

(No Model.)

3 Sheets—Sheet 1.

J. RICHARDS.

MACHINERY FOR CRUSHING AND CONVEYING ORES.

No. 249,995.

Patented Nov. 22, 1881.

Fig. 2.

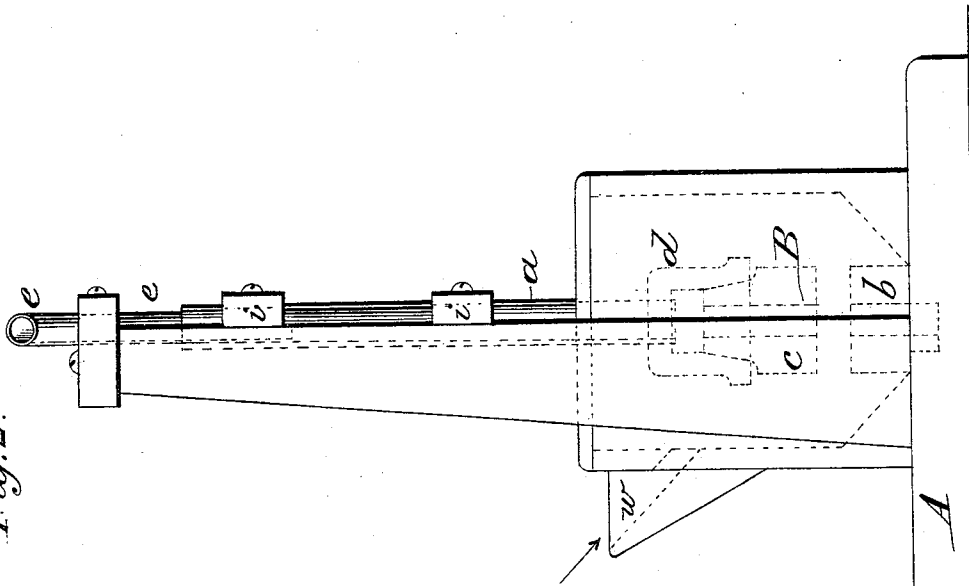
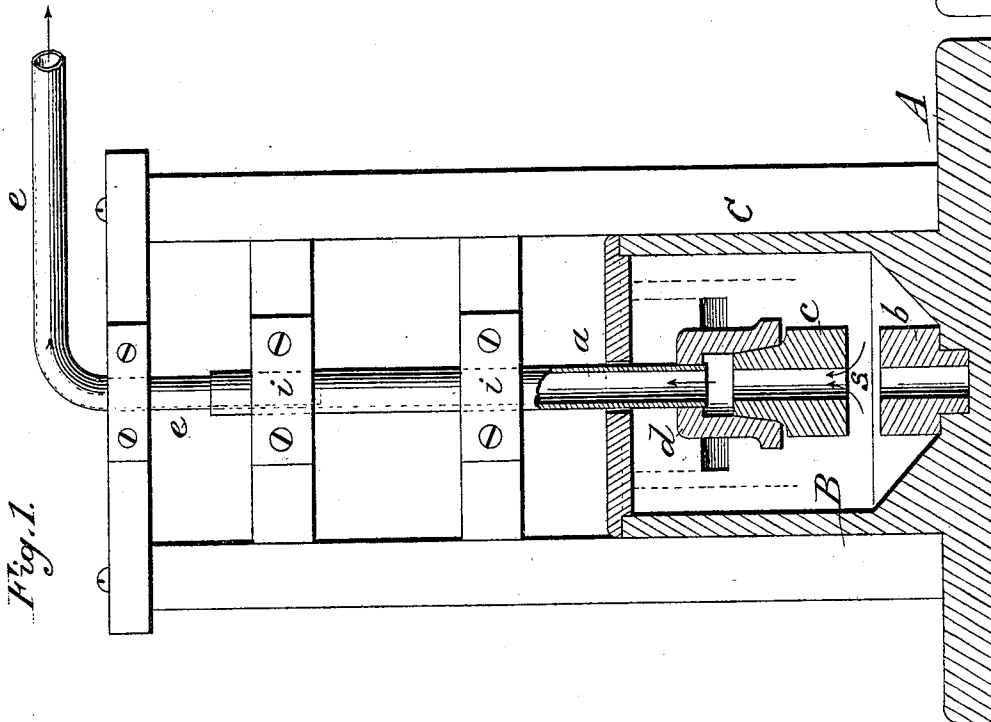


Fig. 1.



Attest:

H. H. Schott.
A. B. Brown.

Inventor:

John Richards,
per A. C. Parker, atty

(No Model.)

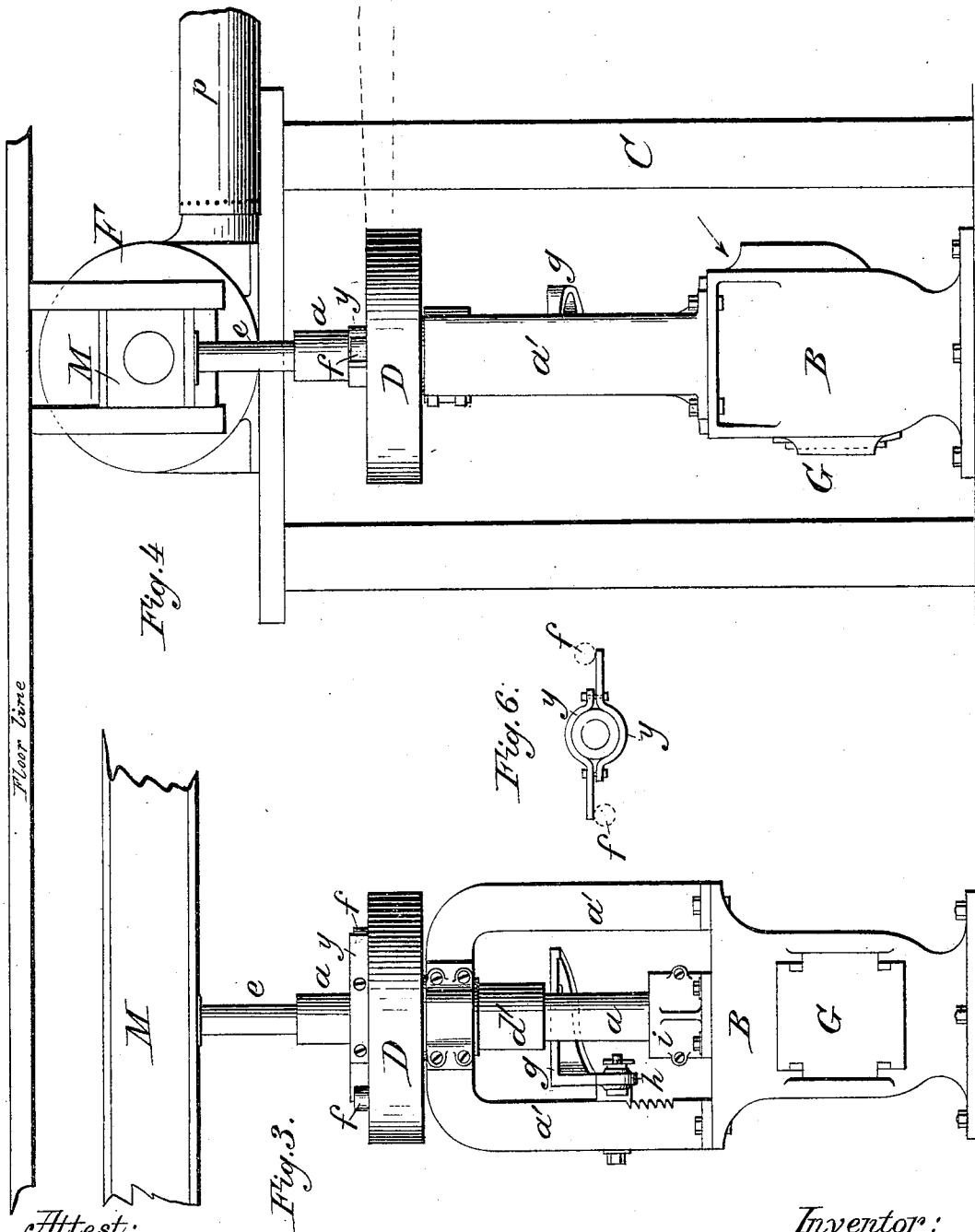
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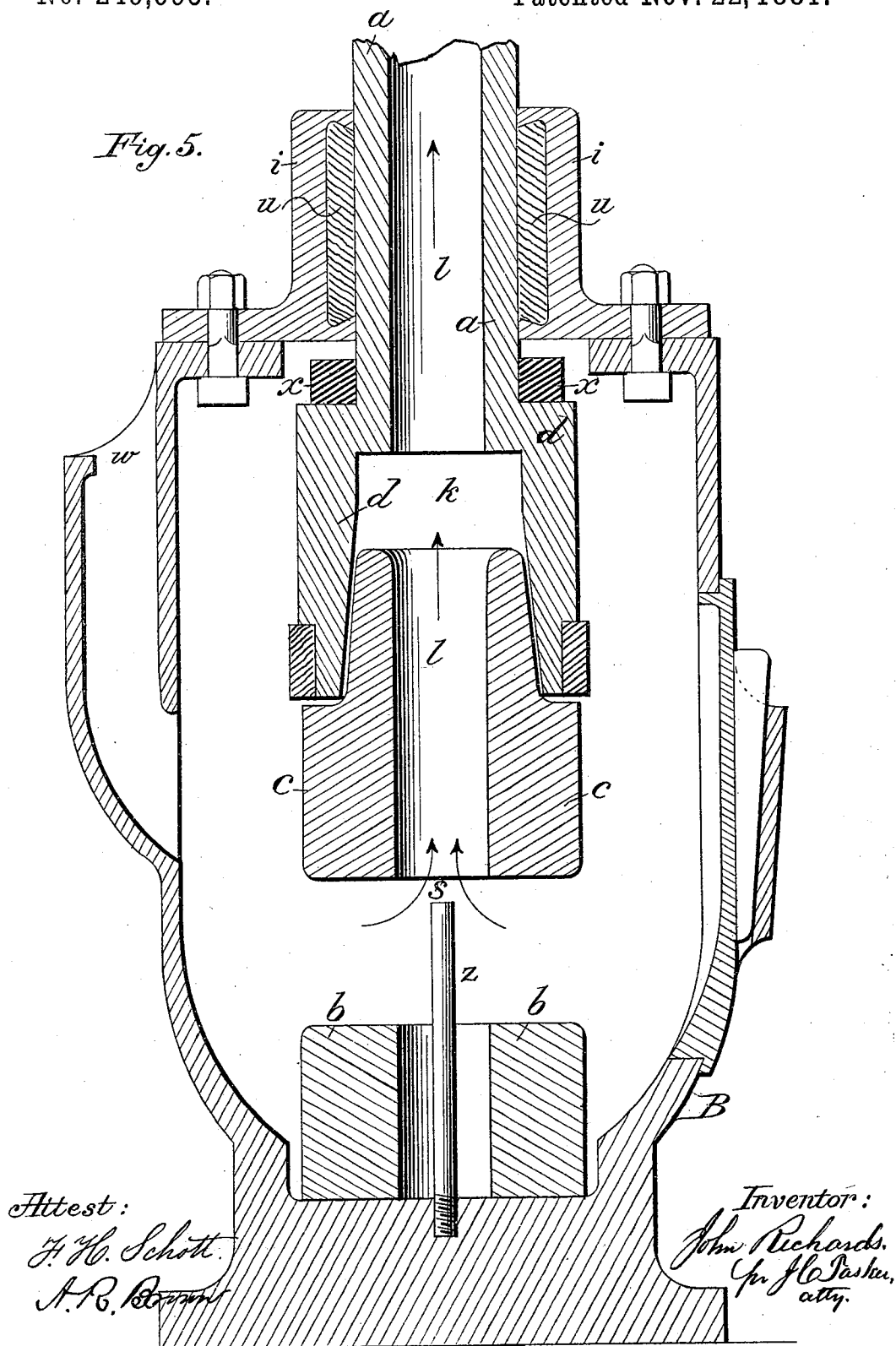
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John Richards
per J. C. Paskin, atty

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UNITED STATES PATENT OFFICE.

JOHN RICHARDS, OF SAN FRANCISCO, CALIFORNIA.

MACHINERY FOR CRUSHING AND CONVEYING ORES.

SPECIFICATION forming part of Letters Patent No. 249,995, dated November 22, 1881.

Application filed September 20, 1880. (No model.)

To all whom it may concern:

Be it known that I, JOHN RICHARDS, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Machinery for Crushing and Conveying Ores; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters or figures of reference marked thereon, which form a part of this specification.

15 This invention relates to machinery for pulverizing or crushing mineral ores; and it consists in the construction and arrangement of parts, as hereinafter more fully described and claimed.

20 The object of my invention is to provide a convenient means for the employment of air-currents in removing the crushed material from stamp-mills. This object is attained by the mechanism illustrated in the annexed drawings, in which—

25 Figure 1 is a front view of my improved battery, partly in section, in which the dust and crushed material are removed through a central aperture or bore extending through the dies and stamp-stem. Fig. 2 is a side view of the same. Figs. 3 and 4 are front and side elevations of a rotary stamp-battery arranged with my improved appliances for removing the dust. Fig. 5 is a vertical section through the battery, and Fig. 6 a detail view of the driving-clamp shown in Figs. 3 and 4.

35 Like letters indicate corresponding parts in the several views.

40 A represents the stamp-frame; B, the battery, and C the battery-casing. *b* is the lower or fixed die, and *c* the upper die. *d* is the stamp-head, and *a* is a hollow stamp-stem attached thereto and communicating above with a pipe, *e*, through which the dust is drawn off by induced air-currents, as will be hereinafter more fully described. This pipe *e* is fixed and extends downward into the hollow stamp-stem, as shown by the dotted lines in Figs. 1 and 2, so that a continuous air-duct from the orifice 50 at *s* is maintained. The stamp-stem *a* is raised by cams or other devices and slides freely in

bearings *ii*. When the stamp is raised a strong air-current passes in at the feedway *w* and aperture *s*, as indicated by the arrows, and carries upward with it as much fine dust as has been made by the blow. By drawing the air to the center and through a hollow die and stamp-stem into a central connecting-pipe the dust is collected as fast as made at the point where the ore is crushed, and by concentration a small current may thus be made to perform the same work that requires a large current when differently applied. The dust, after being drawn up through the stamp-die and stem and off through the pipe *e*, can be conveyed to a suitable receiver or chamber, from which the air is exhausted by fans or other appropriate devices, such chamber being large enough to neutralize the air-currents and permit precipitation of all but fine floating dust. Each battery, when two or more are employed, can be connected with such a receiving-chamber by separate pipes, so that each may operate independently and the chamber, if required, may be constructed with suitable divisions and air-locks.

In the battery shown in Figs. 3, 4, and 5 the stamp has a positive rotary motion, as well as a reciprocating one. The hollow stamp-stem *a* passes through a framing, *a'*, that supports the driving-gearing. Motion is imparted by a band to the pulley D, which is keyed fast to a sleeve, *d'*, through which the stamp-stem *a* slides freely. On the top of this pulley are two studs, *f f*, which engage the clamp *y*, (shown in plan view at Fig. 6.) This clamp or driver is fastened to the upper end of the stamp-stem *a* and slides up and down on the driving-studs *f*, so that the stem *a* will be free to fall when raised and disengaged by the volute cam *g*. The engagement of the studs *f f* with the clamp-driver *y* causes the latter to rotate the stamp-stem when the pulley D is revolved. When the stamp-stem *a* is revolved the cam *g* attached thereto comes in contact with the roller *h* or a fixed tappet, if desired, thus raising the stamp-stem *a* and permitting it to fall once in each revolution; or oftener, as the number of indentures in the cam may determine. The fine dust is drawn upward through the central bore, *l*, Fig. 5, into the pipe *e*, and thence to a box or conductor, M,

which is connected in turn with a fan, F, that forces the dust through the pipe *p* to a receiver or elsewhere, as may be required, for subsequent processes. The roller-tappet *h* is made to adjust up and down in the framing *a'* by means of its engagement with a rack on said frame, so that its position can be changed as the dies wear away at the bottom. The clamp or driver *y* may also be made adjustable for the same purpose. Access to the dies is had through a door, G, in the front of the battery.

In Fig. 5 the bearing *i* is shown as filled with a packing, *v*, preferably composed of wood, which is so arranged as to lessen the effects of jar and abrasion. The stamp is also cushioned on the upstroke by a collar, *x*, composed of elastic material.

A chamber is formed in the stamp-head at *k*, where the air-current will be less strong, and thus permit coarse particles of crushed material to fall back and be again submitted to the action of the dies. The reciprocating motion of the stamp favors such return, because at each stroke the air-current will be interrupted by the top die coming in contact with the lower one or with the ore between them.

Should the die or shoe become clogged with damp ore or from other cause, a stiff rod, *z*, can be set in the lower die or in the bottom of the battery, as shown in Fig. 5, so that the aperture or bore above will be kept clear.

By means of the fan F an induced air-current may be maintained through the conductor M, pipe *e*, and the battery, which will concentrate the crushed material at the lower aper-

ture of the hollow stamp-stem and enable it to be drawn through the same with the expenditure of but little power.

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

1. In an ore-stamp battery, the stamp stem, head, and dies, provided with a central duct for removing the crushed material, in combination with mechanism for inducing air-currents through said duct, substantially as specified.

2. In an ore-stamp battery, the combination, with a hollow cylindrical stamp stem and head, of a pipe having a telescopic connection with said stem, stationary boxes or conveyers, and means for inducing an air-current for removing the crushed material vertically from the center of the battery, substantially as set forth.

3. In an ore-stamp battery, the combination, with a hollow stamp stem, head, and die, of a vertical clearing-rod, substantially as and for the purpose shown and described.

4. In an ore-stamp battery, the combination, with the hollow stamp-stem *a*, head *d*, and dies *b c*, of the pipes *e p*, conveyer M, and fan F, whereby the crushed material is removed vertically from the center of the battery by induced air-currents, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN RICHARDS.

Witnesses:

W. WINTERHALTER,
GEO. H. MILLEN.