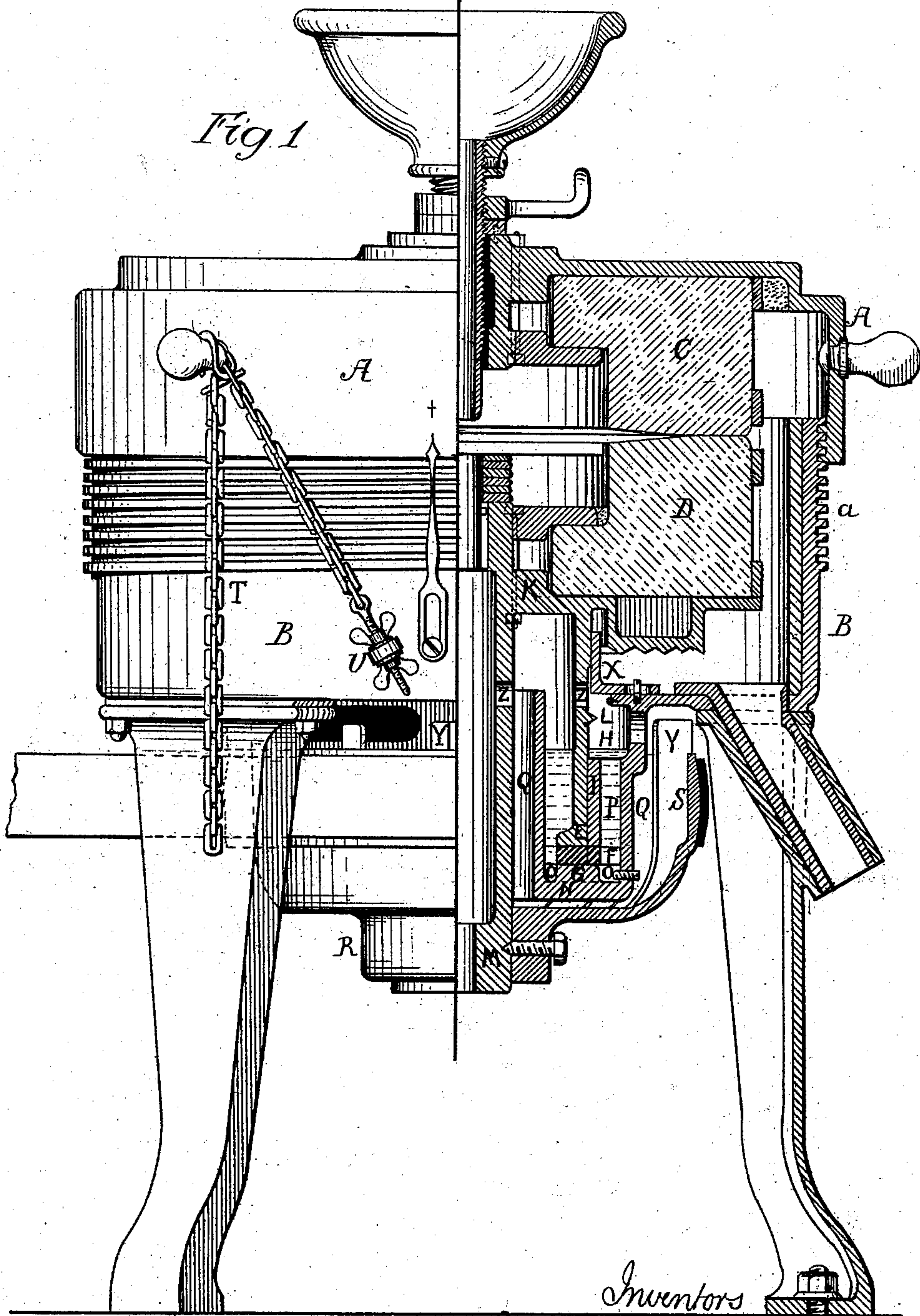


J. HIGGINBOTTOM, & E. HUTCHINSON.
Mill for Grinding Grain, Middlings, &c.

No. 225,374.

Patented Mar. 9, 1880.



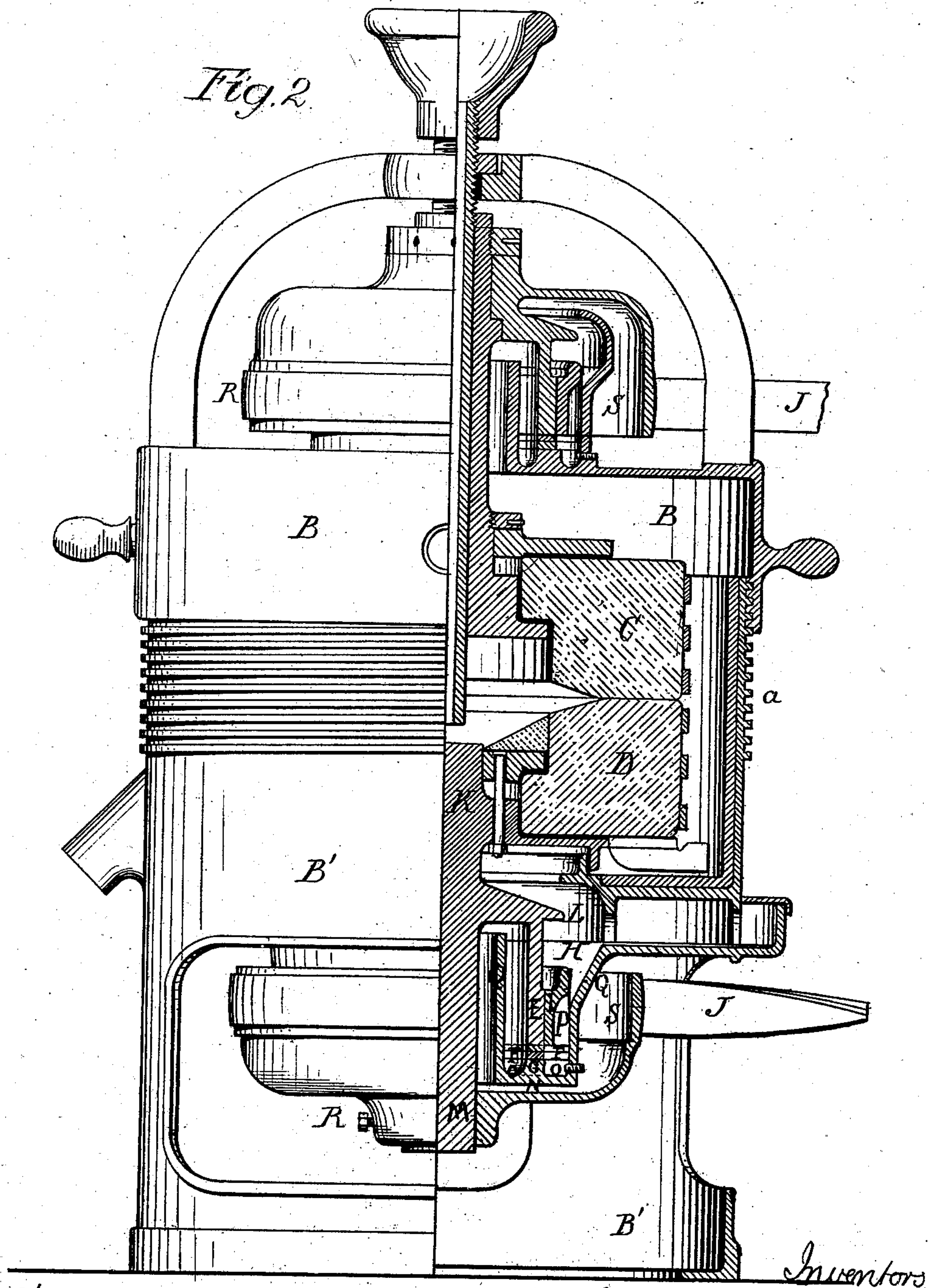
Witnesses
Henry Cowan Jr.
Harry Smith

Inventors
James Higginbottom
and
Edward Hutchinson
by their Attorneys
Horwath and Son

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UNITED STATES PATENT OFFICE.

JAMES HIGGINBOTTOM AND EDWARD HUTCHINSON, OF LIVERPOOL,
ENGLAND.

MILL FOR GRINDING GRAIN, MIDDINGS, &c.

SPECIFICATION forming part of Letters Patent No. 225,374, dated March 9, 1880.

Application filed May 15, 1879. Patented in England, April 30, 1878.

To all whom it may concern:

Be it known that we, JAMES HIGGINBOTTOM and EDWARD HUTCHINSON, both of Liverpool, England, have invented certain new and useful Improvements in Apparatus for Grinding Grain, &c., for part of which improvements we have obtained British Letters Patent No. 1,722, dated April 30, 1878, and of which the following is a specification.

10 The main object of our invention is to so construct a machine for grinding grain, middlings, &c., that the millstones will always run true with each other, and that the bearings will always be well lubricated, and that the
15 strain caused by the belting or gearing for transmitting the power shall not disturb the true running of the stones. These objects we attain in the manner which we will now proceed to describe, reference being had to the
20 accompanying drawings, in which—

Figure 1, Sheet 1, is a part vertical section and part elevation of one form of our improved grinding-mill, and Fig. 2, Sheet 2, a similar view of a modified form of our mill, in which both
25 the upper and lower stones are arranged to be revolved.

Referring to Fig. 1, the outer casing of the machine is made in two parts—namely, the upper part, A, and the lower part, B, the latter
30 being supported by suitable legs, or by a flange or stem, and having at and near its upper edge an external screw-thread, *a*, adapted to an internal screw-thread formed in the upper part of the casing. The upper stone, C, is rigidly
35 secured to the upper part of the casing A. The lower stone is rigidly attached to a casting, K, provided with a central shaft, M, and an annular bearing or bed-plate, E, which rests on an annular plate or plates, F F, the latter
40 resting on the annular projection or bearing surface G in the bottom of an annular casing, Q, which is a part of or is permanently secured to the lower portion, B, of the outer casing, and forms an annular oil-chamber, H. The
45 annular plate or plates F are free to move round under the bed-plate, so as to equalize the wear of the bearing-surfaces. Owing to the annular bearing thus provided for the revolving stone, the grinding-surfaces of the mill-
50 stones will run true to each other.

The lower end of the bed-plate E, the plates F, and bearing G must be turned perfectly true, as also must the exterior of the annular bed-plate, which is adapted to side bearings, I, attached to the interior of the casing Q, between which and the said bearings are oil-
55 passages P. Annular grooves O are formed on each side of the bearing G, and grooves are cut across this annular bearing, so that the oil on the outside of the bed-plate E in
60 the oil-chamber H can pass freely to the inside of the same and rise to any desired level in the oil-chamber for the purpose of keeping the bearing, bed-plate, side bearings, and bearing-plates immersed in oil, tallow, or other
65 lubricant. An oil-drip flange, L, is formed around the annular plate E, above the side bearings, I.

On the end of the shaft M is secured a pulley, R, over which passes a power-driven belt, 70 and upon the inside rim, S, of the pulley are fixed a number of vanes, Y, which, when the machine is in operation, act as exhaust-fan blades to draw out from the oil-chamber H any oil vapors generated by the heating of the bearings. To assist such action, we form air channels or openings *z z* in the hollow shaft M, annular plate E, and in the side of the oil-chamber H.

To the top of the oil-chamber is adapted a
80 flanged adjustable ring, X, which fits against the annular plate E, and prevents the oil vapors from rising into the inside of the lower part of the casing among the materials being ground.

It will be observed that the pulley R is arranged so that its rim S, which receives the driving-belt, is in a horizontal line with the side bearings, I, which consequently receive all the side strain of the belt, and thus prevent
90 the latter from affecting the parallelism of the two millstones. The two millstones can be adjusted toward or from each other by simply screwing the upper part, A, of the casing on the part B, and a chain, T, with adjustable
95 thumb-screws U, is attached to the lower part of the casing, and hooked onto one of the handles on the upper part, A, of the casing, for the purpose of regulating the adjustment of the stones.

A tube-passage with a feed-hopper is arranged in the center of the upper stone, C, for feeding the grain or middlings to the faces of the millstones, and an outlet for the ground material is formed in the side of the lower casing in the usual manner.

For all ordinary purposes the upper stone may be stationary and rigidly attached to the upper part of the casing, the lower stone only being arranged to be revolved; but for some very delicate materials which would spoil by heating it is desirable to make both stones rotate rapidly, but in the same direction and at different speeds, so as to give great centrifugal force with slow grinding action. In Fig. 2 we have shown our invention applied to a mill in which both upper and lower stones are arranged to rotate.

The construction of the upper part, B, and lower part, B', of the casing and the lower stone with its bed-plate and bearings is substantially the same as that already described with reference to Fig. 1, except that in Fig. 2 bearing rings or plates F F are substituted for the single plate F in Fig. 1, and the exhaust vanes and openings for the oil vapors are omitted.

The upper stone, C, instead of being rigidly secured to the upper half, B, of the casing, is secured to a hollow shaft fitting around the feed-tube for the grain. To the upper end of this shaft is secured the belt-pulley R and the annular bed-plate adapted to side bearings and an annular bearing in the oil-chamber, secured to or forming part of the upper portion of the upper half, B, of the casing, the several parts of the bearings being constructed like the corresponding parts of the bearings for the lower stone.

To insure the parallelism of the bearings on the upper and lower parts of the casing, we first cut the screw-thread on the inside of the upper part of the casing. We then fit the lower part of the casing in the lathe and cut the screw-thread on its outside; then, before removing the lower part from the lathe, we screw on the upper part and turn the bearing

on the two parts at one operation, thus insuring the parallelism of the two bearings, no matter which way the upper part may be screwed on the lower part of the casing.

We claim as our invention—

1. The combination of the revolving millstone having an annular bed-plate with a corresponding annular bearing-surface and an annular oil-cup adapted to supply oil to said bearing, substantially as set forth.

2. The combination of the revolving stone having an annular bed-plate with corresponding annular bearing-surface, side bearings, I, and annular oil-cup, substantially as described.

3. In a grinding-mill, the combination of the revolving millstone having an annular bed-plate adapted to an annular bearing with side bearings, I, shaft M, and the pulley having the rim for the belt in line, or nearly so, with said side bearings, all substantially as specified.

4. The outer casing of a grinding-mill made in two parts, each carrying one of the stones, and one part being adapted to be screwed onto the other, substantially as and for the purpose set forth.

5. The combination of the upper and lower parts of the casing, one adapted to screw on the other and each carrying one of the stones, with chain T, adjusting-screws U, and hook and handle.

6. The combination, in a millstone-bearing, of the oil-chamber with pulley S, provided with vanes Y, as and for the purpose set forth.

7. The combination of shaft M, annular bed-plate, and the oil-chamber having perforations z with pulley S, provided with vanes Y, as and for the purpose specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JAMES HIGGINBOTTOM.
EDWARD HUTCHINSON.

Witnesses:

CLARENCE H. WIMSHURST,
H. N. BEWLEY,

*Clerks with Messrs. Bateson & Co., Solicitors,
Liverpool.*