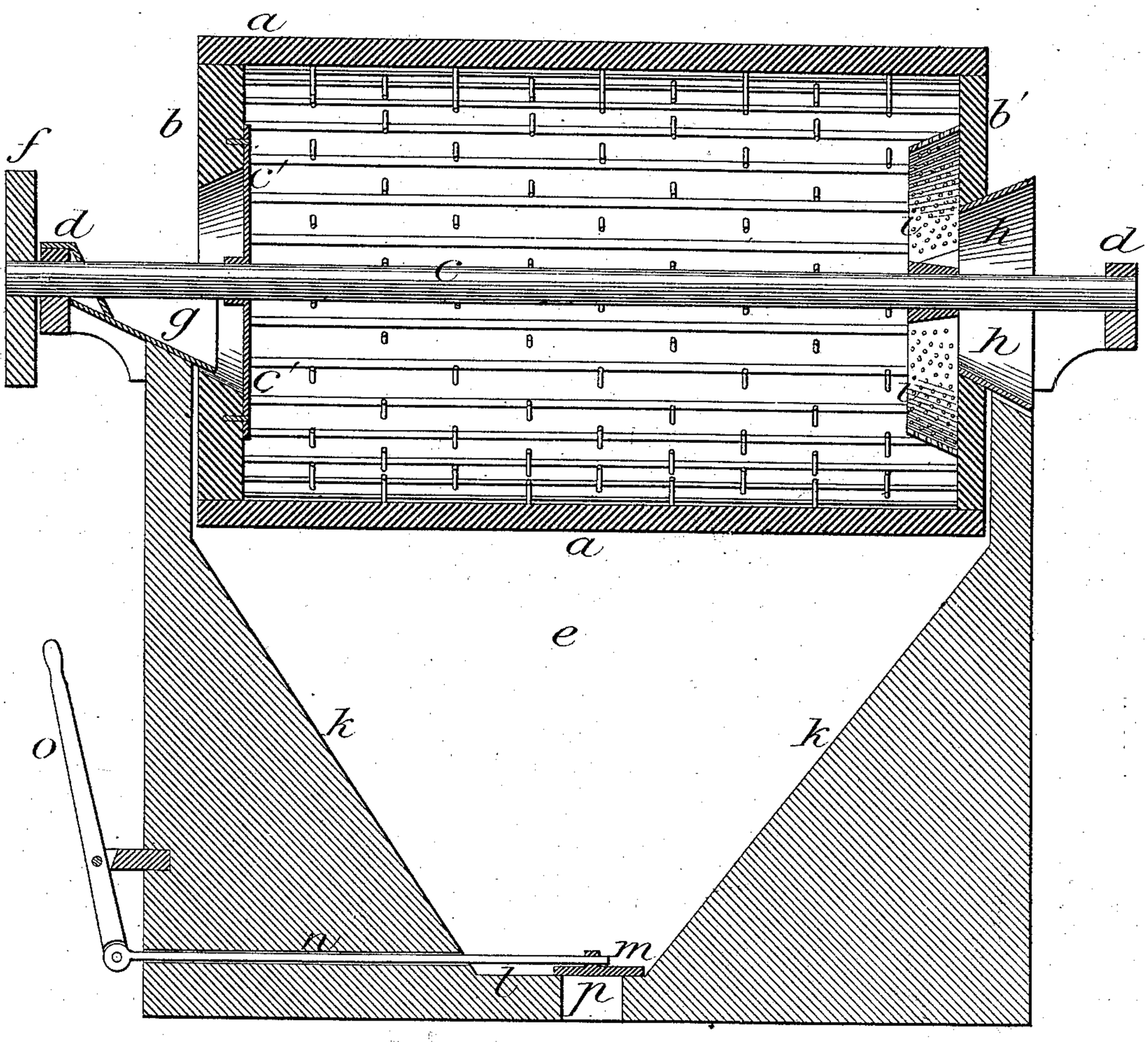
H. Bradford.
Ore-Washer.

No. 15544. Patented Aug. 12. 1856.

Fig. 1



Attest:

Inventor:

UNITED STATES PATENT OFFICE.

HEZEKIAH BRADFORD, OF NEW YORK, N. Y., ASSIGNOR TO HORATIO BOGERT, OF NEW YORK, N. Y.

ORE-WASHER.

Specification of Letters Patent No. 15,544, dated August 12, 1856.

To all whom it may concern:

Be it known that I, HEZEKIAH BRADFORD, of the city, county, and State of New York, have invented a new and useful Apparatus for Washing and Cleaning Iron and other Ores, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a longitudinal, and Fig. 2 a cross vertical section.

The same letters indicate like parts in the two figures.

Some of the iron ores and particularly the rich hematites are coated over with clay and other earthy substances which adheres to the surface with considerable tenacity, and more particularly in the cavities. And this is more or less the case with other ores. And before these ores can be properly subjected to the various processes for working them this outer coating should be removed which has heretofore been attended with great labor and cost particularly where water is not very abundant, and even where water is abundant it has been found very difficult to remove these foreign substances from the cavities.

The object of my invention is to thoroughly cleanse the lumps of ore that they may be smelted or otherwise treated without waste of fuel, and without the injurious consequences arising from the presence of such foreign substances; and to this end my invention consists in removing such foreign substances by feeding the lumps of ore from a hopper at one end through a central hole into the inside of a rotating perforated cylinder armed on the inside with numerous pins or teeth pointing toward the axis, which, as the lumps of ore are rolled over by the rotation of the said cylinder, scrape and loosen the clay and other foreign substances which is then washed off by the agitation of the water induced by the rotation of the cylinder and by the current induced by the supply and discharge; the lumps when reaching the other end of the cylinder being taken up by curved and perforated scoops which lift them up to, and discharge them through a central hole in the rear end of the cylinder, while the water drops back in the cylinder through the perforations in the scoops and gradually carry the foreign substances from the cylinder into the trough, and through a discharge hole in the bottom which is governed by a valve.

In the accompanying drawings *a* represents a hollow cylinder composed of longitudinal slats attached at the ends to two heads *b*, *b'* on a horizontal shaft *c*, the said slats being placed at a suitable distance apart to leave open spaces for the free passage of water but not so large as to permit the large lumps of ore to pass through. Or this cylinder may be composed of staves or plates pierced with numerous small holes for the passage of water. The heads *b*, *b'* have each a central hole of sufficient capacity to receive and discharge the ore, and the head *b* is connected with the central shaft by means of arms *c'*, *c'*. The shaft *c* is mounted in suitable boxes *d*, *d* attached to the upper edge of a trough *e* containing water in which the cylinder rotates, about one half of the circumference of the cylinder being below the upper edge of the trough. The said shaft is provided with a pulley *f* or other suitable means for giving it the required rotary motion. The inner periphery of the cylinder is armed with large teeth which project inward toward the axis.

One end of the trough is provided with an inclined hopper *g* which extends on each side of and below the shaft and fits inside of the eye or central aperture of the head *b*. And the central aperture of the other head *b'* is provided with a funnel shaped flanch *h* fitted to the edge of the trough which is cut out for that purpose. And at this end of the cylinder and on the inside of the head *b'* there are two (more or less) scoops *i*, *i*, which extend from the inner periphery to the shaft in a curved line, the two together forming a line somewhat resembling the letter **S**. These scoops are for the purpose of taking the lumps of ore as they reach that end of the cylinder and carry them up to the delivery aperture of the head *b'*, and to deliver the lumps without water they (the scoops) are pierced with numerous small holes, to permit the water to drop through as the lumps are carried up to the delivery aperture.

The four sides of the trough are inclined as at *k*, *k*, *k*, *k*, and jointed to a bottom *l* of very small area but of greater length than breadth, to which is fitted a sliding valve shutter *m* connected by a rod *n* with a hand lever *o* by means of which the at-

tendant can either close or govern the capacity of a discharge hole *p* at bottom.

Water is to be put into the trough to a sufficient depth for the lower part of the cylinder and lumps of ore therein may be immersed. The cylinder is put in motion at about 30 revolutions per minute (more or less) and the lumps of ore to be cleaned thrown into the hopper from which they enter the cylinder through the central hole or eye in the head *b*, and as the cylinder turns the lumps of ore are rolled over and over on the pins or teeth which thus dig into the clay and other foreign substances on the surface and in the cavities of the lumps of ore, and dig or scrape it out, as these substances are gradually softened by the action of the water, which at the same time has the effect by the agitation induced of washing off the substances as they are loosened by the pins or teeth. The lumps gradually find their way toward the opposite end of the cylinder where they are taken up by the scoops and discharged through the central aperture or eye in the head *b'*, the water running back into the cylinder through the apertures in the scoop. If the lumps do not travel with sufficient rapidity toward the delivery end it is only necessary to lift up the feeding end of the apparatus.

Fresh water in small quantities should be constantly, or at due intervals thrown onto the periphery of the cylinders to keep up the required supply and at the same time to keep the apertures of the cylinder open. While the apparatus is kept in operation the valve in the bottom of the trough should be kept open more or less in proportion to the supply of water. And the current of water thus induced will wash and carry off the foreign substances down to the bottom and through the hole in the bottom, the inclined side of the trough conducting everything to the discharge. And as many small lumps will pass through the apertures in the cylinder they will be carried off at the bottom with the water and foreign substances washed off from the ore and may be collected and saved.

I am aware that machines have been made of various forms for washing ores and separating gold and other metals from foreign substances by introducing such substances through one end into a rotating cylinder or cone rotating in water, and carried toward and delivered at the other end. And I am also aware that in some instances the cone or cylinder has been perforated or made of open work such as wire gauze, but in such cases the inner periphery thereof has not been armed with teeth or pins projecting inward toward the shaft. And I am also aware that in some cases such cylinder or cone has been provided inside with teeth or pins and other contrivances for agitating and carrying the substances from the receiving to the delivery end; but in such cases the cone or cylinder was not perforated or made of open work, and in other respects not adapted to the purposes for which my said invention was designed. I do not wish therefore to be understood as making claim to any of the separate parts of the said apparatus, or to any combination of parts less than the combination of the parts enumerated in the following claim, the said combination being necessary to perform the operations specified.

What I claim as my invention and desire to secure by Letters Patent for cleaning ores and removing foreign substances from the surface thereof is—

The employment of a hollow perforated cylinder rotating on a horizontal or nearly horizontal axis, provided with numerous pins or teeth on the inner periphery pointing toward the axis, combined with a feeding aperture and hopper at one end and lifting scoops and delivery aperture at the other end, and with a water trough or vessel within which the lower part of the said cylinder revolves, the said trough or vessel being provided with a delivery aperture controlled by a valve, all substantially as and for the purpose specified.

HEZEKIAH BRADFORD.

Witnesses:
WM. H. BISHOP,
CHAS. A. WILSON.