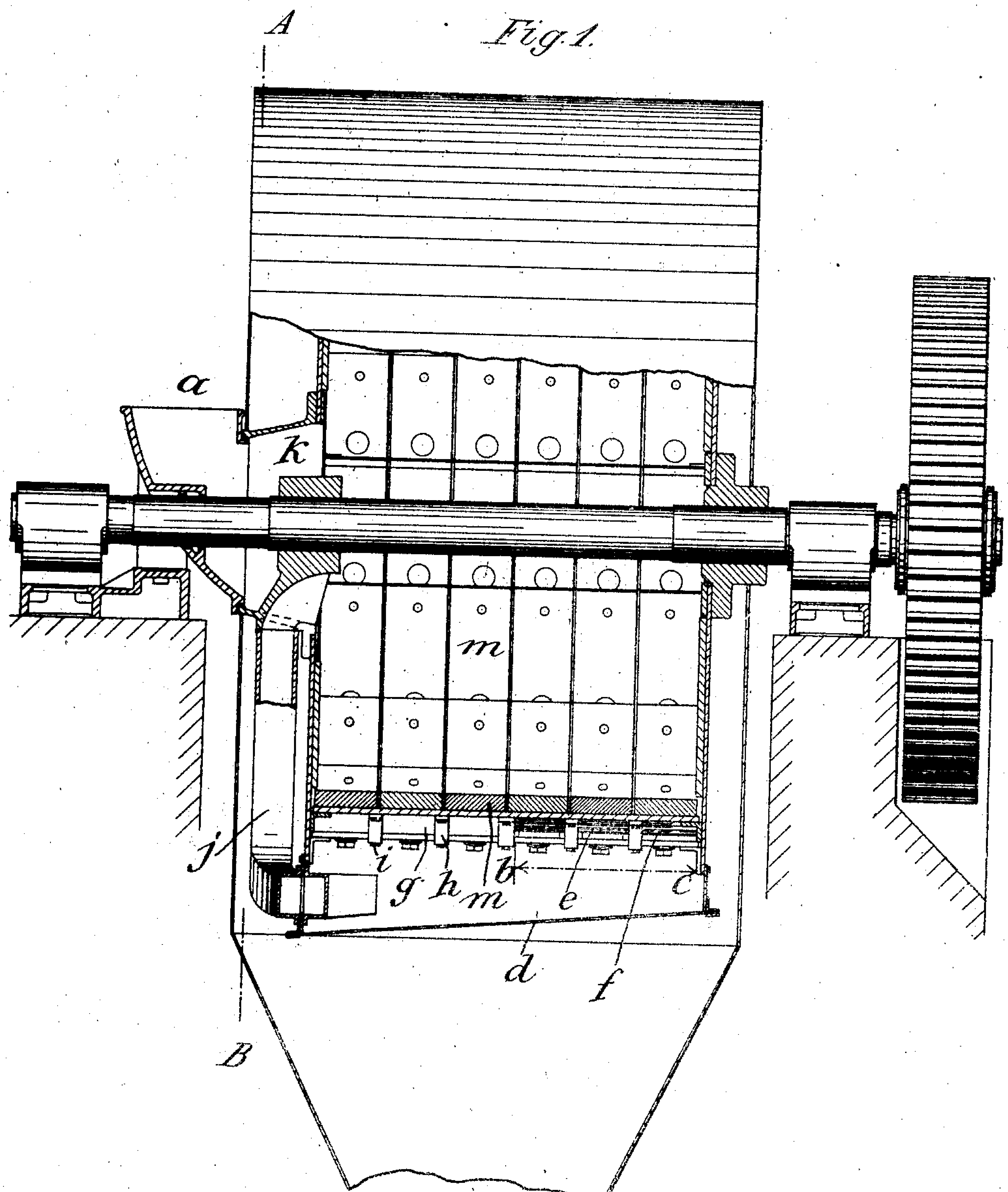
R. BENEKE.
BALL MILL.
APPLICATION FILED JULY 6, 1907.

908,834.

Patented Jan. 5, 1909.

3 SHEETS—SHEET 1.

Fig.1.



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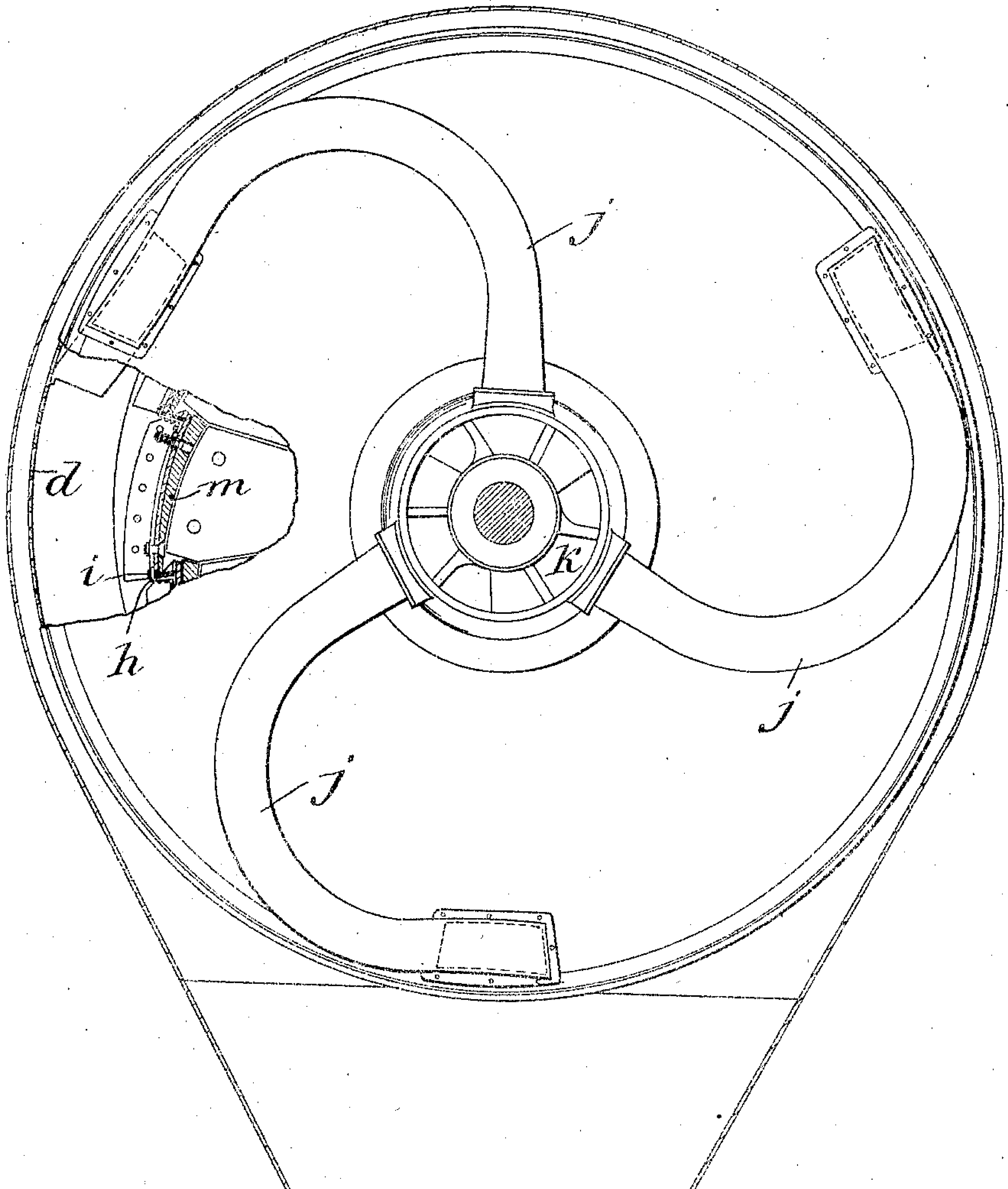
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 4

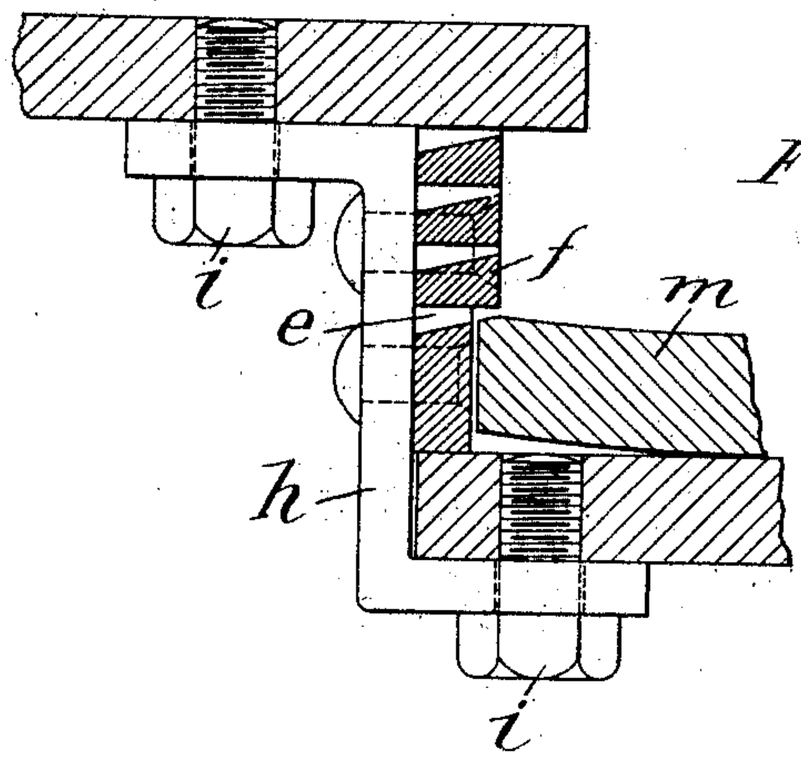
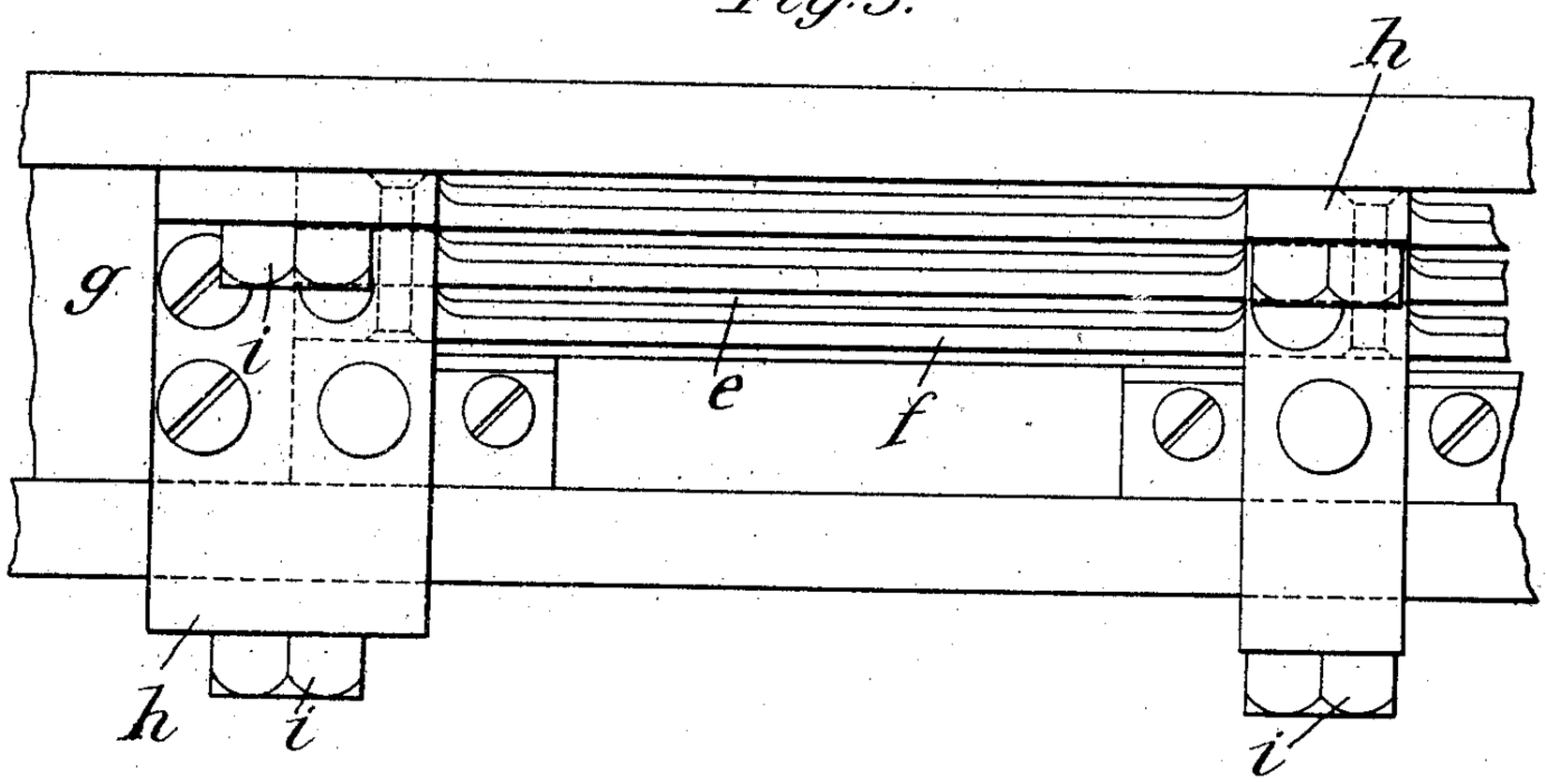


Fig. 3.



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UNITED STATES PATENT OFFICE.

RICHARD BENEKE, OF BROMBERG, GERMANY.

BALL-MILL.

No. 908,834. Specification of Letters Patent. Patented Jan. 5, 1909.

Application filed July 6, 1907. Serial No. 382,525.

To all whom it may concern:

Be it known that I, RICHARD BENEKE, director, a subject of the King of Prussia, residing at No. 6 Mittelstrasse, Bromberg, Germany, have invented new and useful Improvements in Ball-Mills, of which the following is a specification.

Ball grinding mills have already been constructed in which the material to be treated is fed in at one end of the grinding drum and is discharged only at the periphery of the opposite end—and therefore with closed drum—onto a screen or screens, along which the tailings travel back to the inlet end. The disadvantage of these mills is that already pulverized material has wholly unnecessarily to be conveyed through the grinding chamber to the outlet. Furthermore, this annular outlet must be of considerable width, to enable sufficient material to pass to the screen or screens; such relatively wide aperture, however, allows coarse material to fall through also, which has then to pass back over the screens before it can reënter the grinding chamber. Moreover, the balls, owing to their gradually getting reduced in size in the course of time, are liable to jam in the outlet and thus obstruct the passage. I overcome all these inconveniences by providing apertures between the grinding plates in what is itself a well-known manner, but I only furnish such apertures over a certain extent of the drum end opposite to that at which the inlet is located.

One form of construction of the new mill is illustrated in the accompanying drawings.

Figure 1 is a longitudinal section through the mill. Fig. 2 is a cross section on the line A—B of Fig. 1. Fig. 3 is a detail view showing a fragment of the drum with grids between the grinding plates, on a larger scale. Fig. 4 is a cross section through Fig. 3.

The material to be ground is charged into the mill through the feed hopper *a* and drum nave *k*. The pulverized product can leave the drum already at the point *b* of the length *b*—*c* (Fig. 1), falling upon the conical screen *d*. The discharge apertures *e* extending over the length *b*—*c* are furnished in ample number, but are relatively small, so that only well triturated material can pass through, while coarser matter remains in the drum until so far reduced by the balls that it can drop through the apertures *e*. The exact position of the point *b* will depend upon the nature of the material being ground.

The apertures *e* in the particular drum here shown by way of example are located between bars *f* secured between the grinding plates *m*. The bars are of such crosss section (Fig. 4) that the interstitial spaces *e* are narrower on the inner than on the outer side, whereby the exit of material is facilitated. The interstices *e* can be closed by plates *g* (Figs. 1 and 3), secured in any suitable manner, such as by brackets *h* and screws *i* to the ends of the drum plates.

The mill illustrated is of the return-feed type, the tailings remaining on the conical screen *d* being returned in well-known manner, during rotation of the drum, through the hollow arms *j* and nave *k* into the grinding chamber for further reduction. The invention can, however, be equally well applied to mills without any return-feed, that is, without surrounding screens.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

In a ball mill, a drum provided with an inlet at one end, grinding plates, bars between said plates having conical interstitial spaces, brackets, plates for closing any desired number of spaces, and means securing said brackets to the ends of the drum plates.

In witness whereof I have hereunto signed my name this 21st day of June 1907, in the presence of two subscribing witnesses.

RICHARD BENEKE.

Witnesses:
WOLDEMAR HAUPT,
HENRY HASPER.