

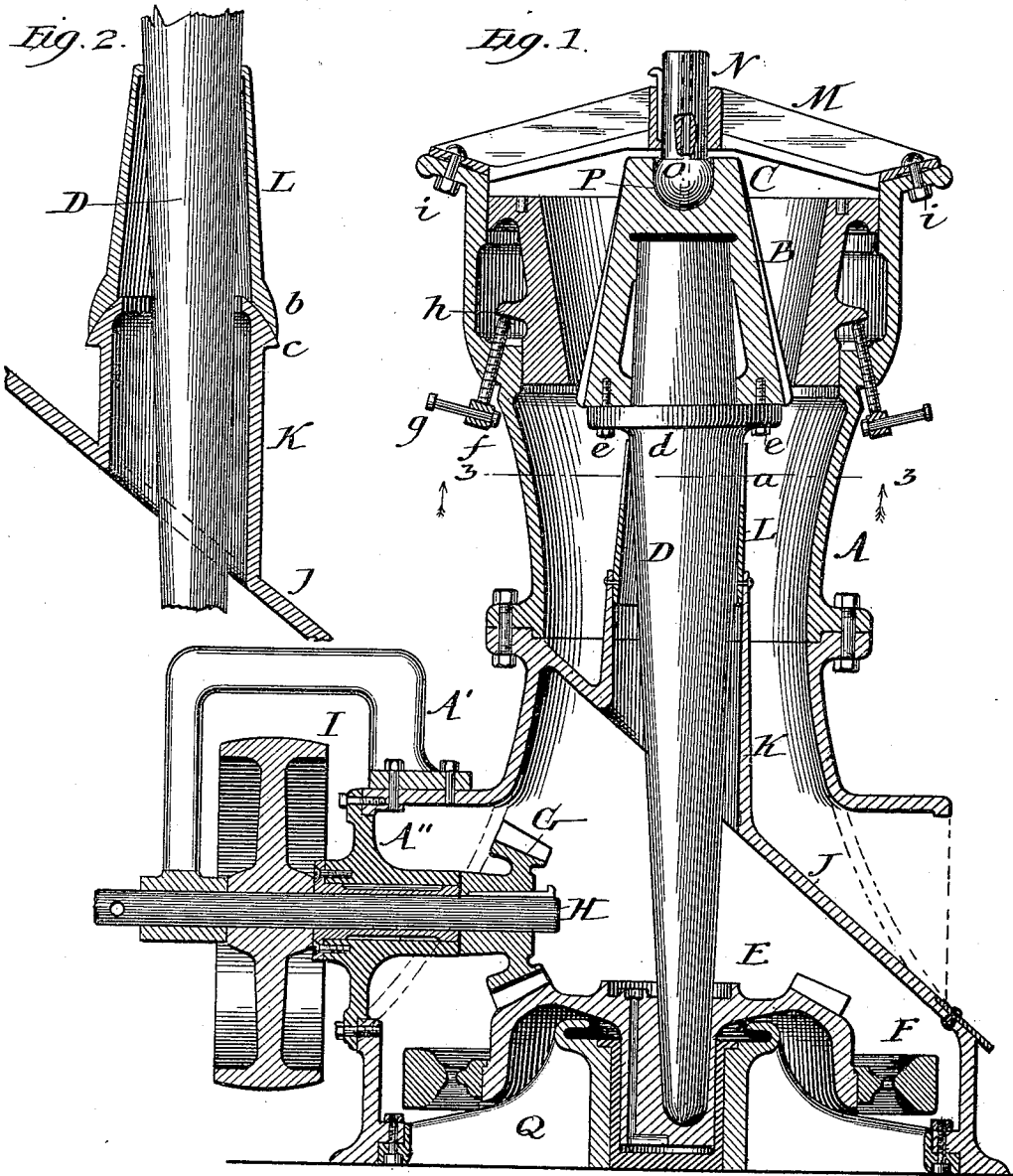
(No Model.)

2 Sheets—Sheet 1.

G. LOWRY.
STONE CRUSHER.

No. 461,583.

Patented Oct. 20, 1891.



Witnesses:

John L. Jackson
Frank Blanchard

Inventor:

George Lowry.
By Bond, Adams & Jones
Attys.

(No Model.)

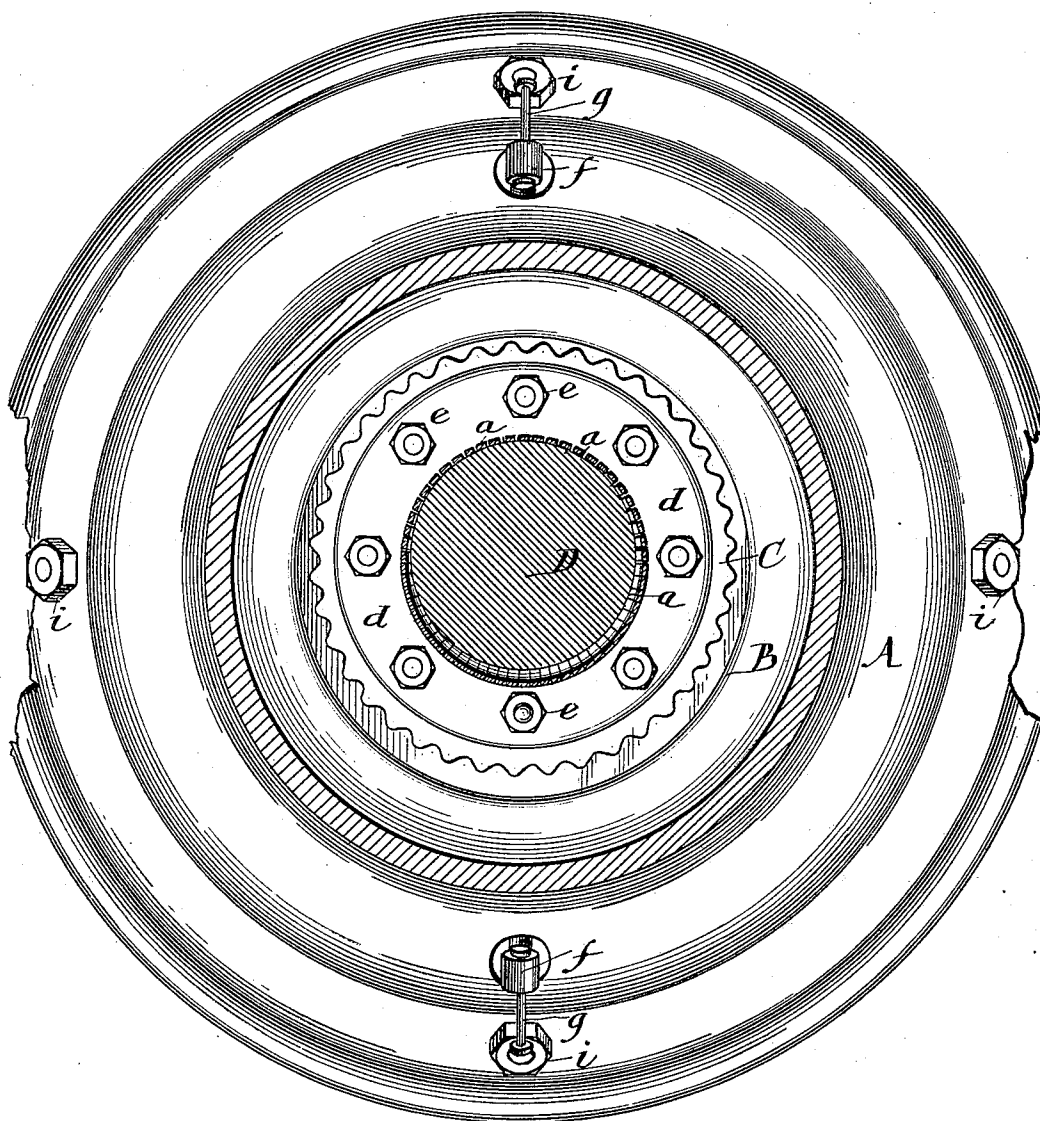
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Fig. 3.



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By *Bond Adams Jones*
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UNITED STATES PATENT OFFICE.

GEORGE LOWRY, OF NORTHAMPTON, ENGLAND.

STONE-CRUSHER.

SPECIFICATION forming part of Letters Patent No. 461,583, dated October 20, 1891.

Application filed December 16, 1890. Serial No. 374,942. (No model.)

To all whom it may concern:

Be it known that I, GEORGE LOWRY, residing at Northampton, Northamptonshire, England, and a subject of the Queen of Great Britain, have invented a new and useful Improvement in Stone-Crushers, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section. Fig. 2 is a section showing a modification in the dust-protector; and Fig. 3 is a horizontal section on line 3 3 of Fig. 1, looking up, as indicated by the arrows.

The object of this invention is to improve the construction and operation of stone-crushers of the gyratory class, and its nature will be pointed out in the claims.

In the drawings, A indicates the outer shell or casing; A', a supporting-arm for the outer bearing of the driving-shaft; A'', a close-fitting section for supporting the inner boxing of the shaft; B, the crushing-cylinder; C, the crushing head or cone; D, the shaft; E, the beveled main driving-wheel carrying the eccentric box and a balance-wheel F; G, the beveled driving-pinion; H, the driving-shaft; I, the driving-pulley; J, inclined diaphragm or chute; K, the central cylindrical portion of the chute; L, dust guard or protector; M, cap; N, bearing-bar having the ball-bearing O at its lower end; P, socket for ball-bearing; Q, base; *a*, slits in the upper end of the dust-guard; *b c*, globular fitting for the lower end of the dust-protector; *d*, collar on shaft D; *e*, bolts for connecting the crushing-head with the shaft-collar; *f*, screws for adjusting the height of the crushing-cylinder; *g*, sliding handles for operating the screws *f*; *h*, shoulders or rim on the crushing-cylinder resting upon the screws *f*, and *i*, bolts for attaching the cap.

The base or lower part of the crusher, with the exception of the arm A', is similar in construction to that shown in my former patent, No. 431,069, dated July 1, 1890, and need not therefore be specially described.

The arm A', which may be a single arm or one of two similar arms, is attached to the base of the machine, as shown, and passes over the driving-pulley and is carried down so as to furnish an outer bearing for the driving-shaft H. The shaft is made long enough

to pass through this additional support, and I thereby give the shaft a double bearing, both of which are supported wholly upon and by the base of the crusher shell or casing.

The upper end of the shell A is provided with two vertical bearings or fittings for the crushing-cylinder, each bearing having a different diameter, as shown and described in my former patent. This crushing-cylinder is made vertically adjustable by means of two or more screws *f*, which pass through the outer shell and are provided with sliding handles *g*, which are used in turning the screws, and when the screws are adjusted the handles are slid back against the casing, so as to form locks or stops which will prevent backward rotation of the screws from the jarring of the crusher. The openings through the shell for the screws *f* may be screw-threaded directly. Screw-threaded linings may be placed in the openings, or non-rotating nuts may be provided inside. By this arrangement for adjusting the crushing-cylinder it may be adjusted vertically to vary the size of the broken stone, as in my former patent, and it may also be adjusted downward with a fine adjustment to compensate for the wear of the crushing cylinder or cone, which is an important advantage, particularly where substantial uniformity in the product is desired.

I have shown the crushing-cylinder B as made of a single piece, which will ordinarily be sufficient, as when constructed in the manner here shown it is easily removed and replaced by a new one; but it is evident that it may be provided with detachable wearing-plates on its inner surface, as is common in the art.

The crushing-cone C is made to fit over the upper end of the shaft D, as shown, and in order to avoid excessive turning the middle portions of the lower cavity are enlarged, as shown, and a cross-cavity is provided at the upper end of the shaft for the same purpose; but, if desired, the cone may be fitted to the top of the shaft as well as against the collar *d*. The upper end of the cone is carried somewhat higher than usual, and it is provided with a concavity P, fitting the ball O, as shown. The lower end of this cone is fitted against the shaft and upon the collar *d*, and it is held in contact with the collar by

means of the screws or bolts *e*, which hold the parts firmly together. Eight of these bolts *e* are shown; but a greater or less number may be used in accordance with the size of the crusher.

The cap M is fitted to the top of the shell A and held by bolts *i*. It is provided with arms reaching to and supporting a solid center, through which passes the shaft or bar N, which is provided at its lower end with the spherical head or bearing-ball O. The shaft or bar N is provided with a longitudinal hole for admitting oil, and it is held by a key or other suitable device to prevent movement and wear at this point and for adjusting the position of the ball-bearing. The cap M may be made in the spider form shown, or it may be a disk plate having sufficient openings for feeding in the stone to be crushed. It requires to be strongly made, as it carries the fulcrum for the lever-shaft D. By this arrangement of the upper bearing I am enabled to carry the bearing farther down into the crusher, which, while it reduces the movement somewhat at the top, gives a rigid bearing and so much greater leverage to the shaft D that it more than compensates for the loss of motion and it improves the operation of the crusher. It is evident that the advantages of this location for the upper bearing may be had by making the shaft D long enough to have the socket for the ball-bearing made in its upper end, and I do not therefore limit myself to making this socket in the crusher-head, although I prefer that form, for the reason that when so made both the ball and its socket are easily renewable and avoid the expense of making a new shaft or of providing parts to compensate for or take up wear at this point. The exterior of the crushing-head is corrugated or ribbed in the usual manner.

The dust guard or protector L in the form shown in Fig. 1 is usually made of steel and it may be bolted or riveted to the cylindrical portion K of the diaphragm, and when so made it is provided with slits to form fingers *a*, which allow its upper end to spread as the shaft comes against it, and as these slits only open by the pressure of the shaft against the inside the shaft will close the opening spaces and prevent the intrusion of dust. This guard may also be made, as shown in Fig. 2, with a sort of ball-and-socket connection with the top of the cylindrical portion K of the diaphragm, so that it may be moved at this point. When so made, it is not essential that the upper end be slitted, as at *a*, and slits may be employed at this point, but fewer in number than will be required when the lower end is firmly attached to the part K. This arrangement will cause the upper end of this protector to be self-fitting against the shaft and form a dust-proof connection with it. The connection at *b c* will not require special fitting, as the collar will soon wear itself to the proper fit, and when made

in the form shown in Fig. 2 it is not essential that it be made of steel. By making this dust-protector in the form of a cylinder and a prolongation of the cylinder K, I thoroughly exclude the dust without in any manner impeding the fall of the broken stone, and I avoid the wear incident to dust-protectors heretofore used in this class of machines, so as to partially neutralize their usefulness.

Instead of the ball-and-socket bearing shown, it is evident that properly-fitting taper bearings may be used, and that when the bearing is so made both ends of the shaft N may be tapered and also without being enlarged, so that when one end is worn out the other end can be used, and a change or renewal may be made without detaching the cap M. The application of the collar or enlargement *d* makes the shaft stronger at the point of its greatest liability to break, and firmly securing the crushing-cone to this collar by bolts or otherwise also strengthens the crusher at this point and reduces the liability to breakage.

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

1. The combination, with a shell or casing A, of the gyrating shaft D, the crushing-cylinder B, the crushing-cone C, having the socket P in its upper end and supported by and rotating with the gyrating shaft, the cap M, attached to the shell or casing, and the vertical shaft or bar N, held stationary on the cap and having the ball-bearing O engaging the socket in the cone, substantially as described.

2. The combination, with the shell or casing A and the crushing-cone C, of the crushing-cylinder B, having laterally-projecting shoulders *h*, the axially-rotating screws *f*, in screw-threaded engagement with and rising upwardly through a part of the shell or casing and bearing against the underside of the projecting shoulders to sustain and vertically adjust the crushing-cone, and the handles *g*, sliding in the outer ends of the rotating screws and adapted to move into a position against the shell or casing for locking the screws against rotary movement, substantially as described.

3. The combination, with the shell or casing A, the crushing-cylinder B, the crushing-cone C, the gyrating shaft D, and the chute J, having a cylindrical portion K, of the tubular dust-guard L, supported by the cylindrical portion of the chute, rising upwardly along the gyrating shaft and terminating in juxtaposition to the crushing-cone to form a tubular prolongation of the tubular portion of the chute, substantially as described.

4. The combination, with the shell or casing A, the crushing-cylinder B, the crushing-cone C, the gyrating shaft D, having a collar *d*, and the chute J, having a cylindrical portion K, of the tubular dust-guard L, supported by the tubular portion of the chute, rising upwardly along the gyrating shaft and having its upper end provided with slits and

terminating in juxtaposition to the collar on the gyrating shaft, substantially as described.

5 5. The combination of a crushing-cylinder B, a gyrating shaft D, provided with a collar d, a crushing-cone C, resting upon the collar of the gyrating shaft, and locking-screws e, rigidly connecting the crushing-cone with the

collar of the gyrating shaft to prevent the cone from rising on the shaft in the grinding operation, substantially as described.

GEORGE LOWRY.

Witnesses:

E. Q. NYE,
WM. EBEL.