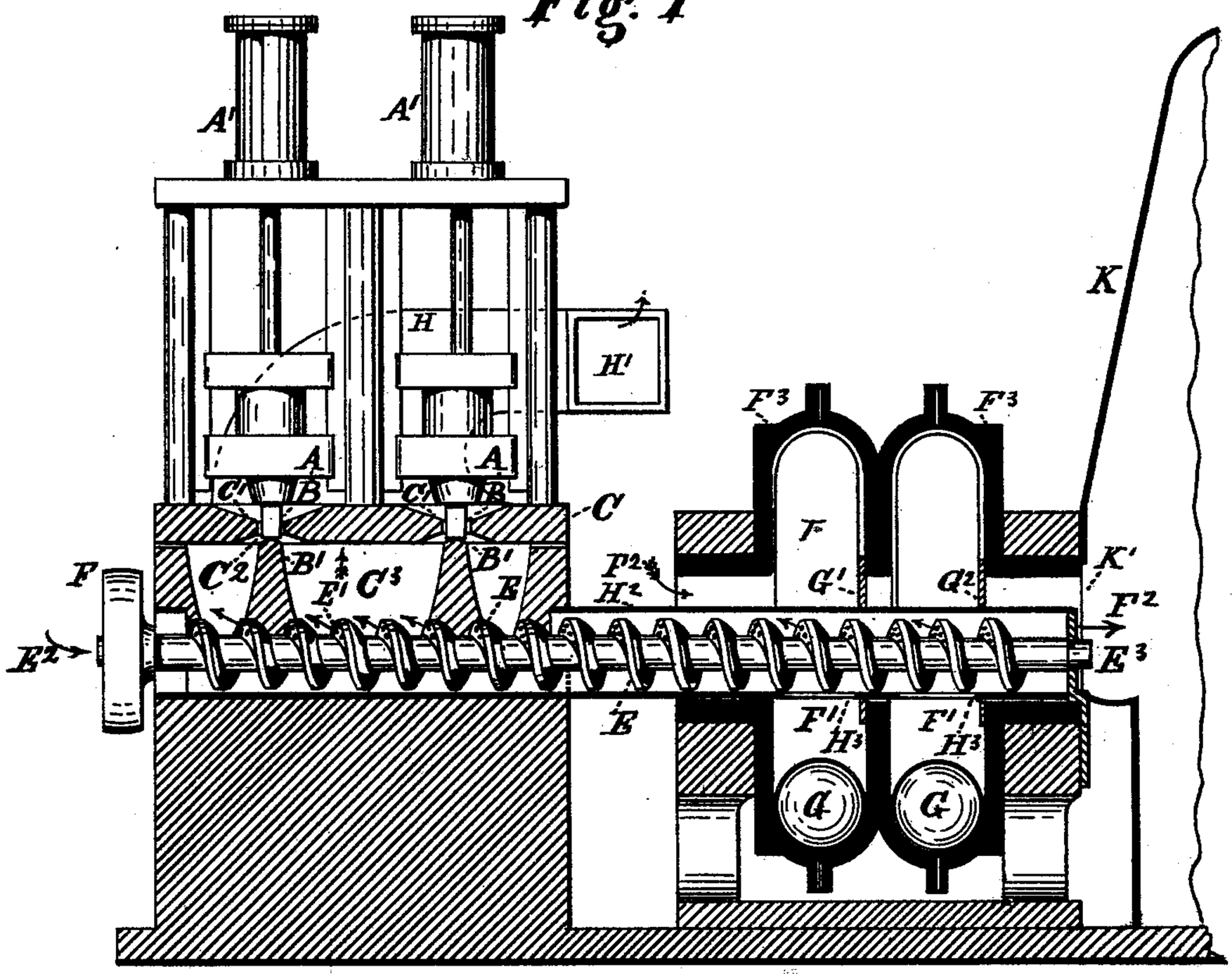


Fig. 2

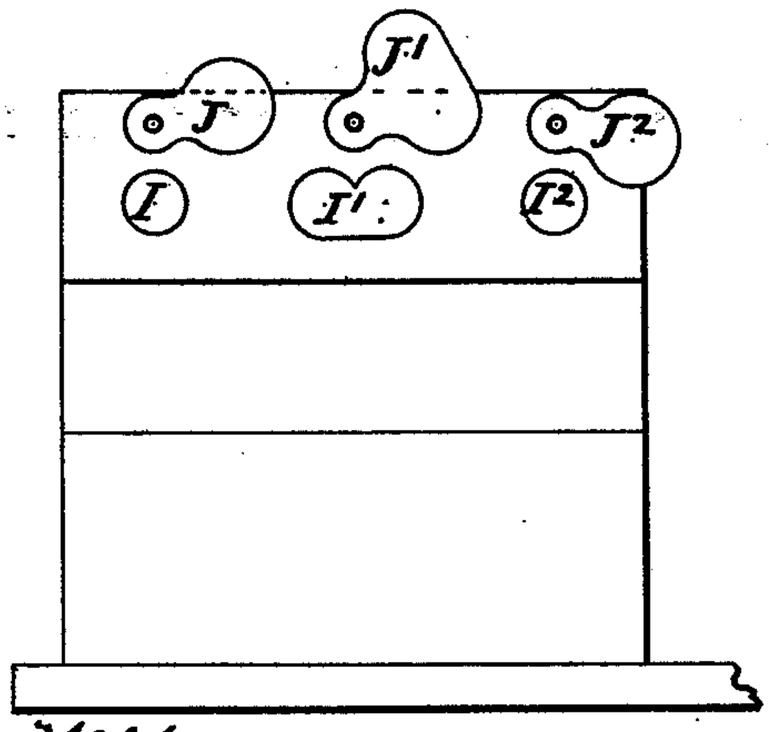
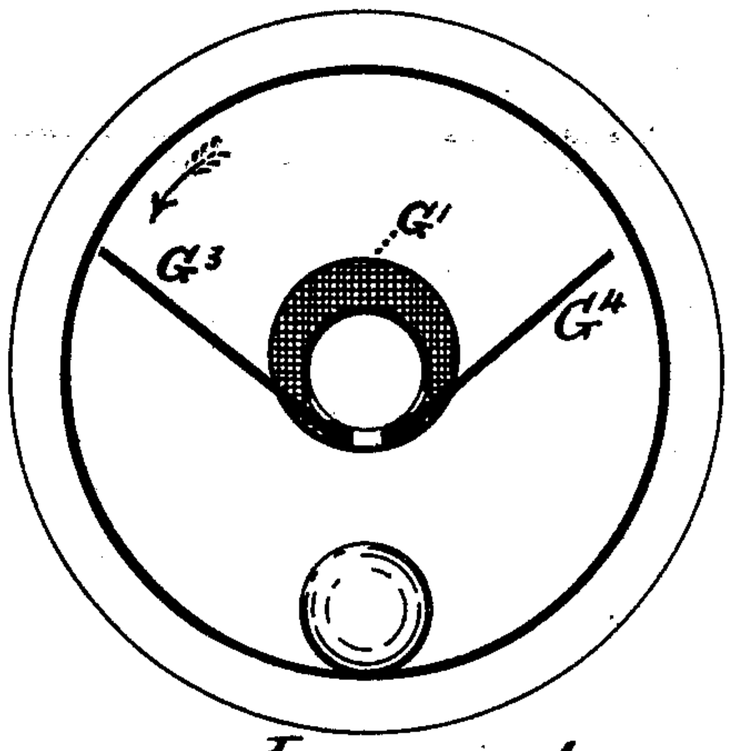


Fig. 3



Witnesses.

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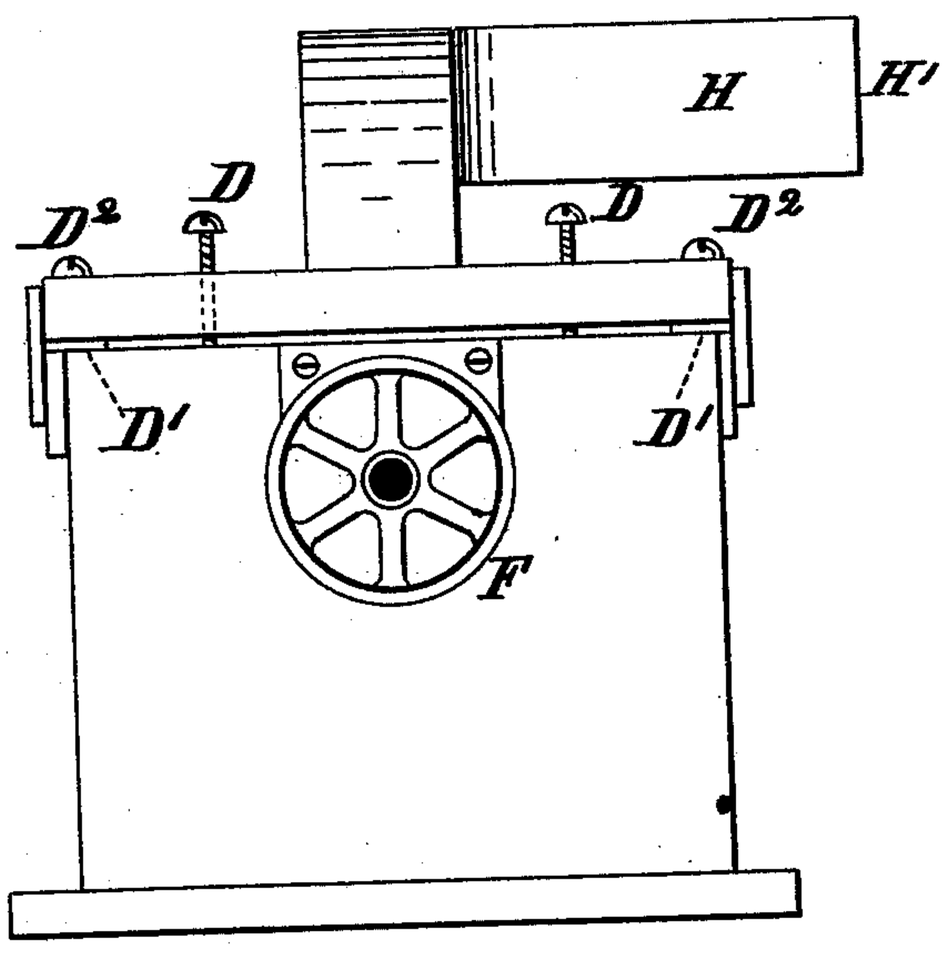
2 Sheets—Sheet 2.

H. W. KING.

Ore-Stamping Mill.

No. 220,028. Patented Sept. 30, 1879.

Fig. 4



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UNITED STATES PATENT OFFICE

HORACE W. KING, OF ALDEN, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO ROBERT DUNBAR AND GEORGE H. DUNBAR, OF BUFFALO, NEW YORK.

IMPROVEMENT IN ORE-STAMPING MILLS.

Specification forming part of Letters Patent No. **220,028**, dated September 30, 1879; application filed August 29, 1878.

To all whom it may concern:

Be it known that I, HORACE W. KING, of Alden, in the county of Erie and State of New York, have invented certain new and useful Improvements in Ore-Stamping Mills, which improvements are fully set forth in the following specification and accompanying drawings, in which—

Figure 1 represents a side elevation of the stamping machinery and a vertical longitudinal section through the lower part of the stamping apparatus, also a section through the pulverizing machinery, all being in section except the conveyer and stampers. A portion of the separator is also shown. Fig. 2 is a side elevation of the lower part of the stamping apparatus; Fig. 3, a central section through one of the pulverizers; Fig. 4, an end view of the lower portion of the stamping machinery, showing the open end of the conveyer and the driving-pulley.

This invention consists, first, in the combination of a movable stamping-die with a movable base-plate having an opening through which it passes and a lower stamping-die, one of said dies being provided with a slightly curved or rounded face, (the other being flat,) so as to pulverize the material finely without impacting or compressing it into cakes or flakes. The curved face of one of the dies allows the material to be forced sidewise as well as downward by the stampers.

The second part of my invention consists in the combination of a stamping apparatus having an exhaust-tube (to which any well-known exhausting apparatus may be connected) and openings provided with covers by which the same may be enlarged or diminished, so as to regulate the influx of air, and a receptacle below for receiving the crushed material, a hollow conveyer perforated on one side of the screw with narrow channels, so as to allow a blast of air from said perforations to pass through and over the mass and separate the finer from the coarser particles, a revolving pulverizing apparatus, and a separator, the arrangement and combination being such that as the crushed material passes down into the chamber below to the conveyer the finer particles are taken up by the air and pass through the exhaust-tube into the separator, while the coarser particles are carried into the revolving pulverizer, and the finer particles as they rise therein are also carried by a current of air into a separator.

The third part of my invention consists in the combination of two or more rotating pulverizers, the first having a screen to keep back the coarser particles until sufficiently fine to pass through, the second having a similar screen, but finer, for the same purpose, each pulverizer having a ball for pulverizing the material and a scraper and separating-plate, one for scraping off the material that may be compressed against the sides of the pulverizers and the other for agitating the material, so that the finer portions may be separated from the coarser and carried by the current of air through the separator.

In said drawings, A represents the stampers. They are operated by the steam-cylinders A^1, arranged in any well-known way for the purpose. B B′ are the stamping or crushing dies, the face of the lower ones being slightly rounded upward, substantially as shown, the face of the upper die being flat. Both dies may be slightly rounded, or the upper one rounded and the lower one flat; but I prefer the arrangement shown, as it answers the purpose better.

C represents the base-plate, through which the stamping-dies pass. It is provided with a depression, C^1, forming a hopper, into which the material to be crushed is put.

It will be seen that the lower die is a little below the base-plate, thereby leaving the receptacle C^2 open above and below, through which the material passes, after being crushed, into the chamber C^3. The size of the openings C^2 may be adjusted by raising the bed-plate, (more or less,) by means of the screws D, Fig. 4, and then inserting thin strips D^1, and fastening the plate down by the screws D^2. By this means the stampers may be made to crush the material to the degree of fineness to which the parts may be adjusted.

It will also be seen that by this arrangement the hammers or stampers cannot receive any more material than they can handle.

The conveyer E (which is turned by any

suitable power connected to the pulley F) is in the form of a hollow screw, and is perforated on one side of the screw the whole length, as at E^1, (see Fig. 1,) and is open at E^2, through which and through the channels E the air is forced from any suitable air-forcing apparatus, the end E^3 being closed. The air is forced through the perforations E^1, so as to penetrate the mass and lift and separate the finer portions of the pulverized material, and allow them to be carried into the separator by the air-current drawn therefrom, while the coarser portions are moved by the conveyer into the pulverizers F^1, where a similar separation and movement into a separator takes place as the material becomes finer, and the finer portions rise into the air-current passing in the direction of the arrows F^2.

The pulverizers F^1 are turned by belts running from the flat faces F^3, and the material after leaving the stampers is further pulverized by them by means of heavy chilled-iron balls G, weighing from twelve to eighteen hundred pounds. The insides of the pulverizers are also of chilled iron. They are each provided with a screen, G^1 G^2, the first being coarser than the second, and so on, if more pulverizers are used.

In Fig. 3, G^3 represents a scraping-plate for taking off the material that may become packed against the sides of the pulverizer, and G^4 is a plate which assists in holding up the pulverized material, so that the air-current will carry off the finer particles into the separator.

H is a tube connected to the top of the bed-plate and communicating with the chamber C^3, the end H^1 being attached to an exhaust-separator. H^2 is a tube inclosing that part of the conveyer running from the stampers through the pulverizers, and is provided with openings H^3 to allow the partly-finished material to drop into the pulverizers F^1.

In Fig. 2, I I^1 I^2 are the openings by which the force of the current of air within the stamping apparatus may be controlled by means of adjusting covers J J^1 J^2.

It will be seen that in this process of separating metals from their ores two currents of air are used—one a forced current from the perforations in the sides of the conveyer, for the purpose of lifting or blowing the pulverized material up into the air as the conveyer is moving the coarse and fine particles along toward and into the revolving pulverizers, the other exhaust or drawn current moving with sufficient force to carry off the particles which are not heavy enough to fall back to the conveyer.

The stamping-dies may be made removable, so as to be easily connected or disconnected in any well-known way, and should be made of chilled iron or tempered steel.

Any suitable separator having an exhausting apparatus may be connected with the stamping and pulverizing mechanism at H^1 and F^2.

I claim as my invention—

1. The upper and lower stamping-dies, in combination with a base-plate, C, having an adjusting device for the purpose of regulating the fineness of the particles that may be crushed and forced into the chamber C^3.

2. The combination of an upper stamping-die, a base-plate, C, with a receptacle, C^2, open above and below, and a lower stamping-die provided with a slightly-rounded face, arranged below said receptacle, substantially as and for the purposes specified.

3. The combination of a stamping apparatus for crushing the material, a chamber below the base-plate for receiving it, and a screw-conveyer and passage for carrying it from thence to a pulverizer, where the pulverizing process is completed, substantially as described.

4. A stamping apparatus for crushing ore, having an exhaust-tube for connecting it with an air-exhauster, in combination with adjustable openings for regulating the force of the air-current, a hollow conveyer having perforations on one side of the screw, and an inclosing-tube having openings H^3, for the purposes hereinbefore mentioned.

5. The combination of two or more revolving pulverizers, F^1, each provided with a ball, G, a screen varying in fineness in each, as specified, and an opening at F^2, in combination with the conveyer E, for the purposes set forth.

6. In ore-stamping mills, the hollow screw-conveyer having perforations E^1 in the rear of the spiral wings, in combination with the ore-channel below the stamping-dies, and with an air-forcing and an air-exhaust apparatus, substantially as and for the purpose described.

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Witnesses:

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