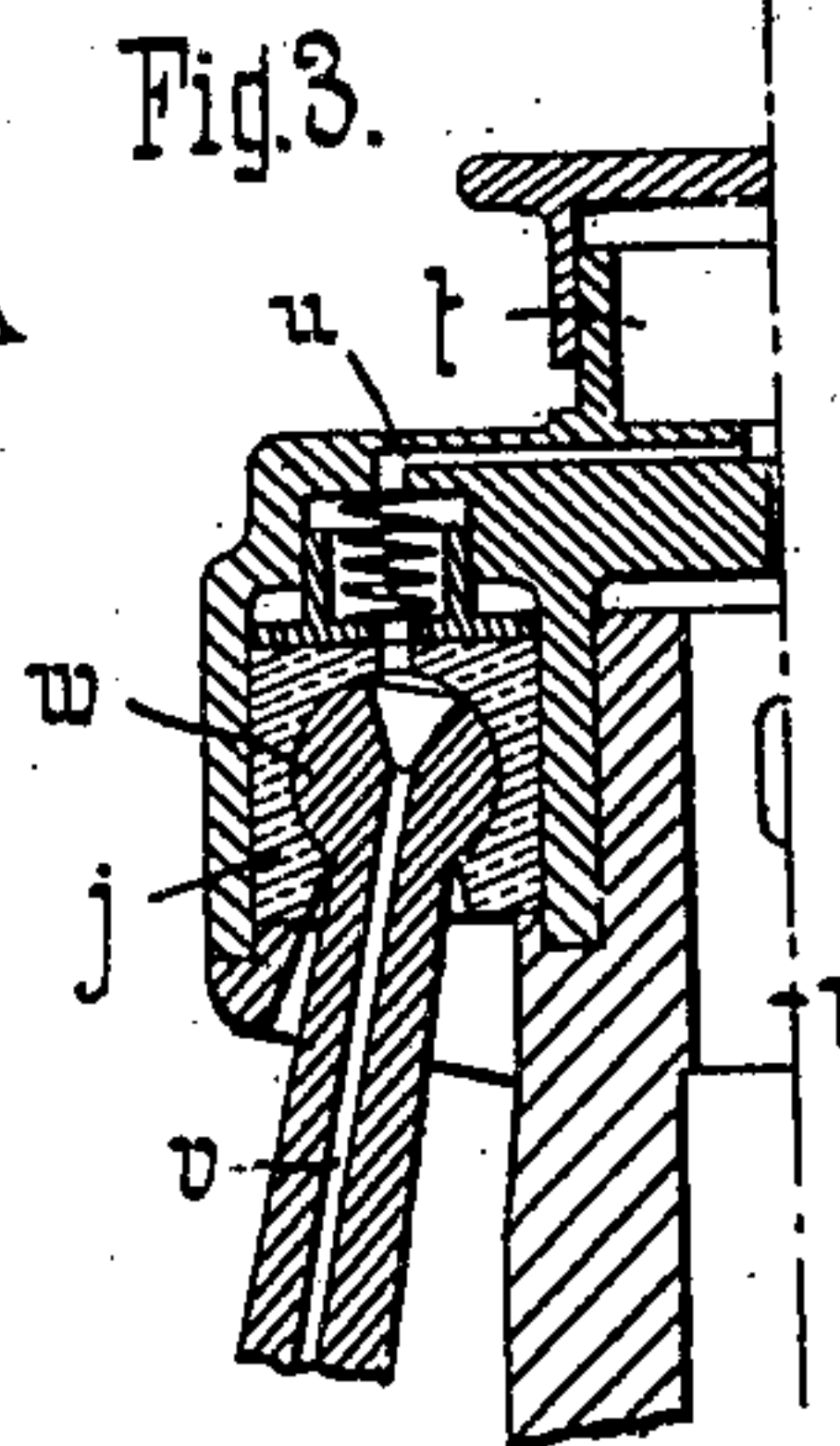
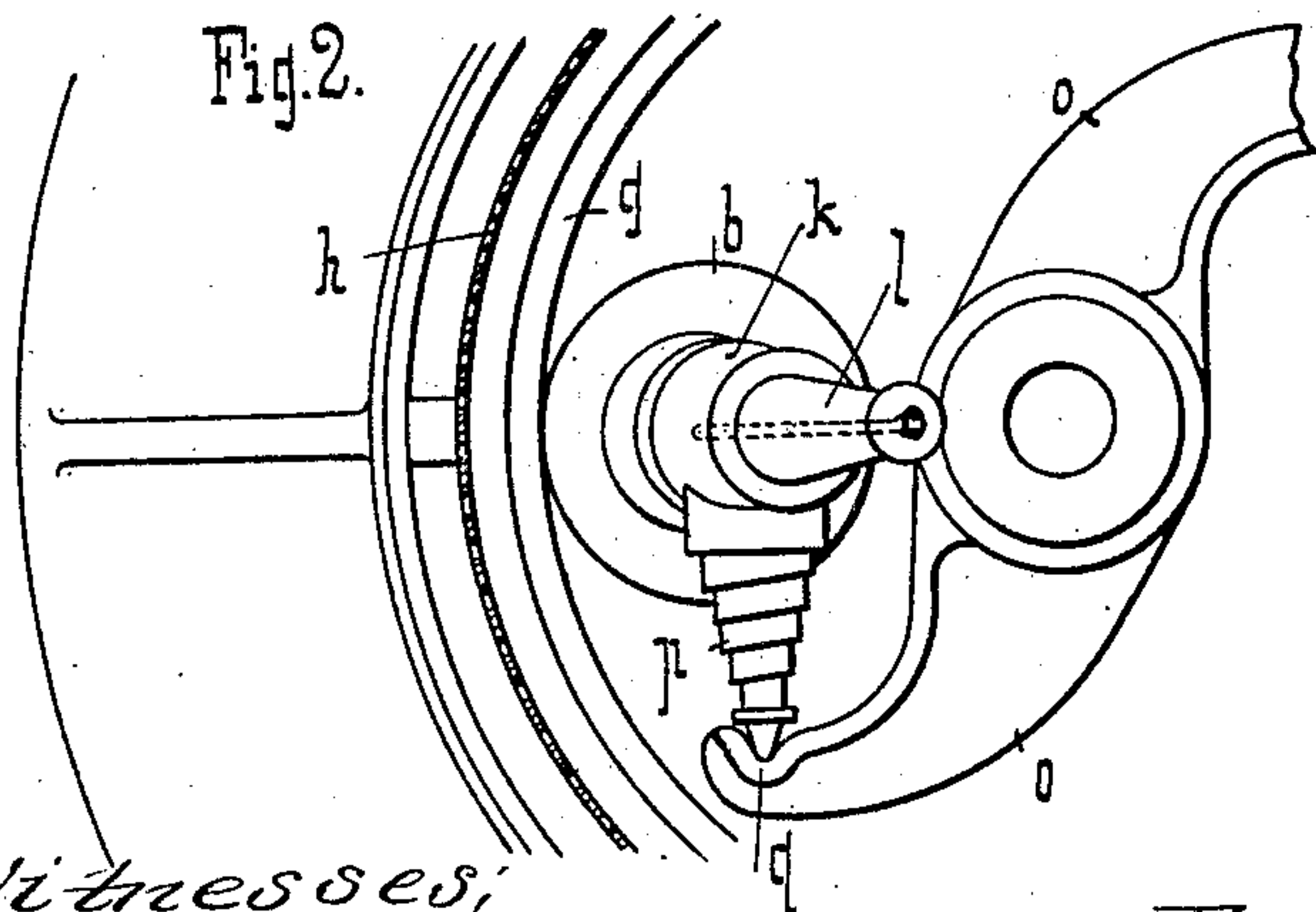
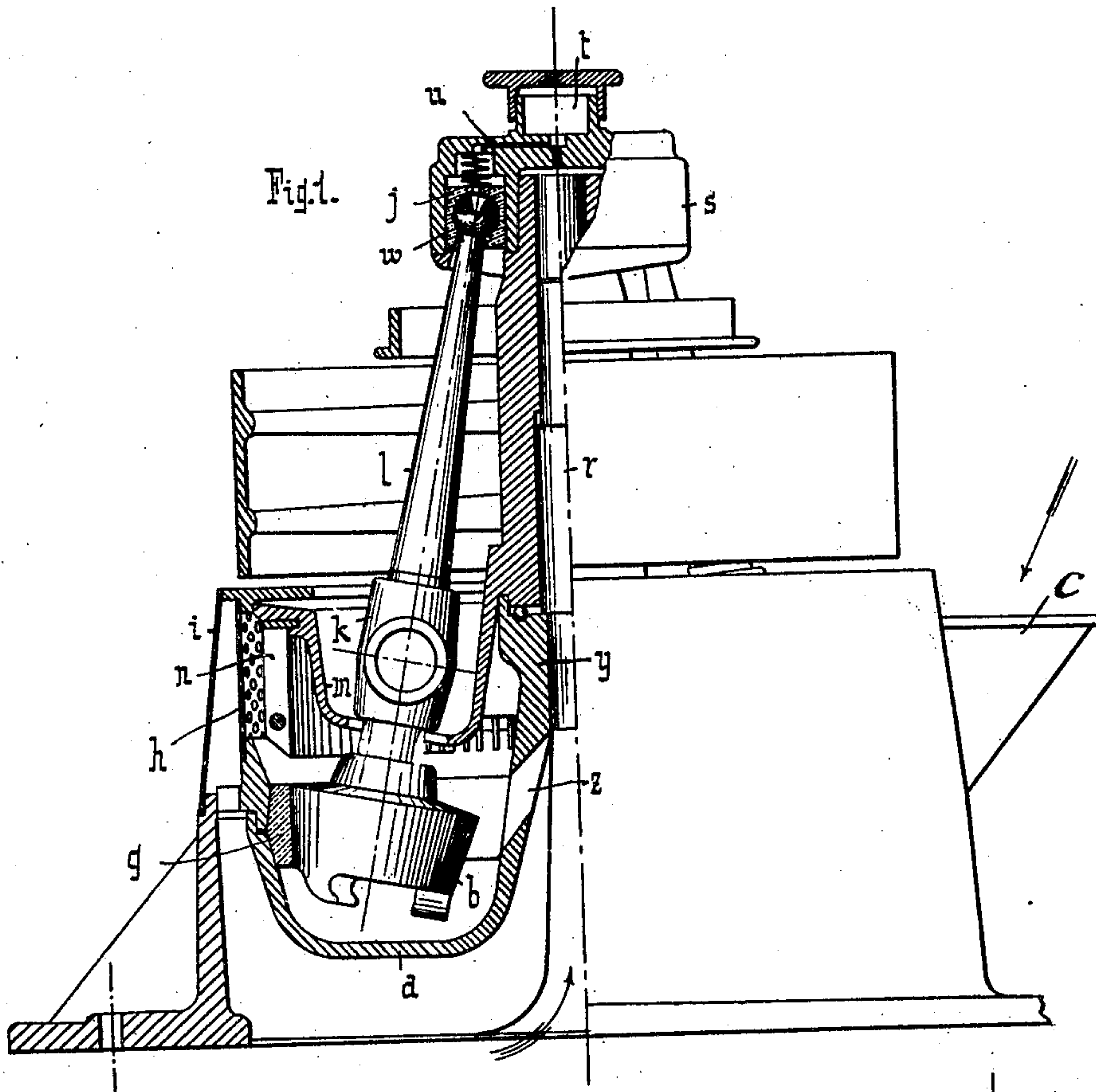


No. 871,558.

PATENTED NOV. 19, 1907.

E. BARTHELMESS.
RING AND ROLLER MILL.
APPLICATION FILED JUNE 26, 1905.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 4.

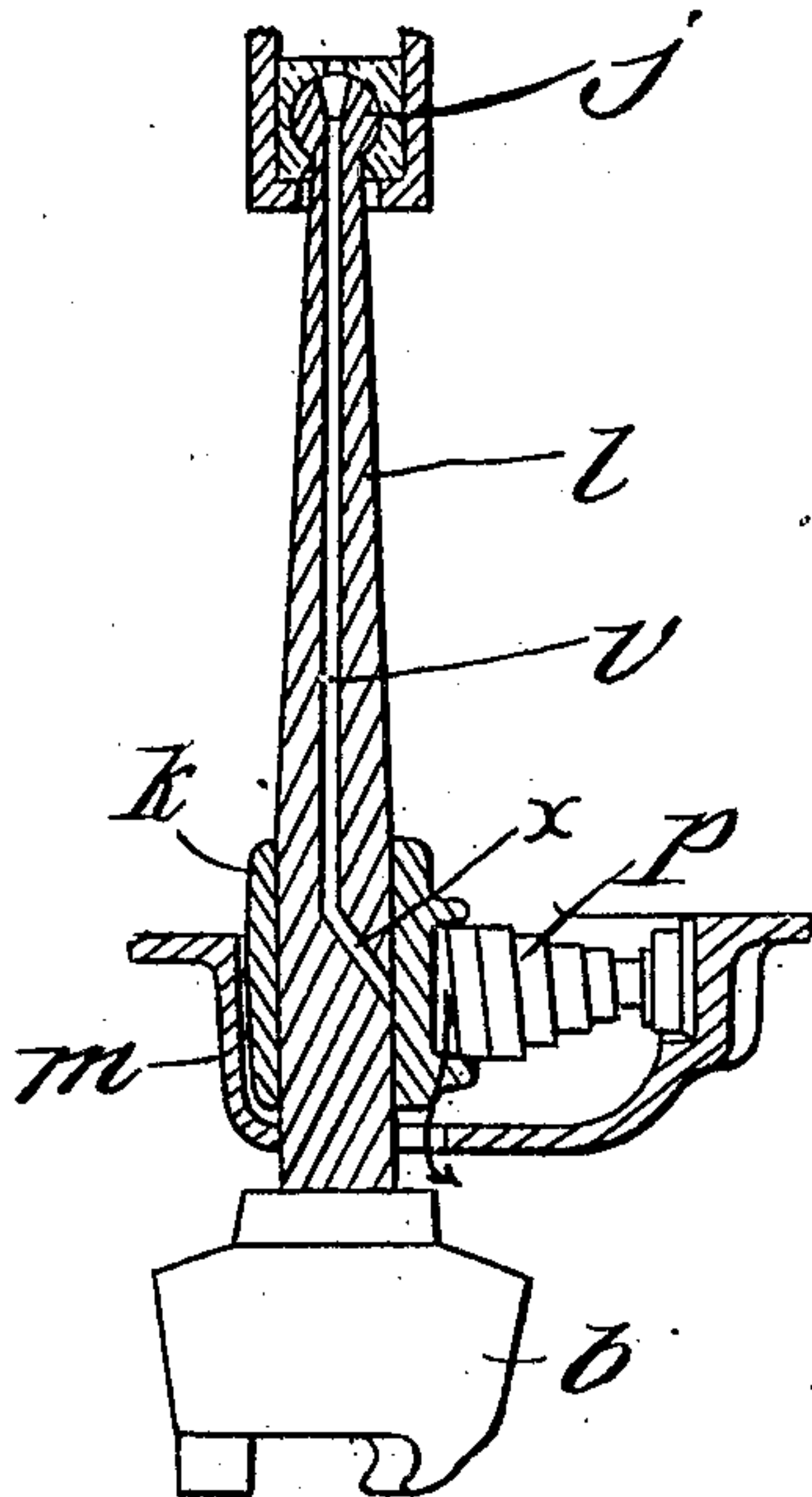
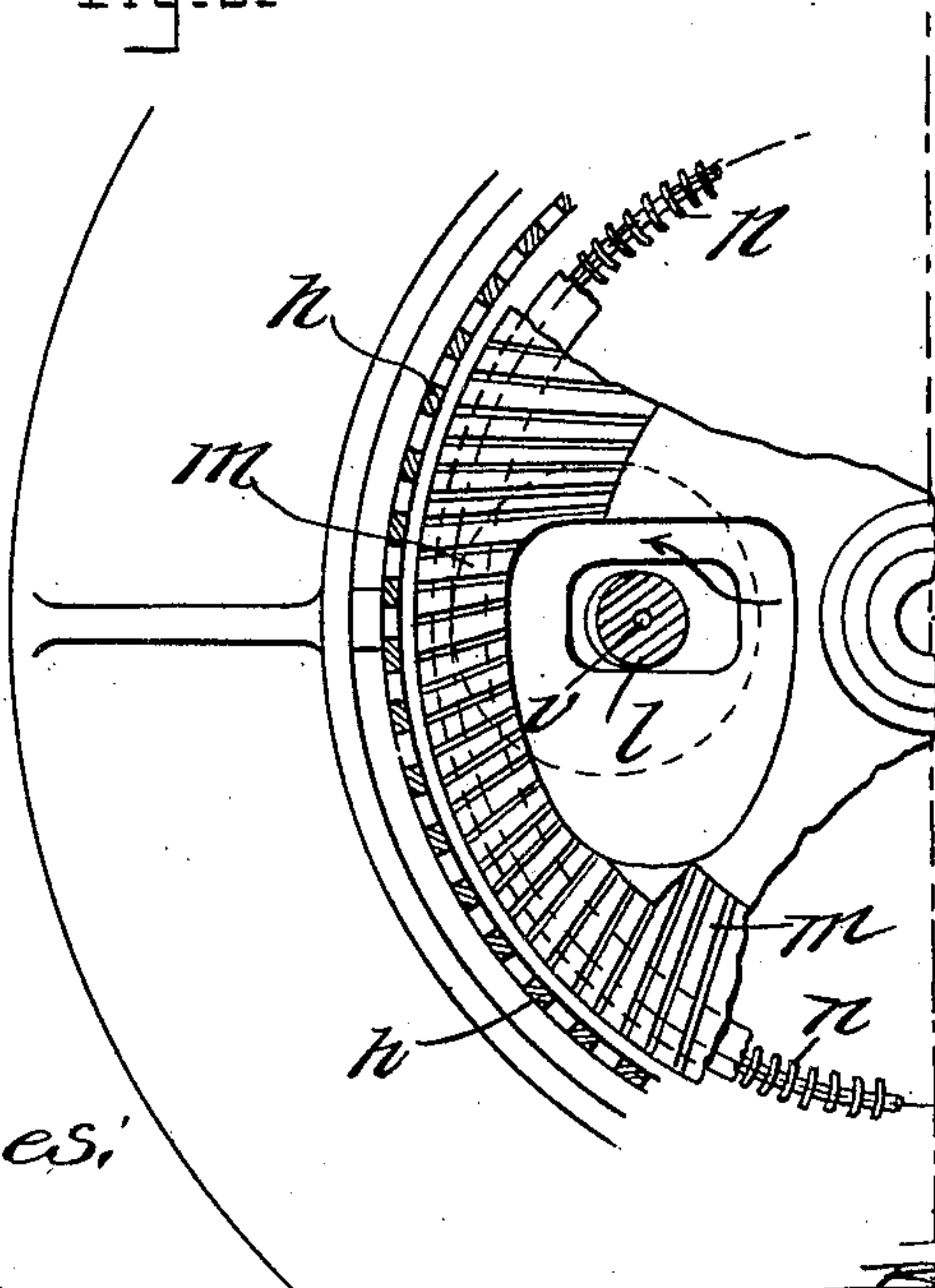


Fig. 5.



Witnesses:

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UNITED STATES PATENT OFFICE.

EMIL BARTHELMESS, OF NEUSS, GERMANY.

RING-AND-ROLLER MILL.

No. 871,558.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed June 26, 1905. Serial No. 267,116.

To all whom it may concern:

Be it known that I, EMIL BARTHELMESS, a subject of the King of Prussia, residing at Neuss-on-the-Rhine, in the Empire of Germany, have invented certain new and useful Improvements in Ring-and-Roller Mills, of which the following is a specification.

This invention relates to ring-and-roller or pendulum-mills for the grinding of materials by the dry method, in which the grinding effect is produced by grinding bodies or rollers which move in a circle in a horizontal plane and which are pressed by centrifugal force against the inside of an annular grinding surface. In dry grinding, the ground material is discharged through sieves or gratings.

In order to obviate the great pressure on the bearings common to pendulum-mills and the great wear which is caused by the penetration of dust from the grinding vessel into the bearings, the cover which serves as a partition between the grinding chamber and the bearings and which rotates with the pendulums, has its periphery so constructed as to form a fan, which draws fresh air in through the openings for the shafts of the pendulums, and the top of the cover, through which the pendulums extend, projects downwardly nearly as far as the grinding bodies or rollers. Since the dustproof openings for the pendulum shafts are at the lowermost parts of the said extensions, the lower bearings for the pendulums can be arranged very near to the grinding bodies or rollers, without fear of their becoming dusty, in order to permit the machine to run smoothly and at the same time to prevent the pendulums from becoming bent or strained.

In order that all the bearings of the pendulum mill, including those which rotate and oscillate at the same time, may simultaneously be provided with lubricant without the use of sensitive complicated piping, etc., axial bores are made in the pendulum shafts, so that the lubricant (grease or oil) is supplied by centrifugal force or artificial pressure to the several bearings from a lubricator arranged in the center of the mill through completely closed passages or conduits.

In order that the passage for the lubricant may remain closed in all positions of the pendulum-shafts, the upper ends of the latter are substantially spherical in shape and are mounted in fixed spherical cups or sockets.

In order that the grinding rollers may be free to run on ahead of their points of suspension and thereby take up an oblique position with respect to the annular grinding surface, and the downward pressure on the supporting bearings be partly relieved, the pendulum-shafts together with the grinding bodies or rollers are arranged obliquely and are held in this position by compression springs. By this arrangement, the buffer-springs between the lower pendulum bearings and the cross piece which carries them round are arranged to turn upon knife-edges in such a manner that the buffer-springs are carried by the knife-edges while the buffer-springs themselves carry the bearings.

Referring to the accompanying drawings wherein I have illustrated, by way of example, the preferred embodiment of my invention and in which like reference characters denote like parts; Figure 1 is a view of a pendulum-mill, embodying my invention, and showing the same partly in elevation and partly in vertical section. Fig. 2 is a detail view illustrating the cross arm which serves to impart movement to the pendulum, as well as the elastic connection between the cross-piece and the lower pendulum-bearing. Fig. 3 is a vertical section, upon an enlarged scale, of the upper bearing of the pendulum-shaft. Fig. 4 is a view partly in elevation and partly in vertical section showing the axial bore in one of the pendulums which forms a conduit for the lubricant as well as the elastic connection with the cross-piece shown in Fig. 2 and Fig. 5 is a partial horizontal section of the mill.

In Fig. 1, *a* designates the grinding vessel in which grinding bodies or rollers *b, b*, preferably two in number, are arranged to rotate. *c* is the inlet for the material to be ground, *g* the grinding ring, *h* a fine sieve arranged above the said ring, and *i* a casing surrounding the said sieve.

j and *k* are the upper and lower bearings for the pendulum shafts *l, l* carrying the grinding bodies or rollers.

m is the cover which shuts off the grinding chamber and which is provided with downward extensions. The outer casing or wall of this cover is composed of narrow fan-blades *n*, shown in detail in Fig. 5.

z, z are openings in the central column *y* for the entrance of air.

Mounted upon the central shaft *r* and arranged to rotate with the latter is a cross-

arm *o* provided near its outer ends with depressions, each of which is adapted to receive a knife edge *q*, carried by a buffer-spring *p*. The buffer-spring *p* has its opposite end connected to one of the lower bearings *k* of a pendulum-shaft. The buffer-springs *p* thus permit of an elastic action between the cross-head *o* and the bearing *k*.

The cover *m* not only exerts no pressure on the bearings of the pendulum, and serves as a dustproof support, but presents the additional advantage that the fan, formed in its periphery, outside the bearings draws greater quantities of air through the mill and thereby accelerates the discharge of the finely ground material.

On the bearing-head *s* surrounding the upper end of the central shaft *r* of the mill is arranged a lubricator *t*, from which a central passage supplies the lubricant to the bearing of the main shaft *r*, while passages *u* conduct the lubricant to the upper bearings *j*, *j*. The pendulum-shafts *l*, *l* are provided with axial bores or passages *v*, *v* which, in the spherical ends or journals *w*, *w* of the said pendulum-shafts, are enlarged to form funnels so that, even in the outermost positions of the lower ends of the pendulums, the connection of the passages *u* with the passages *v* is not interrupted. From the passages *v*, transverse passages *x* extend into the bearings *k*, *k*, through which passages the lubricant is supplied to the bearing-sleeves. In this lubricating device, either stiff grease or a thin liquid lubricant (oil) can be employed, since the passages for the lubricant (although the positions of their separate parts among themselves and also relatively to the mill, are continually changing) are completely closed and allow the lubricant to pass out only at the places where it is required for use. The lubricant, which under ordinary conditions is supplied by the action of the centrifugal force to the places where it is to be used, may also be supplied thereto under pressure and by reason of the central arrangement of the lubricator, the vessel containing the lubricant is always accessible during the operation of the mill.

If the mill is to be used for wet grinding, a closed casing is provided instead of the sieve surrounding the grinding chamber,

and the grinding vessel is filled with water. This construction has a great advantage in that it permits not only grinding and washing, but also permits of the simultaneous separation of the parts of the material which can and which cannot be ground into a slime or mud.

According to the nature of the material to be treated, parts of the apparatus can be dispensed with. For example, when the material can be broken up sufficiently by the stirring action of the grinding bodies alone without special grinding action, simple stirrers may be substituted for the grinding rollers *b*, *b*.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a ring-and-roller mill, a driving column, a cover mounted on said column and having depressions therein, fan-blades mounted substantially at the periphery of said cover and forming a wall, roller- or pendulum-shafts extending through slots in the depressed parts of said cover, bearings for said shafts arranged directly above said cover and in said depressions, and grinding bodies or rollers mounted on said shafts directly below said cover.

2. In a ring-and-roller mill, a driving column, a cover mounted on said column and having depressions therein, roller- or pendulum-shafts extending through slots in the depressed parts of said cover, bearings for said shafts arranged directly above said cover and in said depressions, and grinding bodies or rollers mounted on said shafts directly below said cover.

3. In a ring-and-roller mill, a bearing-head, a driving-column carrying said bearing-head, roller-shafts having upper spherical ends working in said bearing-head, lower bearings for said shafts, a cross-piece on said driving column, knife-edges engaging said cross-piece and buffer-springs between said lower bearings and said cross-piece.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

EMIL BARTHELMESS.

Witnesses:

PETER LIEBER,
ERNEST ENDRÉ.