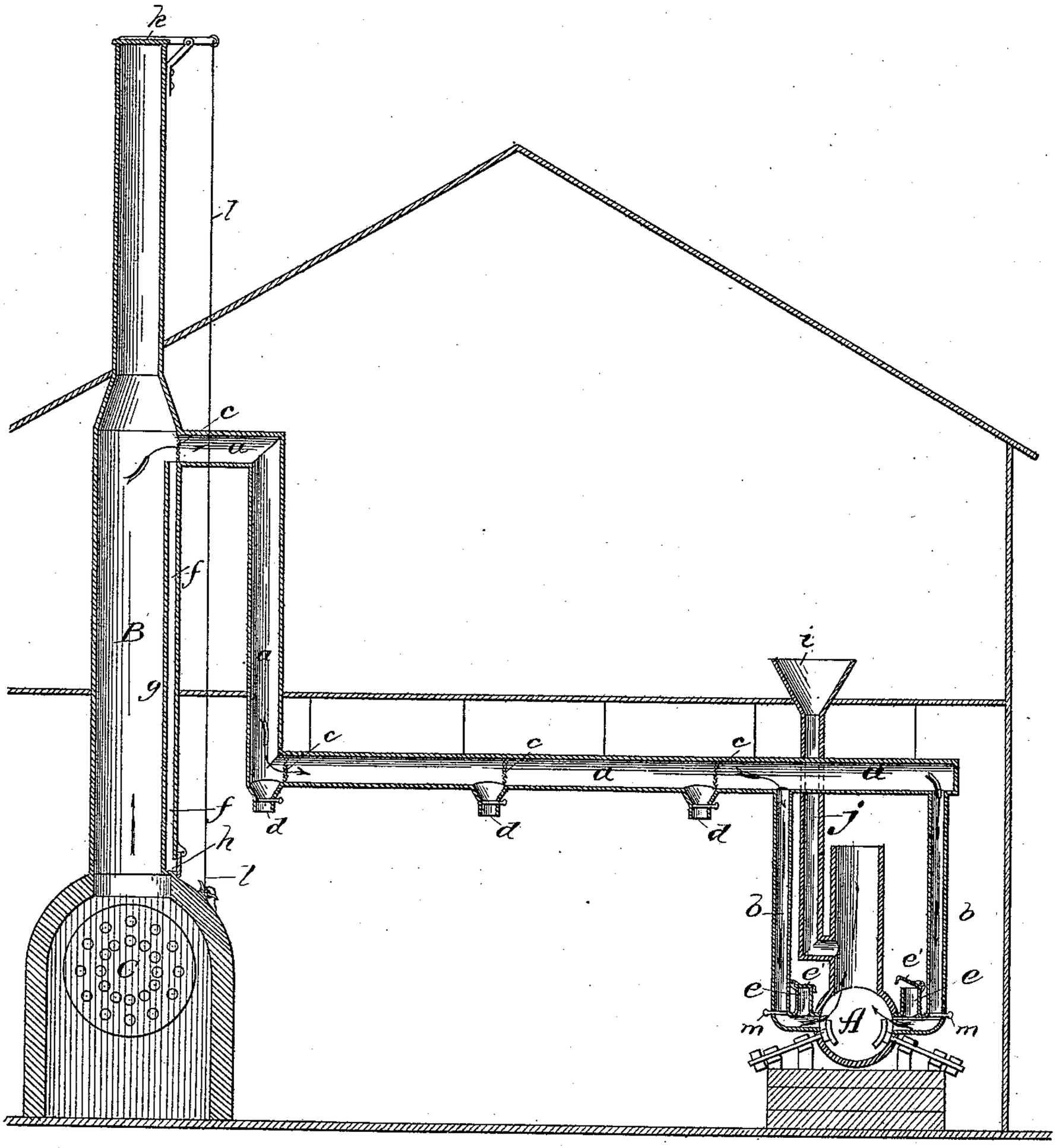
(No Model.)

J. K. HALLOWELL.

ORE DRYING AND PULVERIZING APPARATUS.

No. 447,028. Patented Feb. 24, 1891.



Witnesses:
Chas. Gaylord,
Clifford D. White.

Inventor:
John K. Hallowell,
By Dyrenforth & Dyrenforth,
Attys.

UNITED STATES PATENT OFFICE.

JOHN K. HALLOWELL, OF CAMDEN, NEW JERSEY.

ORE DRYING AND PULVERIZING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 447,028, dated February 24, 1891.

Application filed June 13, 1888. Serial No. 277,024. (No model.)

To all whom it may concern:

Be it known that I, JOHN K. HALLOWELL, a citizen of the United States, and a resident of Camden, in the county of Camden and State of New Jersey, have invented a certain new, useful, and Improved Ore Drying and Pulverizing Apparatus, of which the following is a specification.

The object of my invention is so to treat the material to be pulverized, and while it is undergoing pulverization, that its resistance to the pulverizing action will be materially reduced.

The moisture commonly contained in ore, rock, and the like material in a natural state has the effect, generally, of enhancing its tenacity and in many instances to such a degree as to preclude the possibility of its economical dry pulverization. I overcome this difficulty by forcing waste hot products of combustion from a furnace through the material while it is being ground, thereby eliminating the moisture and greatly enhancing the brittleness of the material.

The apparatus forming my invention is represented in sectional elevation in the accompanying drawing, and following is a description thereof, the mechanism being housed in a suitable inclosure, (building,) as indicated.

A is a pulverizer, of any suitable construction, having a desired number of inlets *e* for cold air, and which, to that end, should communicate with the surrounding atmosphere, but which communication should, for a purpose hereinafter explained, be controllable, as by providing the inlets with adjustable caps *e'*, preferably secured permanently to the inlet-pipes by latching. The pipes *e* form branches, near the pulverizing-machine, of hot-air inlet-passages *b*, leading into the machine, preferably at opposite sides thereof, as shown, as branches from the main hot-air conduit *a*. A suitable hopper *i*, extending above a floor forming in the inclosure the compartment in which the mechanism of my apparatus is in the main contained, communicates with the machine A, as shown, through a pipe *j*, and affords means through which to feed to the machine the material to be pulverized according to my improved method.

The conduit *a*, which is closed at the end nearest the pulverizing-machine A, leads to the latter through its branches *b* from the heated air-supplying medium, preferably the chimney B of a furnace, which may be in use for heating a steam-boiler C to furnish power for other purposes than pulverizing, and hence furnishing the heat which might otherwise be wasted for my purpose, thereby enabling the latter to be accomplished without expense for fuel. The conduit *a* may communicate with the chimney at any desired height, and from the point of such communication the chimney should be provided with an interior false partition *g*, extending to an opening *h* or hand-hole at the base of the chimney and forming a passage *f*.

At intervals along a horizontally-extending portion of the conduit *a* it is provided with pockets *d*, preferably of the hopper shape illustrated, each being provided with a slide-valve, as shown, forming the removable closure for its base. Adjacent to each pocket, at the farther side thereof in the conduit *a*, and also near the end thereof where it communicates with the chimney, I provide a wire-screen damper *c*.

The operation is as follows: The ore or other rock material to be pulverized is fed to the machine A through the hopper *i*, while hot air from the chimney is simultaneously forced into the machine by way of the conduit *a* and its branches *b*, the cold-air inlets *e* being normally closed and the hot products of combustion from the furnace escaping into the chimney B, and thence directed into the conduit *a* by controlling the escape thereof from the top of the chimney through the medium of a cover or damper *k*, hinged to be extended over the top of the chimney and controlled from a rope *l* or the like extending from it into accessible position. Thus while the material fed to the machine A is undergoing the reducing effect of its pulverizing action the waste heated air will be drawn through the pulverizing-machine and into such thorough and intimate contact with the material as to evaporate and absorb the moisture therein and carry it off in its escape with the comminuted material.

The screens *c* in the conduit *a* serve to intercept matter—such as soot, chimney-dust, and the like—that may enter the conduit from

the furnace with the hot air, and the pockets *d* receive the accumulations of such intercepted matter, which may be readily emptied as often as required on pulling out the sliding bottoms of the pockets. Whatever of such matter is intercepted at the first screen *c*, located nearest the chimney, will drop into the space *f*, whence the accumulation thereof may be removed from time to time through the opening *h*.

Should at any time the heat introduced by the hot air through the pipes *a* and *b* into the pulverizing-machine A be too great, its temperature may be reduced or it may be cut off entirely by opening to the desired extent the chimney at its top by raising the damper *k*, removing the covers of the cold-air inlet *e* to let cold air into the machine, and shutting off to the desired extent communication between the conduit *a* through the branches *b* with the pulverizer by adjusting to that end the sliding dampers *m*.

The draft through the pulverizing-machine may readily be increased to any desired degree by attaching any suitable suction appliance—such as a fan—to its discharge; but my apparatus does not necessarily depend for its efficacy on such provision, and for that reason and for the further reason that an attachment of the kind will be readily understood by those skilled in the art to which my improvement relates without illustration it is not shown in the accompanying drawing.

From the foregoing description it will be quite apparent that by my improved apparatus the disintegrating property of the material to be pulverized may be very considerably and economically enhanced, thereby also materially increasing the capacity of the pulverizing-machine and reducing the wear thereon, for the reason that dry brittle rock material is disintegrated much more readily, rapidly, and perfectly than the same material when moist.

By means of my improvement it is quite feasible to "dry-pulverize" ore by passing it directly from a wet mine through the pulverizing-machine, thereby affording great economy in the working of the mine.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus for simultaneously drying and pulverizing triturable material, the combination of a pulverizing-machine A, a furnace having a chimney B, and a conduit *a*, connecting the pulverizing-machine with the chimney and containing one or more pockets *d* and screens *c*, substantially as described.

2. In an apparatus for simultaneously drying and pulverizing triturable material, the combination of a pulverizing-machine A, a furnace having a chimney B, provided with a false partition *g*, forming a passage *f*, open near its base, a conduit *a*, connecting the pulverizing-machine with the chimney and provided with one or more pockets *d*, and screens *c* in the conduit near its communication with the chimney and near each of said pockets, substantially as described.

3. In a machine for simultaneously drying and pulverizing triturable material, the combination of a pulverizing-machine A, having controllable air-inlets *e*, a furnace having a chimney B, and a conduit *a*, leading from the chimney and having branches *b* leading into the pulverizing-machine, substantially as described.

4. In a machine for simultaneously drying and pulverizing triturable material, the combination of a pulverizing-machine A, having controllable air-inlets *e*, a furnace having a chimney B, provided with a false partition *g*, forming a passage *f*, open near its base, a damper *k* at the upper end of the chimney, a conduit *a*, leading from the chimney and provided with pockets *d* and internal screens *c*, and branches *b*, leading from the conduit into the pulverizing-machine and provided with dampers *m*, the whole being constructed and arranged to operate substantially as described.

JOHN K. HALLOWELL.

Witnesses:
F. G. FAXON,
CHAS. W. PILE.