

No. 742,191.

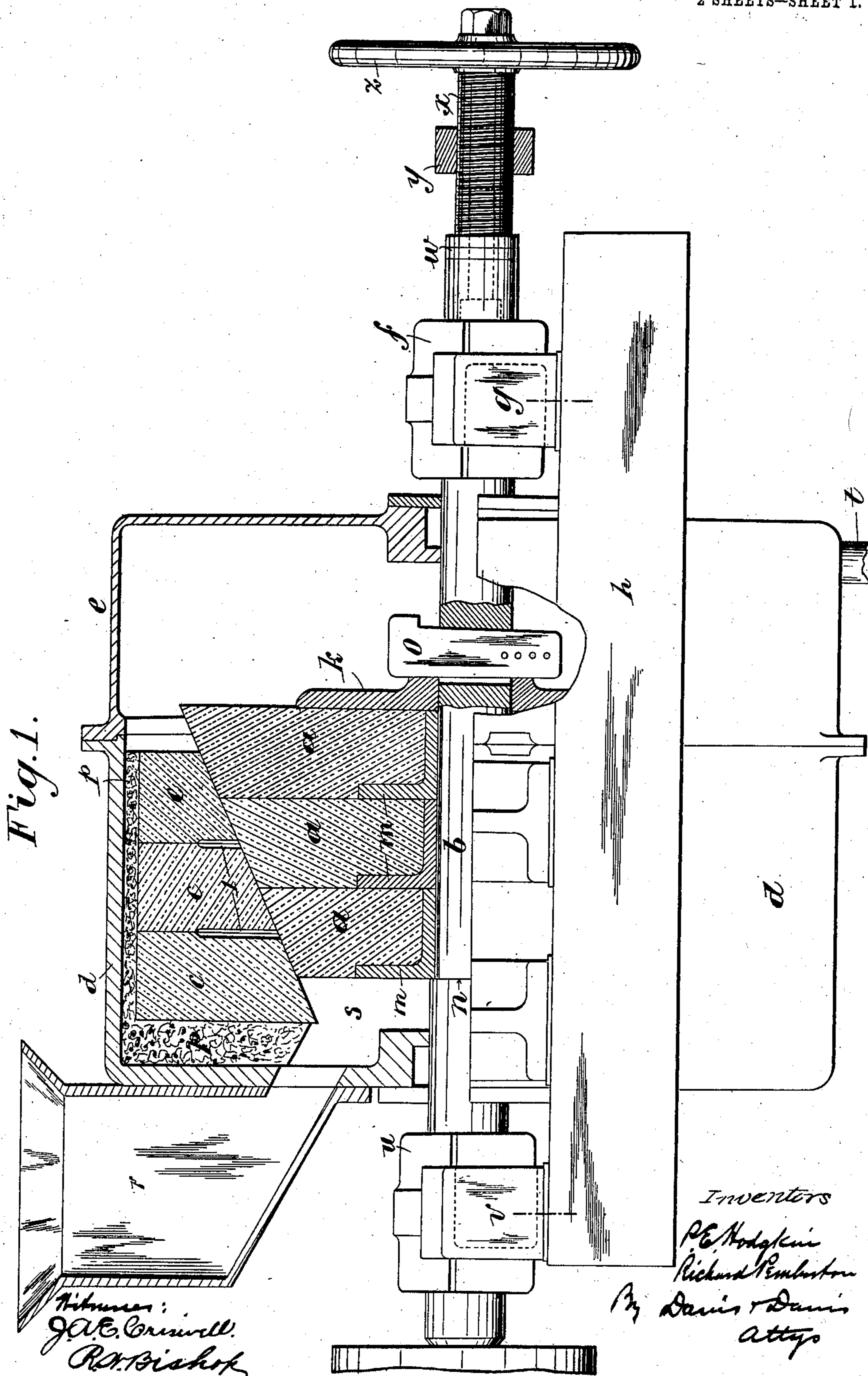
PATENTED OCT. 27, 1903.

P. E. HODGKIN & R. PEMBERTON.  
GRINDING MILL.

APPLICATION FILED OCT. 16, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



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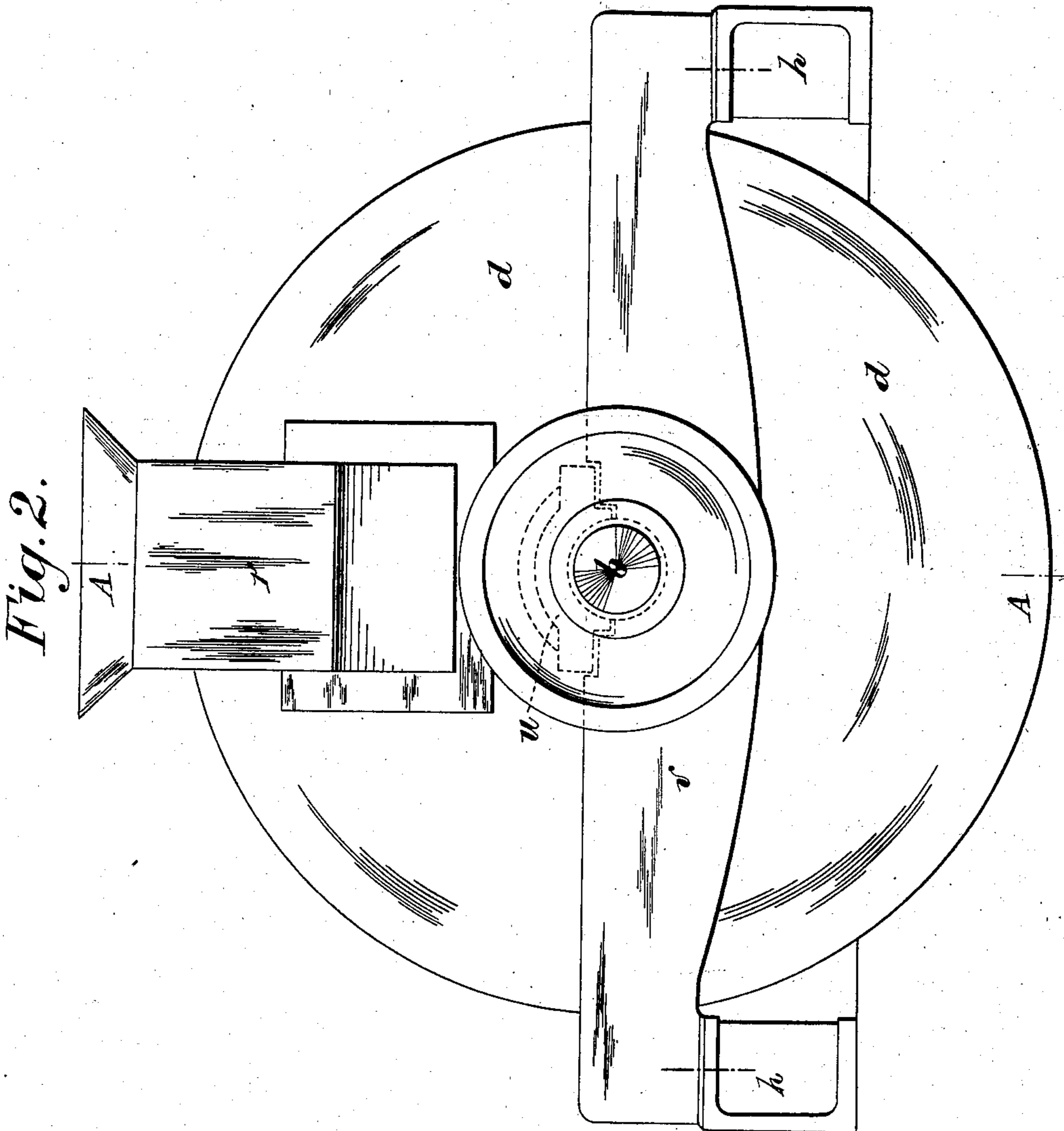
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Witness:  
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# UNITED STATES PATENT OFFICE.

PHILIP ELIOT HODGKIN, OF READING, AND RICHARD PEMBERTON, OF NORTHFLEET, ENGLAND, ASSIGNORS TO THE PULSOMETER ENGINEERING COMPANY, LIMITED, OF READING, ENGLAND.

## GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 742,191, dated October 27, 1903.

Application filed October 16, 1902. Serial No. 127,557. (No model.)

*To all whom it may concern:*

Be it known that we, PHILIP ELIOT HODGKIN, residing at Reading, in the county of Berks, and RICHARD PEMBERTON, residing at Northfleet, in the county of Kent, England, subjects of the King of Great Britain and Ireland, have invented Improvements in Grinding-Mills, of which the following is a specification.

This invention has reference to grinding-mills of the kind wherein a runner having an external conical surface is arranged to work within a fixed stone having an internal conical surface and which are specially suitable for grinding cement. In such mills the runner and fixed stone have heretofore each been made in one piece, and as the conical grinding-surfaces revolve at different speeds at different points along the periphery thereof in the direction of the axis and rapidly become unevenly worn costly repairs and renewals become necessary, which also involve much loss of time. Furthermore, such runners and fixed stones are expensive in first cost. Now according to the present invention in order to increase the life of the runner and fixed stone used in such mills and to facilitate and cheapen the construction and renewal of these parts each of them instead of being made in one piece as heretofore is built up of annular sections of varying diameters that are arranged side by side at right angles to the axis of the driving-shaft and are detachably secured in place; the arrangement being such that when any section has become unduly worn it can be easily removed and replaced by another without necessarily renewing the whole of the sections and so that each section, except the smallest, can when worn be utilized after being turned down to a suitable size to take the place when necessary of the next smaller section.

The invention also consists in various combinations and arrangements of parts, as hereinafter described, and pointed out in the claims.

In the accompanying illustrative drawings, Figure 1 shows, partly in longitudinal section

on the line A A of Fig. 2 and partly in side elevation, and Fig. 2 in end elevation, a grinding-mill embodying the present invention.

*a a* are the annular sections composing the runner, secured upon the driving-shaft *b*, and *c c* are the annular sections composing the fixed stone, secured in the forward portion *d* of a stationary casing *d e*.

To enable the annular sections *a* of the runner to be readily removed from the driving-shaft *b*, they are held in place endwise thereon by suitable clamping means, and that end portion of the shaft over which the sections are to be passed is made plain—that is to say, without any collar or circumferential projection that would interfere with the removal of the said sections. The said end portion of the shaft is arranged to rotate in a bearing *f*, carried by a cross-beam *g*, that is mounted to slide endwise upon the side portions *h* of the bed plate or frame of the machine, but is normally fixed to said side portions, the arrangement being such that after removing the adjusting means used for forcing the shaft *b* endwise to keep the runner up to the fixed stone and detaching the cross-beam *g* from the side portions *h* the said cross-beam *g*, with bearing *f*, can be slid endwise off the shaft and the rear end portion *e* of the mill-casing removed, after which the annular sections *a* can be easily loosened and one or more of them removed and replaced by another or others, and after again clamping the sections in place the rear end portion *e* of the casing, the cross-beam *g*, with bearing *f*, and the adjusting means can be returned to and fixed in their original position, the whole operation being easily effected in a comparatively short time. When the rear end portion *e* of the casing and the sections *a* of the runner are removed, ready access is also afforded to the sections *c* of the fixed stone.

In the constructional form of grinding-mill shown in the drawings each annular section *a* of the runner is fixed upon a metal ring *m* of L-section, and the several rings *m*, with the sections *a*, are fixed in place upon the driving-shaft *b* between a collar or shoulder

2 on the forward portion thereof and a clamping ring *k*, that is forced forward by suitable means, such as a cotter *o*, passing through the shaft. The annular sections *c* of the fixed stone are secured, as by cement *p*, within the stationary forward portion *d* of the mill-casing, through which the driving-shaft *b* extends. The said forward portion of the casing is formed with a feed-opening *q*, over which is secured the lower end of a feed-hopper *r*, so that the material to be ground can pass from a space *s*, into which it is directly fed, to the gradually-increasing annular space between the runner and fixed stone, the ground material being finally discharged into the rear portion *e* of the mill-casing, which is provided with an outlet *t* for the ground material and is detachably secured, as by bolts, to the stationary forward portion *d* of the casing.

The forward end of the driving-shaft *b* is mounted in a bearing *u* on a cross-beam *v*, fixed to the side frames or bearings *h*, like the rear end portion of the driving-shaft *b*, which is plain—*i. e.*, without projections—and is provided with a ball thrust-bearing *w*, arranged to be set up by an adjusting-screw *x*, carried by a fixed bearing *y* and provided with a hand-wheel *z*.

The adjacent surfaces of the runner and fixed stone may be formed with a dressing consisting of any suitable arrangement of furrows. Also narrow annular spaces or openings *l* may advantageously be formed between the adjacent sections *c* of the fixed stone, such spaces or openings extending from the inner conical surface of the stone outward in planes at right angles to the axis of the driving-shaft *b* for the purpose of delaying the passage through the mill of the material being ground, thus giving a longer time during which the material will be subjected to the grinding action than if they were absent.

What we claim is—

1. A grinding-mill comprising a casing consisting of forward and rearward parts detachably connected together and provided respectively with an inlet for material to be ground and an outlet for ground material, a fixed stone built up of a number of annular sections placed side by side and secured in the forward portion of said casing, a driving-shaft extending longitudinally through said casing and fixed stone and having a plain rear end, a conical runner having an external conical surface and a cylindrical bore and built up of a number of annular sections fixed side

by side in a detachable manner to said shaft, longitudinal frames at the sides of said casing, forward and rearward cross-beams carried by said side frames and provided with bearings for said shaft, and means for forcing the said shaft and runner endwise.

2. A grinding-mill comprising a fixed stone having an external cylindrical surface and an internal conical surface, a runner having a corresponding external conical surface and a cylindrical bore and built up of a number of sections arranged side by side and each fixed at its center to a metal ring, a driving-shaft having a shoulder on its forward portion against which the ring of the foremost section can bear and having its rearward end shaped to admit of the runner-sections with rings being readily removed therefrom, a clamping-ring surrounding said shaft, means for forcing said clamping-ring against the rearmost runner-section and the foremost one against the shoulder on said shaft, means for supporting said shaft and means for forcing the same endwise, substantially as described.

3. A grinding-mill comprising a casing having a feed-opening in its front end and a detachable rear portion with outlet-opening at its lower part, a fixed stone built up of annular sections arranged side by side and secured in the forward portion of said casing, said fixed stone having a conical inner surface that increases in area toward the rear and a cylindrical outer surface, a runner having a corresponding but reversely-arranged external conical surface arranged to work within said fixed stone, said runner having a cylindrical bore and being built up of annular sections arranged side by side and each fitted to a central metal ring, a longitudinal driving-shaft extending through said casing and runner and having a shoulder on its forward end against which the foremost section of the runner bears and a plain rear end, front and rear bearings for said shaft, the rear bearing being removable, a clamping-ring surrounding said shaft and arranged to bear against the rear surface of the rearmost section of the runner, a cotter extending through said shaft and adapted to set up said clamping-ring, and means for adjusting said shaft with runner endwise, substantially as described.

Signed at 75-77 Cornhill, London, England, this 22d day of September, 1902.

PHILIP ELIOT HODGKIN.  
 RICHARD PEMBERTON.

Witnesses:

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 WM. O. BROWN.