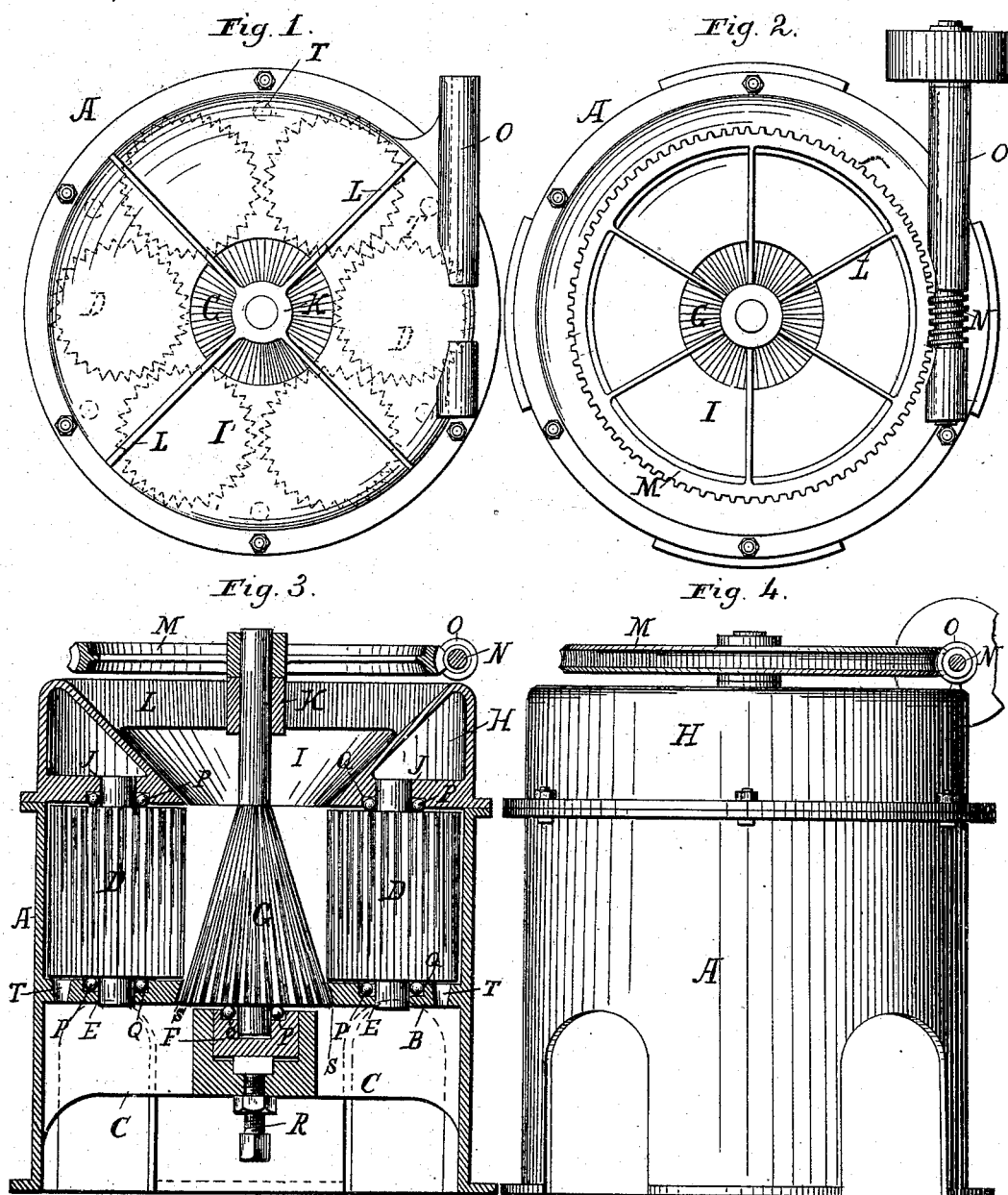


(No Model.)

S. P. M. TASKER.
STONE AND ORE CRUSHER.

No. 262,996.

Patented Aug. 22, 1882.



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UNITED STATES PATENT OFFICE.

STEPHEN P. M. TASKER, OF PHILADELPHIA, PENNSYLVANIA.

STONE AND ORE CRUSHER.

SPECIFICATION forming part of Letters Patent No. 262,996, dated August 22, 1882.

Application filed May 24, 1882. (No model.)

To all whom it may concern :

Be it known that I, STEPHEN P. M. TASKER, of the city and county of Philadelphia, in the State of Pennsylvania, have invented an Improvement in Stone and Ore Crushers, of which the following is a specification.

My invention relates in general to machines employed for crushing, disintegrating, or triturating metalliferous ores, stones, and other hard substances, and which machines are variously known as "stone-breakers," "ore-crushers," or "grinding-mills."

A preferred form of a convenient embodiment of my invention is hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a top plan view of a crusher or grinding-mill conveniently embodying my improvements, and represented after the removal of a worm-wheel shown in the other figures, and designed to revolve the crushing-cone. Fig. 2 is a similar view of the same, representing the worm-wheel in place. Fig. 3 is a vertical central sectional elevation, and Fig. 4 a side elevation of the same apparatus.

Similar letters of reference indicate corresponding parts.

In the accompanying drawings, A is a housing or frame-work constructed in such manner, of such material, and in such form as convenience of manufacture may dictate. I find a good form to be that represented in the drawings, in which the housing proper is a cylindrical shell provided with a horizontal annular diaphragm, B, equipped with a series of journal-bearings, E, for the lower extremities of the axles of the crushing-cylinders D.

C are a series of brackets or webs, which are radially disposed with respect to the housing, and which centrally support the lower bearing, F, of the crushing-cone.

G is the crushing-cone of suitable material, the surface of which is roughened or serrated.

H is a hopper-casting in the nature of an annular cover-plate, which incloses at its upper portion the housing, and which is provided with a centrally-discharging hopper, I, with a series of bearings, J, for the upper extremities of the axles of the crushing-cylinders, and with a central upper bearing, K, for the upper extremity of the shaft of the crushing-cone,

said upper bearing for the cone being preferably supported by radial webs springing from the inclined sides of the hopper. By the above construction it will be observed that the crushing-cone is vertically disposed centrally within the housing, while the crushing-cylinders are vertically disposed therein concentrically with respect to the crushing-cone and circumferentially with respect to the casing. Of course the precise construction recited may be departed from and other constructions resorted to for the purpose of enabling the placing and support, in the manner described, of the crushing-cone and cylinders. I have simply recited the specific construction represented as a convenient one.

M is a worm-wheel secured to the upper extremity of the shaft of the crushing-cone at a point above its upper bearing, and geared with a worm-shaft, N, suitably supported in a shaft-bearing, O, bracketed from or connected with a housing. By means of the above worm-gearing any desired speed of rotation may be imparted to the crushing-cone.

P are ball-bearings of any preferred anti-friction character, which are applied to the axles of the crushing-cylinders, both at their upper and lower bearings, and to the lower bearing of the axle of the crushing-cone. These balls are contained in suitably-constructed tracks Q, of chilled iron or steel, and serve not only to resist the radial thrust upon the cylinders arising from the crushing operation, but also to support the weight of the cylinders and of the cone. They form a convenient and durable means of journaling the revolving parts.

R is a vertical adjusting-screw adapted to adjust the vertical set of the lower bearing, F, of the crushing-cone.

I have denominated the central circular opening in the horizontal annular diaphragm, within which opening the base of the cone is disposed, by the letter S. This opening, in connection with the base of the cone, forms the discharging-vent of the machine, is reamed out, so to speak, from below upward—that is to say, its side walls are not vertical, but are conically inclined in a plane correspondent to the plane of the exterior of the cone. These walls are, if desired, roughened or serrated,

and serve to form a fixed surface against which the cone acts to crush. The size of this circular opening is slightly in excess of that of the base of the cone, but only slightly, so that the vertical adjustment of the cone enables the latter to more or less completely fill this opening, and thereby regulate the width of the annular discharging-vent between the cone and opening, thereby in turn regulating the fineness to which the stones are broken. As already stated, both the cone and the cylinders are suitably roughened or serrated upon their surfaces. The cylinders are preferably so disposed with respect to the circular opening in the annular diaphragm and with respect to the cone that their inner peripheries register in line with the top of the circular opening, and are in close proximity to the face of the cone at a point slightly above its extreme base. The vertical set of the cone of course regulates the degree of nearness to which it shall approach the extreme inner peripheries of the cylinders.

There are a series of vents or escape-passages cut through the annular diaphragm around its outer circumference at points between the crushing-cylinders, as represented in Figs. 1 and 3. These vents are to enable the escape of crushed material happening to be carried between the cylinders and the outer portion of the diaphragm, and not happening to be crushed and discharged in the usual manner.

Such being a description of a preferred construction of my apparatus, its operation will be readily understood. The cone is revolved, material is fed through the hopper around it, and as the material descends it becomes engaged between the inclined faces of the revolving cone and the vertical inner faces of the crushing-cylinders, whereby the material itself occasions the revolution of the cylinders and becomes crushed between the said cylinders so revolved and the positively-revolving cone. The operation is continuous, the material being continuously crushed and continuously discharged between the cone and the circular opening in the diaphragm. A sufficient amount of material is fed around the cone to almost completely fill the annular space between the cylinders and the cone, and to cause the greater portions of the surfaces of both cone and cylinders to be operative for the crushing action, the large lumps being gradually reduced in size, so that they gradually descend until they reach that lowermost point at which they are crushed to the degree of fineness desired, at which point they find their escape. The balls ease the play of both cylinders and cone, and form journal-surfaces

which are not injuriously affected by contact with pulverized material.

The device is compact, simple, and cheap of construction, and is adapted for the crushing of substances of varying sizes to varying degrees of fineness. Its action is continuous and positive, and it enables me to dispense with link-and-toggle connections and to employ but a few parts.

While I have represented and described worm-wheel gearing as imparting the requisite motion to the crushing-cone, it will yet be understood that other driving devices may be substituted for such gearing without departing from the essential features of construction of my device.

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

1. A grinding-mill provided with a vertically-revolving grinding-cone, and with a series of revolvable grinding-cylinders circumferentially disposed with respect to said cone.

2. In a stone and ore crushing machine, the combination of a revolving crushing-cone, a casing or housing provided with a hopper or kindred feed device adapted to discharge around the cone, and a series of vertically-erected crushing-cylinders arranged around the crushing-cone and exterior to the line of feed and discharge of material to be ground.

3. In a stone or ore crushing machine, in combination, a housing, a vertically-operating crushing-cone, a circular series of crushing-cylinders surrounding said cone, and means for imparting rotation to said crushing-cone.

4. In a grinding-mill, the combination of a vertically-erected crushing-cone, a series of crushing-cylinders disposed in circumferential relation about the cone, a housing, and a series of anti-friction balls disposed in suitable relation in the housing about the shafts of the cone and cylinders, as and for the purpose set forth.

5. In a stone-crushing machine in which a series of crushing-cylinders surround a crushing-cone, a diaphragm provided with a circular opening within which the cone is placed and exterior to which opening the cylinders are located, and means for vertically adjusting the position of the cone, so as to regulate the breadth of the annular passage-way formed between the cone and the opening in the diaphragm.

In testimony whereof I have hereunto signed my name this 20th day of May, A. D. 1882.

STEPHEN P. M. TASKER.

In presence of—

J. BONSTALL TAYLOR,
W. C. STRAWBRIDGE.