

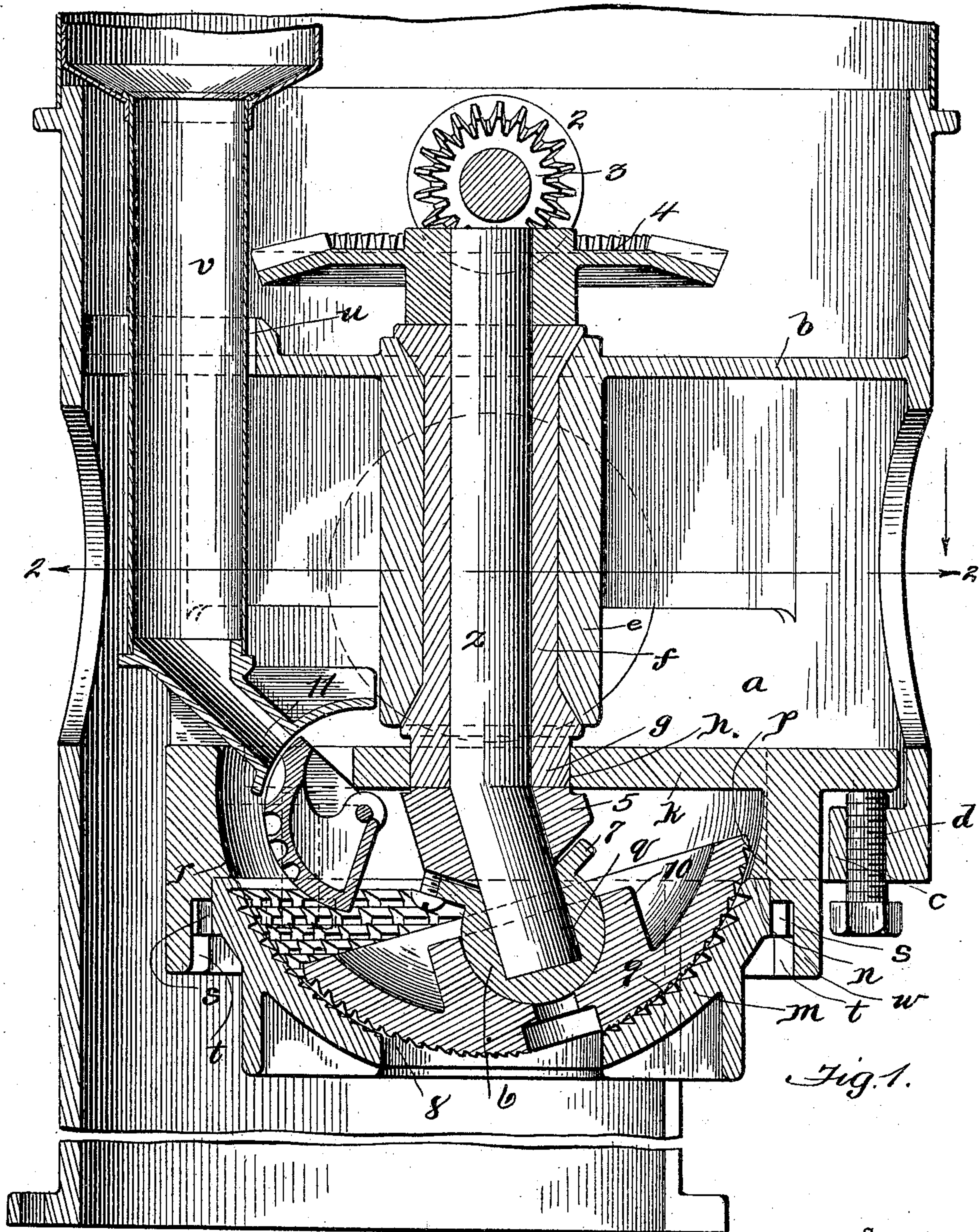
No. 820,193.

PATENTED MAY 8, 1906.

H. A. HIGBEE.  
GRINDING MACHINE.

APPLICATION FILED JULY 8, 1904.

3 SHEETS—SHEET 1.



Inventor.

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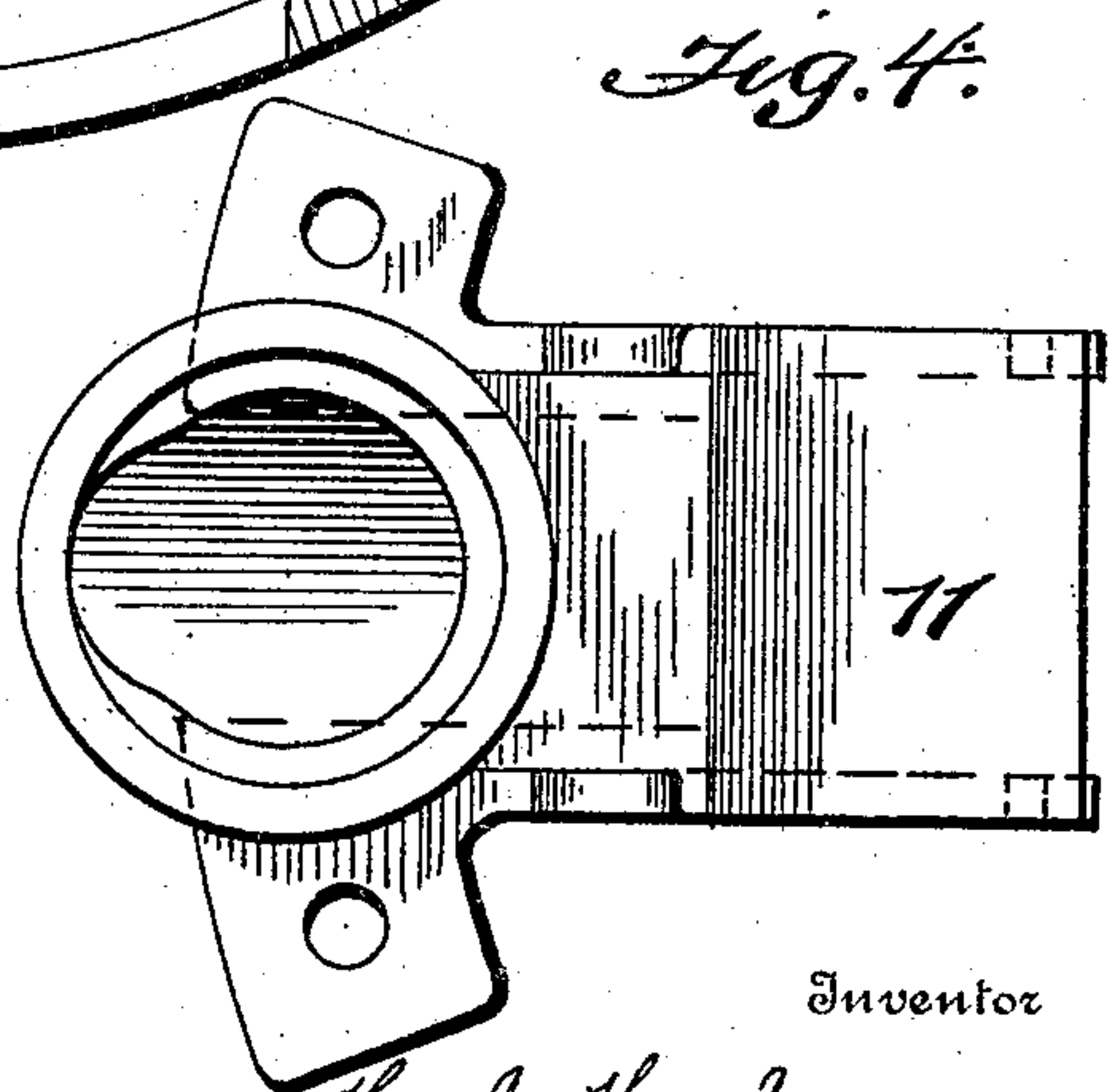
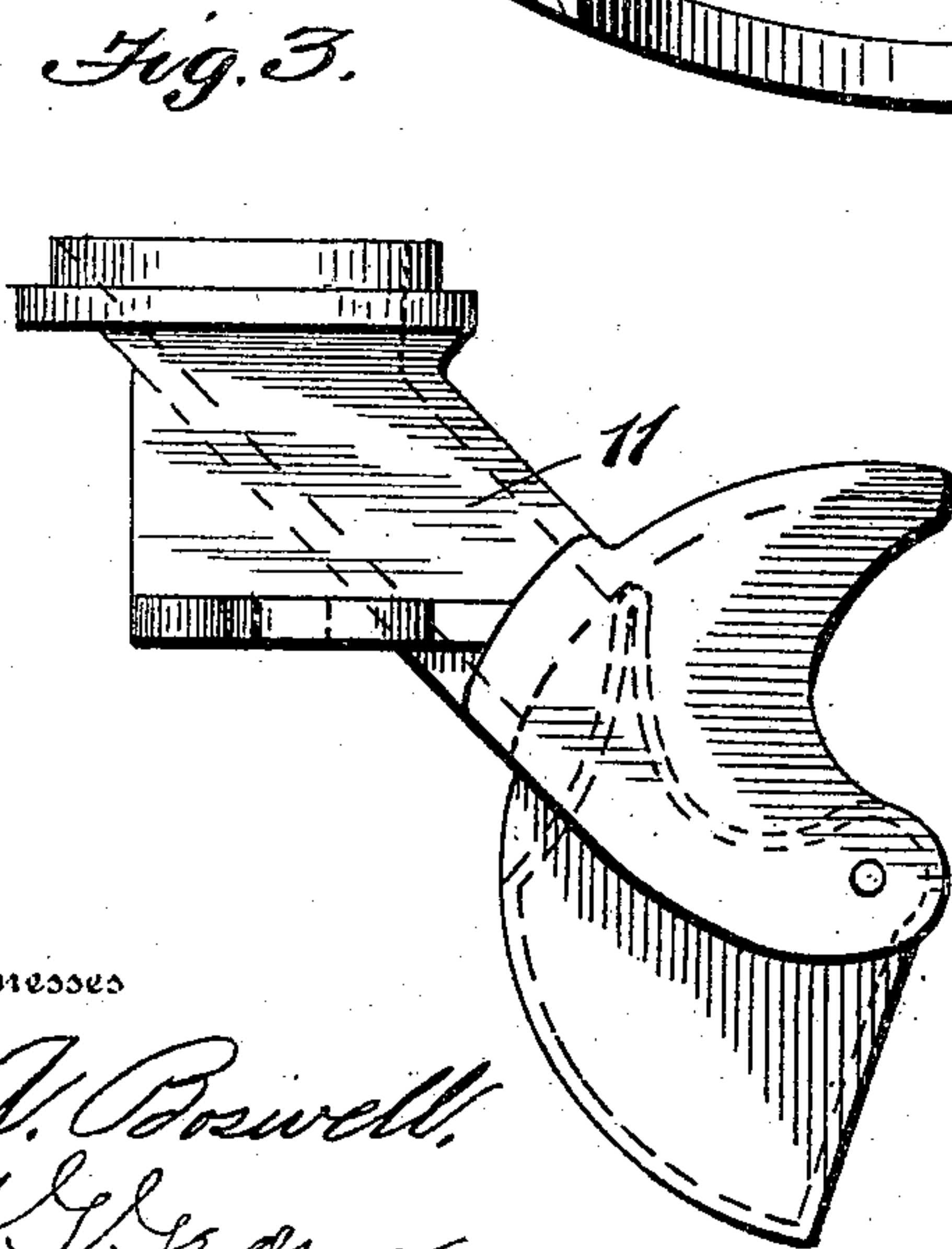
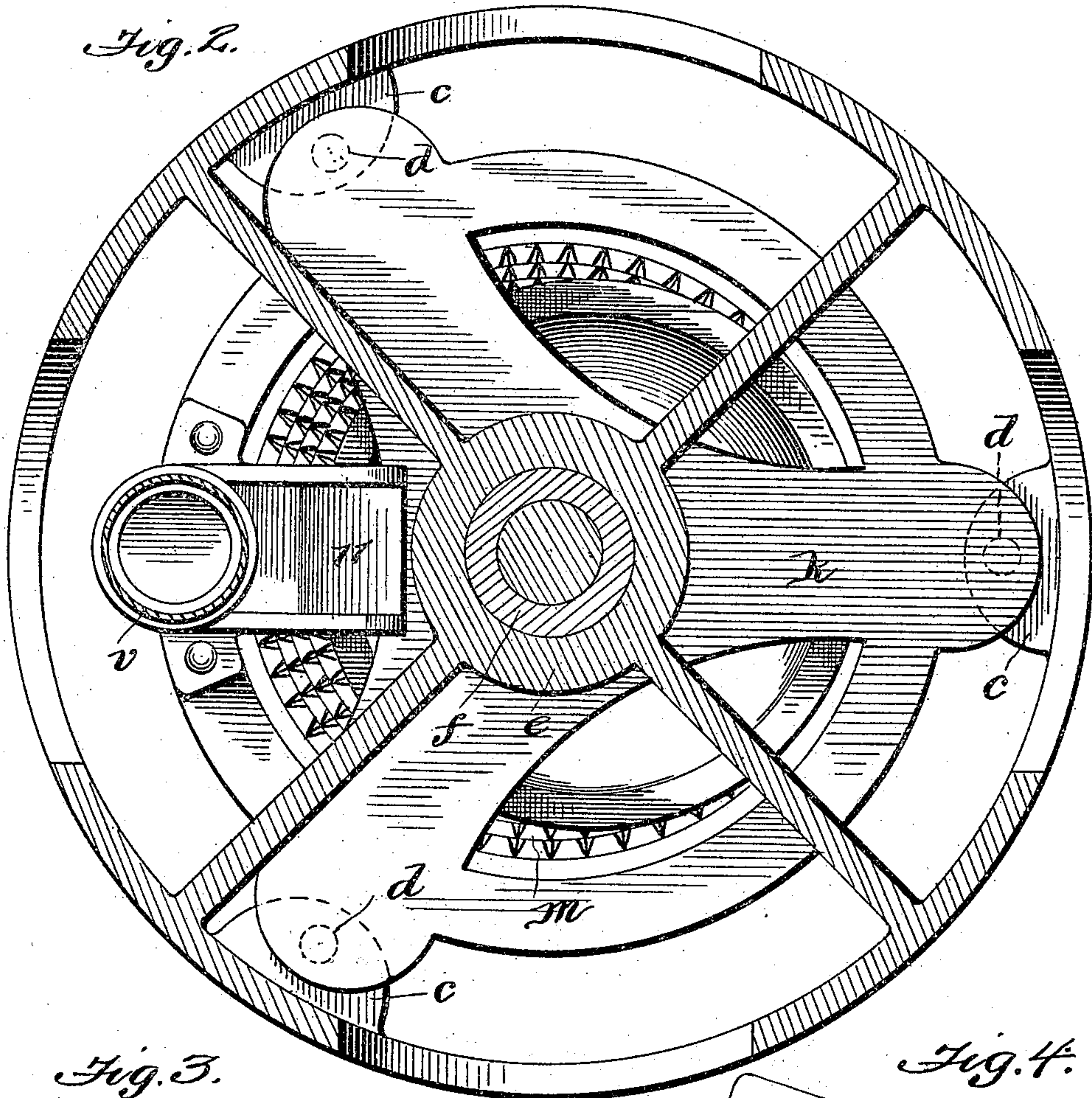
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3 SHEETS—SHEET 2.



Witnesses

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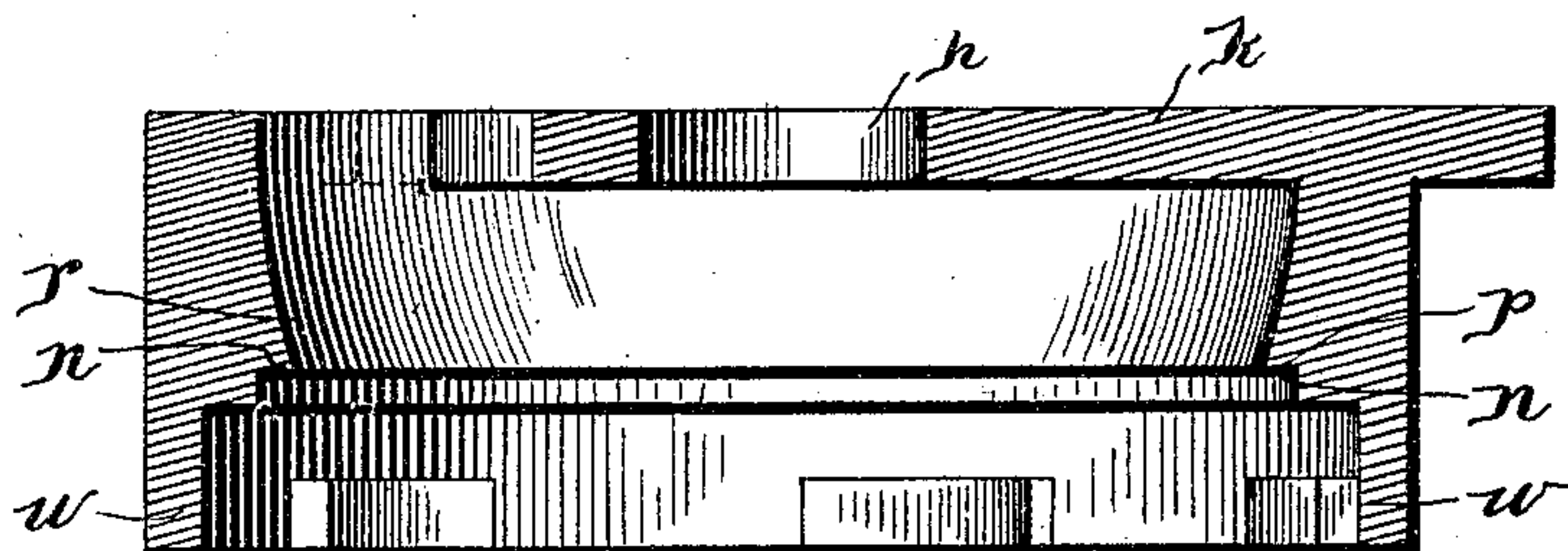
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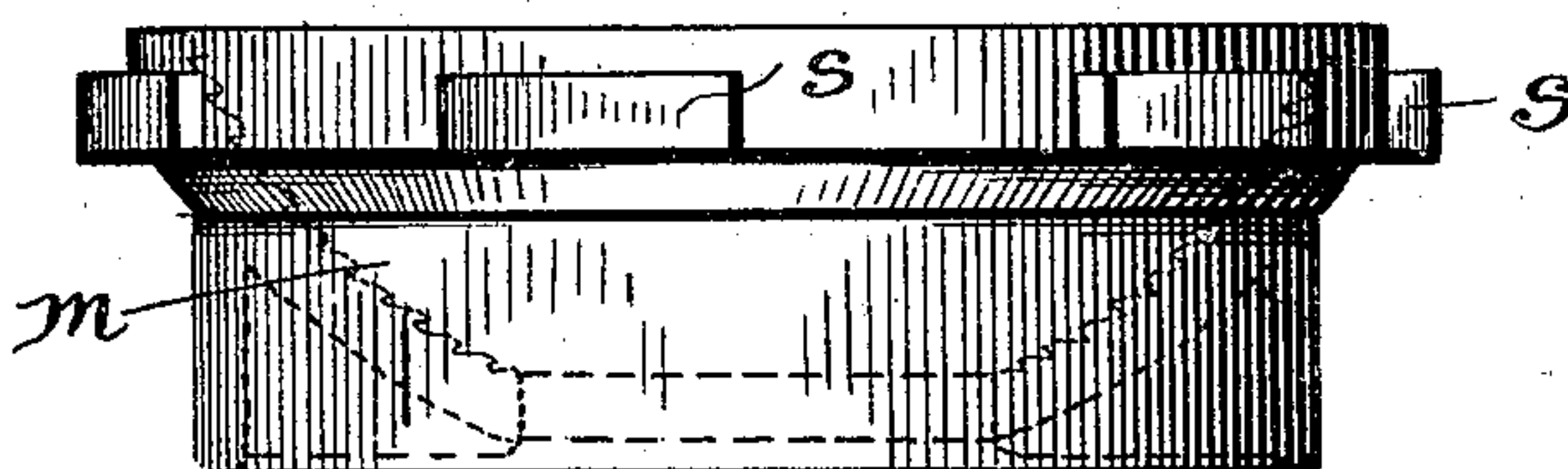
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3 SHEETS—SHEET 3.

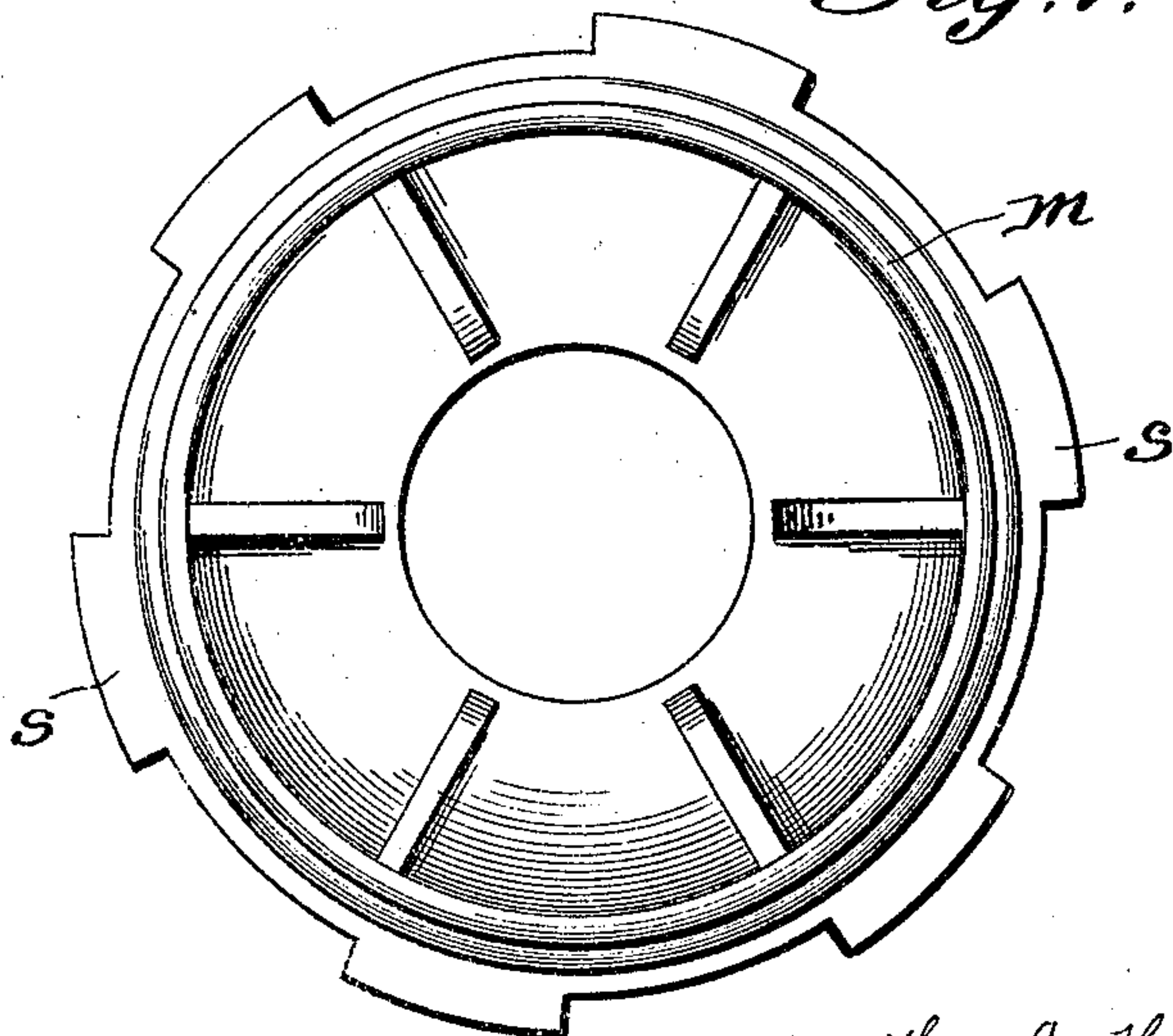
*Fig. 5.*



*Fig. 6.*



*Fig. 7.*



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# UNITED STATES PATENT OFFICE.

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## GRINDING-MACHINE.

No. 820,193.

Specification of Letters Patent.

Patented May 8, 1906.

Application filed July 8, 1904. Serial No. 215,781.

*To all whom it may concern:*

Be it known that I, HARRIET A. HIGBEE, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have made a certain new and useful Invention in Grinding-Machines; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to letters and figures of reference marked thereon, which form a part of this specification.

Figure 1 is a vertical central section. Fig. 2 is a horizontal section. Fig. 3 is a detail of the feed, side view. Fig. 4 is a detail of the feed, top view. Fig. 5 is a sectional view of upper bowl portion. Fig. 6 is a side view of lower grinding-plate. Fig. 7 is a bottom view of the same.

The invention has relation to grinding-machines chiefly designed for the purpose of reducing grain; and the invention consists in the novel construction and combinations of parts, as hereinafter set forth.

In the accompanying drawings, illustrating the invention, the letter *a* designates the frame of the machine, having at or near its upper portion a diaphragm *b* and lower down, usually near its middle portion, supporting-lugs *c*, which are provided with threaded perforations for the reception of the adjustable screw-bearings *d*.

The diaphragm *b* is provided with a central depending cylindrical barrel *e*, in which is located the vertical bearing *f*, usually of Babbitt metal, the lower end *g* of which projects downward to receive the central opening *h* of the spider-form top *k* of the upper portion of the bowl, which is provided with the lower or concave grinding-plate *m*. This portion *p* of the bowl is provided with an annular shoulder *n* at the bottom of its concave wall *r*, said shoulder facing downward to engage the rim-face of the concave grinding-plate *m*, which forms the lower portion of the bowl. This grinding-plate is provided with exterior lugs *s*, designed to engage the interior lugs *t* of the bowl-flange *w*, the lugs of both plate and flange having intervals between them of sufficient extent to permit the grinding-plate to be removed downward or

through the open bottom of the main frame when the lugs are disengaged. The upper portion of the bowl, which rests on the screw-bearings *d*, is also designed to be removable in a similar manner. The diaphragm *b* is provided with an opening *u* near its periphery for the introduction of a feed-tube *v*. A bearing 2 is provided in the frame-wall for the journal of the pinion 3, which engages the wheel 4, which is secured to the upper end of the bent shaft *z*, the vertical portion of which rotates in the vertical central bearing *f*. The lower end of the shaft *z* is inclined to the prolongation of the axis of the vertical portion at an angle of about fifteen degrees, and it is provided at its junction with said vertical portion with a collar or annular enlargement 5, the upper face of which is level, while its lower face is beveled, the cone of bevel having its axis coincident with that of the inclined end *q* of the shaft *z*. On the inclined shaft end plays loosely the bearing-socket 6, having at its upper end an exterior rim-flange 7, having outward and upward inclination corresponding to the bevel of the cone-face of the enlargement 5, which is provided usually with a keeper-screw, which serves to prevent the socket from falling off the inclined shaft end when the grinding-plates are removed. The lower or concave grinding-plate has a central opening (indicated at 8) which provides for the discharge, the dress of this plate being from coarser peripheral teeth to finer teeth around this central opening. The upper or convex grinding-plate, having a corresponding dress, is indicated at 9. This plate is provided with a hub portion 10, the bearing of which receives the socket 6 and loosely engages the same. This joint is spherical. In this construction, therefore, the lower grinding-plate remains stationary, but is adjustable to regulate the fineness of the grinding. The bent shaft rotates, carrying its inclined lower end around in a sweeping manner, so that it performs a revolution around the vertical axis. A similar motion of the upper or convex grinding-plate is effected, except that this plate is not positively rotated. Such rotation as is set up in this plate is automatic, being effected mainly by the grinding stress.

The feed-tube *v* is provided with a suitable hopper at its upper end and by its lower end



is connected to the rim-flange of the terminal spout 11, which is connected to the upper portion of the bowl near its wall.

In this mill there is motion of reciprocation 5 or translation as well as circular motion of the convex grinding-plate, so that in connection with the concave grinding-plate there is a rubbing or rolling as well as a cutting action. As the teeth of the plates are 10 dressed to have their more abrupt faces toward the center, a strong center feed is established, and as the finer teeth of the convex plate pass intermittently over the central discharge-opening of the lower plate they 15 are relieved of their charge very freely and choking is avoided. The feed is regulated by an adjustable gate. This gate is of sector form pivoted opposite the concave mouth of the feed-tube and is provided with passages 20 of different size to permit different quantities of the grain to pass in accordance with the size of the passage adjusted to the mouth of said tube. This gate is shown of sector form, having passage-pockets of different 25 size. It is attached to a shaft, which is designed to have an ordinary adjusting-arm in connection with a ratchet (not shown) for fixing the adjustment.

Having described this invention, what I 30 claim, and desire to secure by Letters Patent, is—

1. In a grinding-machine, the combination 35 with an adjustable spherically-concave grinding-plate having a center discharge-opening, of the upper spherically-convex grinding-plate, the vertical bearing of the frame, the bent shaft, its gear, and the spherical joint-

socket loosely engaging said bent shaft, substantially as specified.

2. In a grinding-machine, the combination 40 with a frame and an adjustable spherically-concave lower grinding-plate attached thereto, of a bent shaft, and a spherically-convex upper grinding-plate loosely connected to said bent shaft by a spherical joint-socket, 45 substantially as specified.

3. In a grinding-machine, the combination 45 with a frame and a detachable and adjustable spherically-concave lower grinding-plate, of a bent shaft, and a spherically-convex upper grinding-plate loosely connected to the 50 lower oblique portion of said bent shaft, substantially as specified.

4. In a grinding-machine, the combination 55 with an open-bottom frame, and a detachable lower concave grinding-plate, in connection therewith of a convex upper grinding-plate, the flanged spherical socket and the inclined conical collar, substantially as specified.

5. A grinding-machine, consisting of the 60 open-bottom frame bent shaft, and gearing, the detachable and adjustable spherically-concave center discharge lower grinding-plate, the spherically-convex upper grinding-plate, the peripheral feed, and the adjustable 65 feed-gate, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HARRIET A. HIGBEE.

Witnesses:

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