

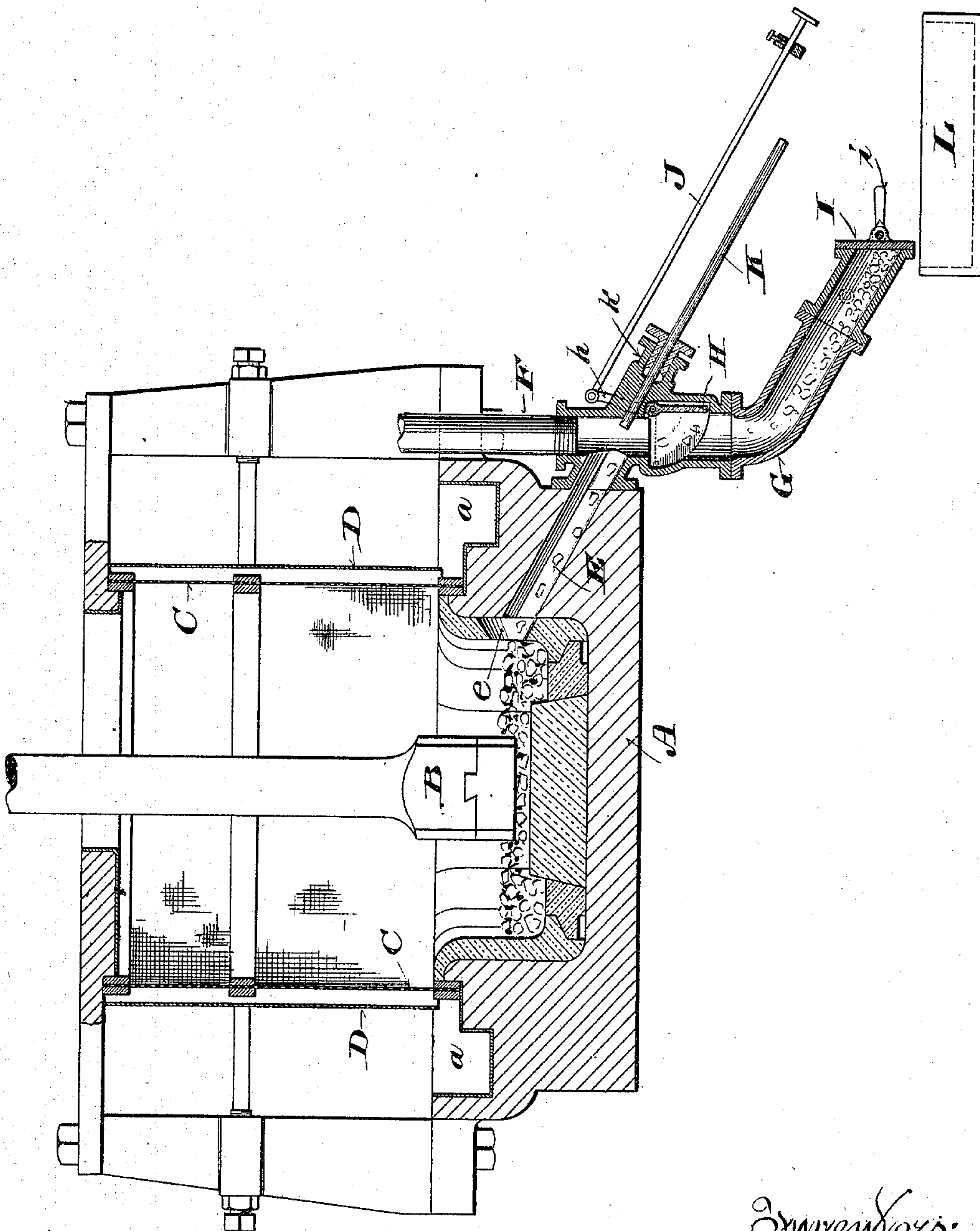
No. 681,234.

C. H. & H. C. KRAUSE.
ORE CRUSHER.

Patented Aug. 27, 1901.

(Application filed Mar. 11, 1901.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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ORE-CRUSHER.

SPECIFICATION forming part of Letters Patent No. 681,234, dated August 27, 1901.

Application filed March 11, 1901. Serial No. 50,624. (No model.)

To all whom it may concern:

Be it known that we, CHARLES H. KRAUSE, residing at Southlake Linden, and HENRY C. KRAUSE, residing at Point Mills, in the county of Houghton and State of Michigan, citizens of the United States, have invented certain new and useful Improvements in Ore-Crushers, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

Our invention relates particularly to that class of ore-crushers in which the crushed ore when it is reduced to the desired size is discharged by the splash of water through screens.

The main objects of the invention are to remove pieces of free metal which are too large to pass through the screens in the ordinary way, to reduce the loss of metal in slimes and tailings, to increase the capacity of mills of this class, and to avoid accidents and injury to such mills by reason of the accumulation therein of large pieces of free metal.

The invention consists in certain novel features in the construction and arrangement of parts and in the combinations of parts hereinafter particularly described, and pointed out in the claims.

For the purpose of illustration we have shown the invention in connection with a stamp-mill particularly designed for crushing copper ore or copper-bearing rock; but it is applicable to other kinds of stamp-mills and ore-crushers of the class above mentioned and may be used for crushing other kinds of ore or metal-bearing rock.

The accompanying drawing shows the device in connection with such a stamp-mill in vertical section.

A is the mortar, B the stamp, and C the screen surrounding the cavity in the mortar of a single-stamp mill such as are used for crushing copper-bearing rock in the Lake Superior copper region. The mortar is provided with a hardened die and stave-liners, the stamp is provided with a hardened shoe, and the screen is surrounded by a splash-pan or deflector D, by which the pulp or crushed ore is deflected after passing through the

screen downwardly into a channel *a*, formed in the mortar around the central cavity therein. Stamps of this kind for crushing copper ore or copper-bearing rock of the character above mentioned are made to strike a powerful blow and crush a large quantity of the ore or rock in a given time. The ore or rock is fed with water into the mill through an opening in the roof around the stamp-shaft, and as it is crushed by the powerful blows of the stamp against the die in the mortar it is thrown violently in all directions against the screen.

For the sake of economy in the operation of the mill and in the product it is desirable to crush the ore or rock only enough to free the metal which it contains and to discharge it from the mortar as soon as it is sufficiently crushed. Much of the copper-bearing ore or rock obtained in the Lake Superior region contains metal in large flakes or pieces, many of which are too large to pass through the meshes or openings in the screen. These large flakes or pieces of metal, if allowed to accumulate in the mortar, not only interfere with the operation of the mill and reduce its capacity, but are rapidly abraded by the repeated powerful blows of the stamp. This results in a large increase in the quantity of fine pulp or slimes produced by the mill and a corresponding loss in the tailings. To avoid these difficulties and objections, we provide the mill with a discharge for removing from the mortar as soon as they are separated from the rock the flakes or chunks of metal that are too large to pass through the screen C. This discharge, as applied to a single-stamp mill of the kind shown in the drawing, consists of a descending conduit or passage E, leading out through one side of the mortar and connected at its outer end by a pipe F with a pump, elevated tank, or other water-supply arranged to produce through the passage E into the mortar an upward current of water of sufficient force to hold back rock and sand, while the heavier pieces of metal are allowed to descend by gravity against the inflowing current and escape from the mortar through said passage. At its outer end the passage E is continued downwardly below the con-

nection of the water-supply or injection pipe F in a pipe G, which is provided with two valves or gates H and I. The valve H is located just below the junction of the passage E with the pipe G and opens downwardly into a recess provided therefor in one side of said pipe, so as to afford a free and unobstructed passage when it is open for the discharge of the copper or other metal into the lower part of said pipe, which forms a trap for catching and holding a quantity of metal. The valve H is operated by means of a rod J, which is connected with an arm *h* on the stem or pivot pin of said valve, or it may be operated by any other suitable means. The valve I is constructed and arranged to tightly close the lower end of the pipe G in order to avoid waste of water and admit of a continuous operation of the stamp-mill and of the discharge device. The lower end of the pipe G is preferably faced obliquely to its axis to form a seat for the valve I, which may be pivotally connected with said pipe at a distance from its end by two links, one on each side, as indicated by dotted lines in the drawing. These links may be extended to form handles *i* for operating said valve, which is drawn tightly against its seat on the end of the pipe when it is closed, as shown in the drawing.

K is a rod movable endwise through a stuffing-box *k* on the outer side of the pipe G in line with the passage E. It serves to clear said passage in case it becomes clogged or large pieces of metal lodge at its upper end.

The injection-pipe F is provided at any convenient point therein with a valve or other means (not shown) for regulating or shutting off the flow of water through the discharge-conduit.

The device operates as follows: Normally the upper valve H in the pipe G is open, the valve I is closed, and the rod K is withdrawn from the discharge-passage and stands in the position shown in the drawing. Under these conditions when the stamp-mill is in operation water is supplied through the pipe F and its flow through the passage E into the mortar is regulated so that the force of the current will hold back rock and sand in the mortar, but will allow the heavier pieces of metal to descend through said passage and drop into the lower end of the pipe G, which serves as a trap for catching and holding a certain quantity of metal and preventing waste of water. The metal caught and held in the pipe G is discharged from time to time into a box L or other suitable receptacle by first closing the valve H and then opening the valve I. After the metal has been thus discharged from the pipe G the valve I is closed and the valve H is opened. By means of this arrangement and manipulation of the valves H and I the operation of the stamp-mill and of the discharge device is not interrupted, and little or no water is wasted. In case the passage E becomes clogged the rod

K is thrust inwardly through it, and the obstruction is thereby dislodged and removed.

One of the stave-liners next to the inner end of the passage E is formed with an outwardly-flaring hole *e*, as shown in the drawing. The shape of this hole has been found in practice to be essential to the most efficient and satisfactory operation of the device.

It is obvious that any stamp-mill or ore-crusher to which our auxiliary discharge for free metal is applicable may be provided, according to the requirements of the case, with one or more of the devices, substantially as herein shown and described.

Various changes in the details of construction and arrangement of parts in adapting our discharge device to different kinds of stamp-mills or ore-crushers for use under various conditions upon different kinds of ore and metal-bearing rock may be made without departing from the principle and intended scope of our invention.

We claim—

1. In an ore-crusher the combination with a stamp and mortar for crushing the ore and a screen through which the crushed ore is discharged by the splash from the stamp, of an auxiliary discharge for free metal too large to pass through the screen, consisting of a conduit leading downwardly out of said mortar and a water-supply connection leading into said conduit and adapted to produce an upward current through the same, substantially as described.

2. In an ore-crusher the combination with a stamp and mortar for crushing the ore and a screen through which the crushed ore is discharged by the splash from the stamp, of an auxiliary discharge for free metal too large to pass through the screen, consisting of a conduit leading out of said mortar inside of the screen, an injector connection for forcing water through said conduit into said receptacle, and a valve for closing said conduit below the injector connection, substantially as described.

3. In an ore-crusher, the combination with the receptacle in which ore is crushed, of a descending discharge-conduit leading out of said receptacle and provided with a trap at its lower end, and a water-injection connection with said conduit above said trap, substantially as described.

4. In an ore-crusher, the combination with the receptacle in which ore is crushed, of a descending discharge-conduit leading out of said receptacle and provided with two valves for closing a portion of the lower part of said conduit and a water-supply connection leading into said conduit above said valves, substantially as described.

5. In an ore-crusher, the combination with the receptacle in which ore is crushed, of a descending discharge-conduit leading out of said receptacle and provided with a valve, a water-supply connection leading into said conduit above said valve, and a rod movable

axially through the upper part of said conduit for clearing the same, substantially as described.

5 6. In an ore-crusher, the combination with a stamp and mortar, and a screen surrounding the mortar, of a descending discharge-conduit leading out of the mortar and provided with valves which are arranged to cut
10 off a portion of said conduit, and a water-supply connection leading into said conduit above said valves and arranged to produce

an upward current of water through said conduit into said mortar, substantially as described.

In witness whereof we hereto affix our signatures in presence of two witnesses.

CHARLES H. KRAUSE.
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Witnesses:

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