

No. 675,264.

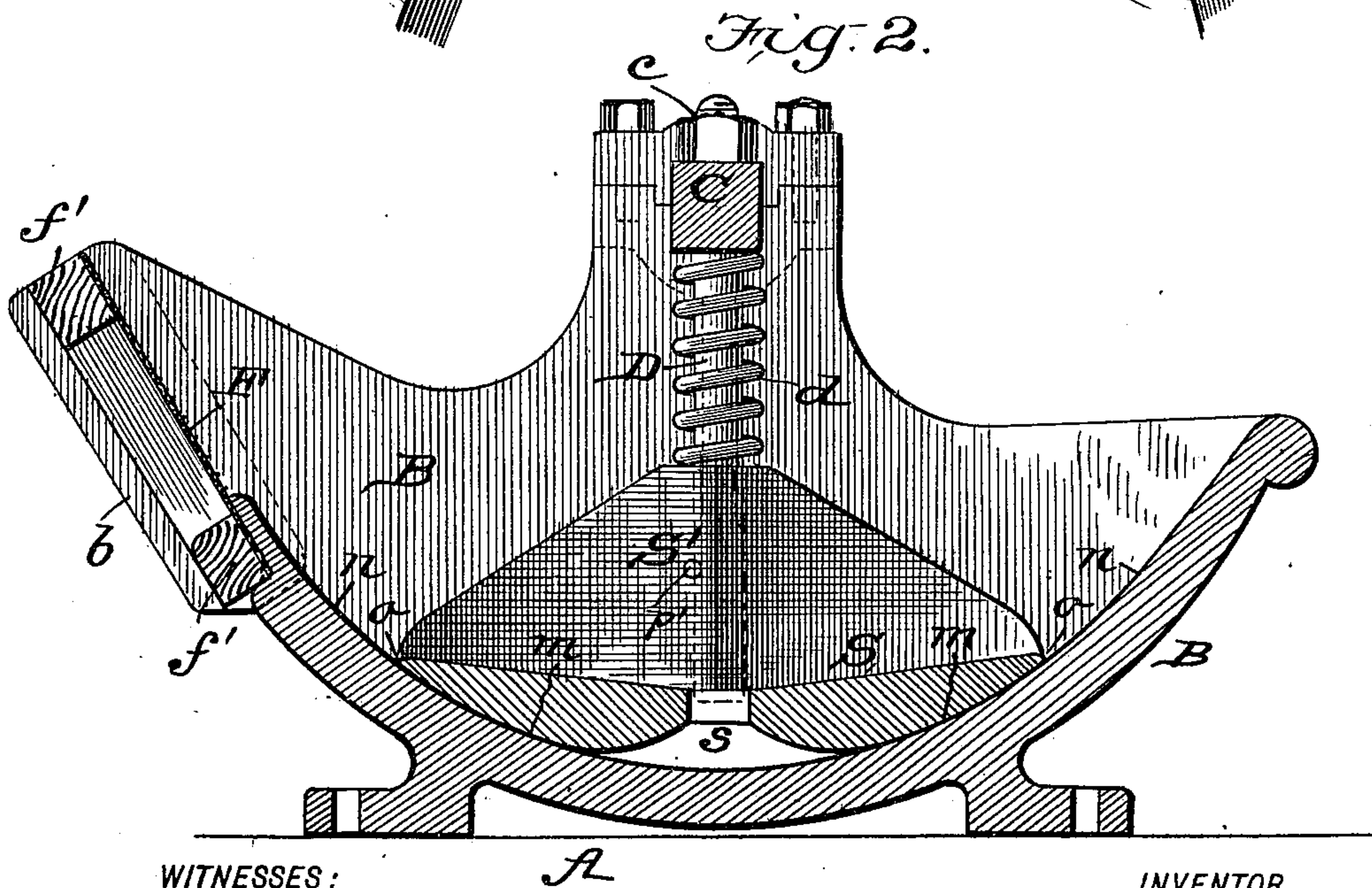
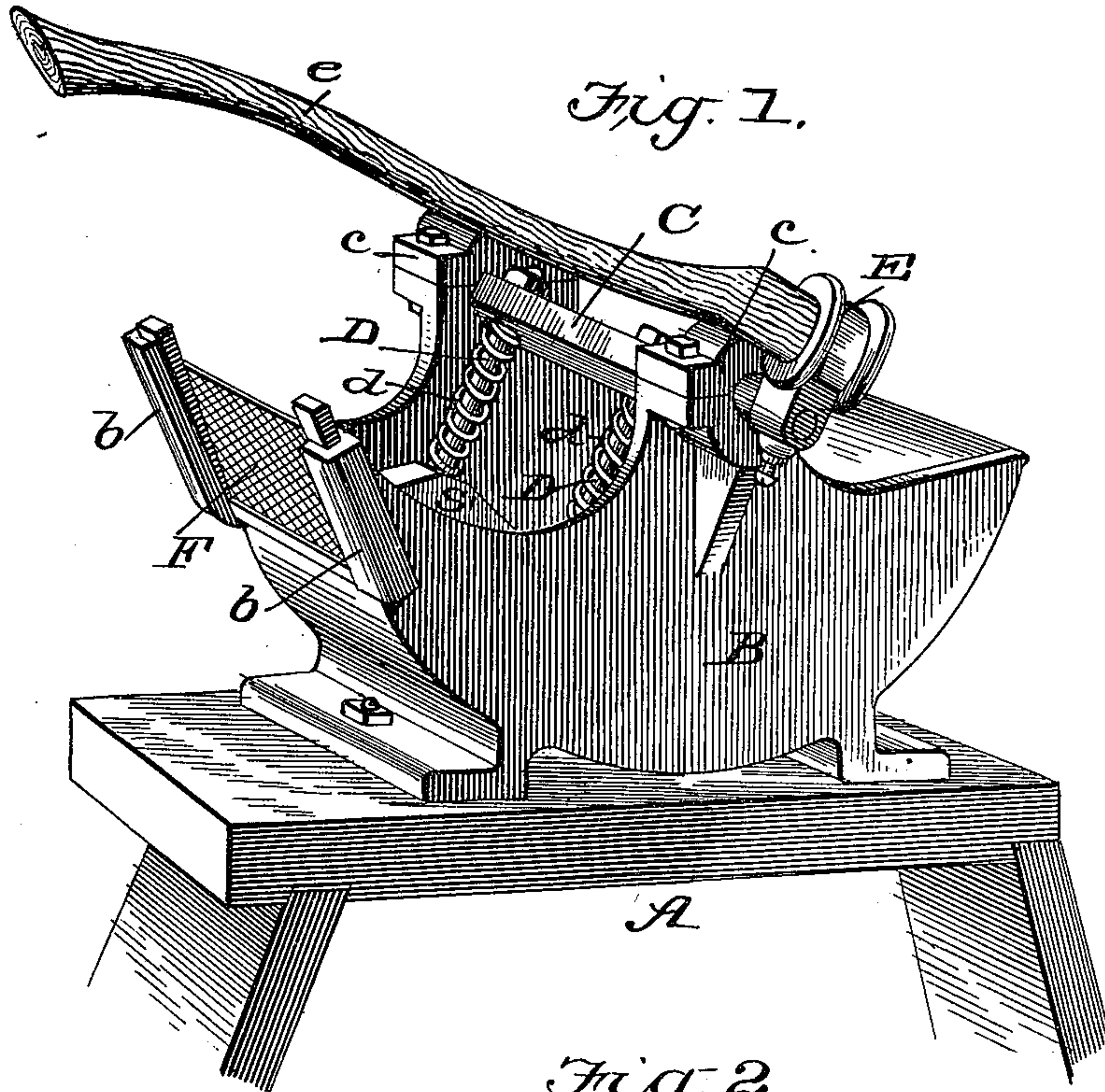
Patented May 28, 1901.

A. C. CALKINS.  
ORE PULVERIZER.

(Application filed July 10, 1900. Renewed Apr. 24, 1901.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:  
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Fig. 3

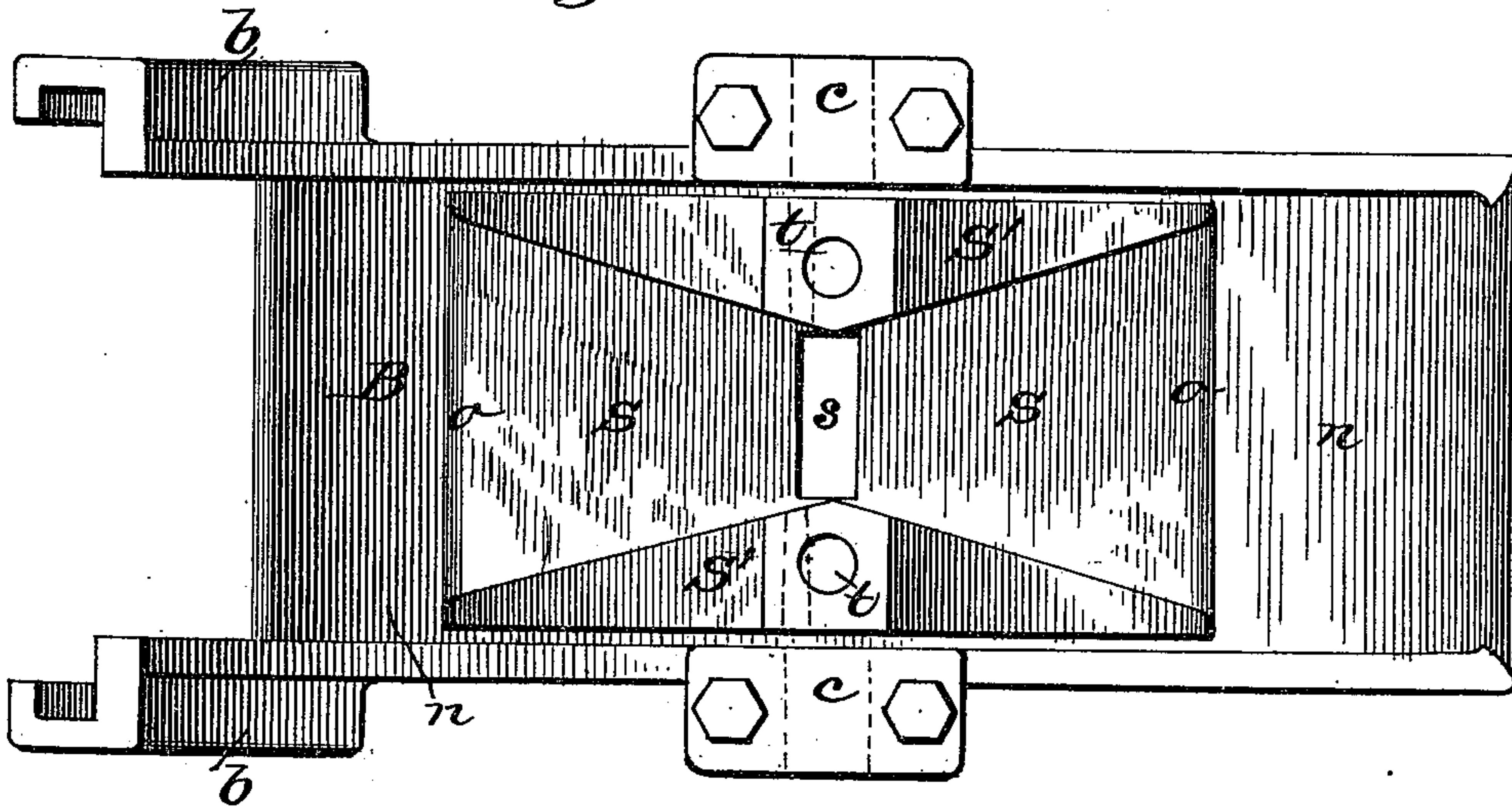


Fig. 4.

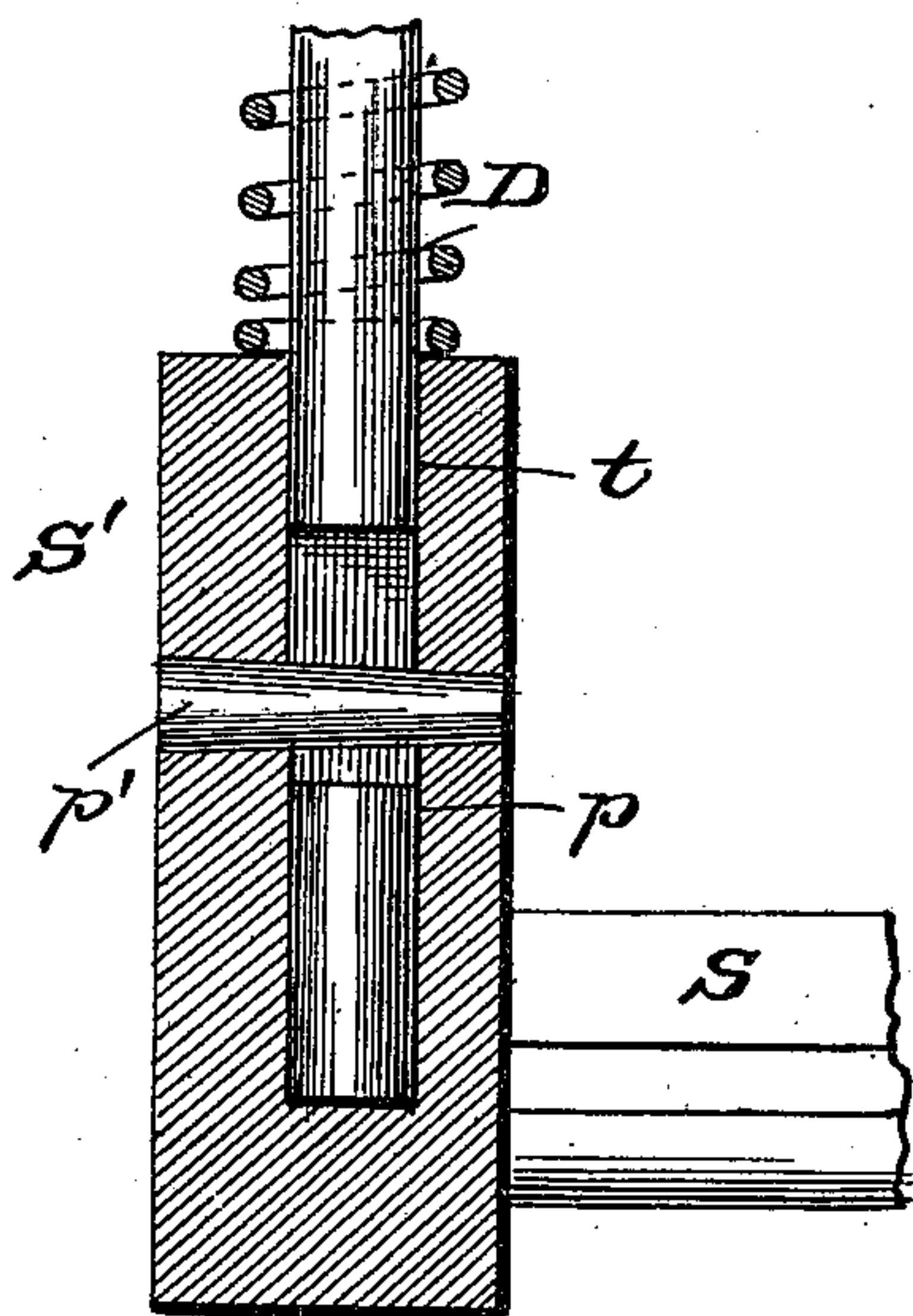
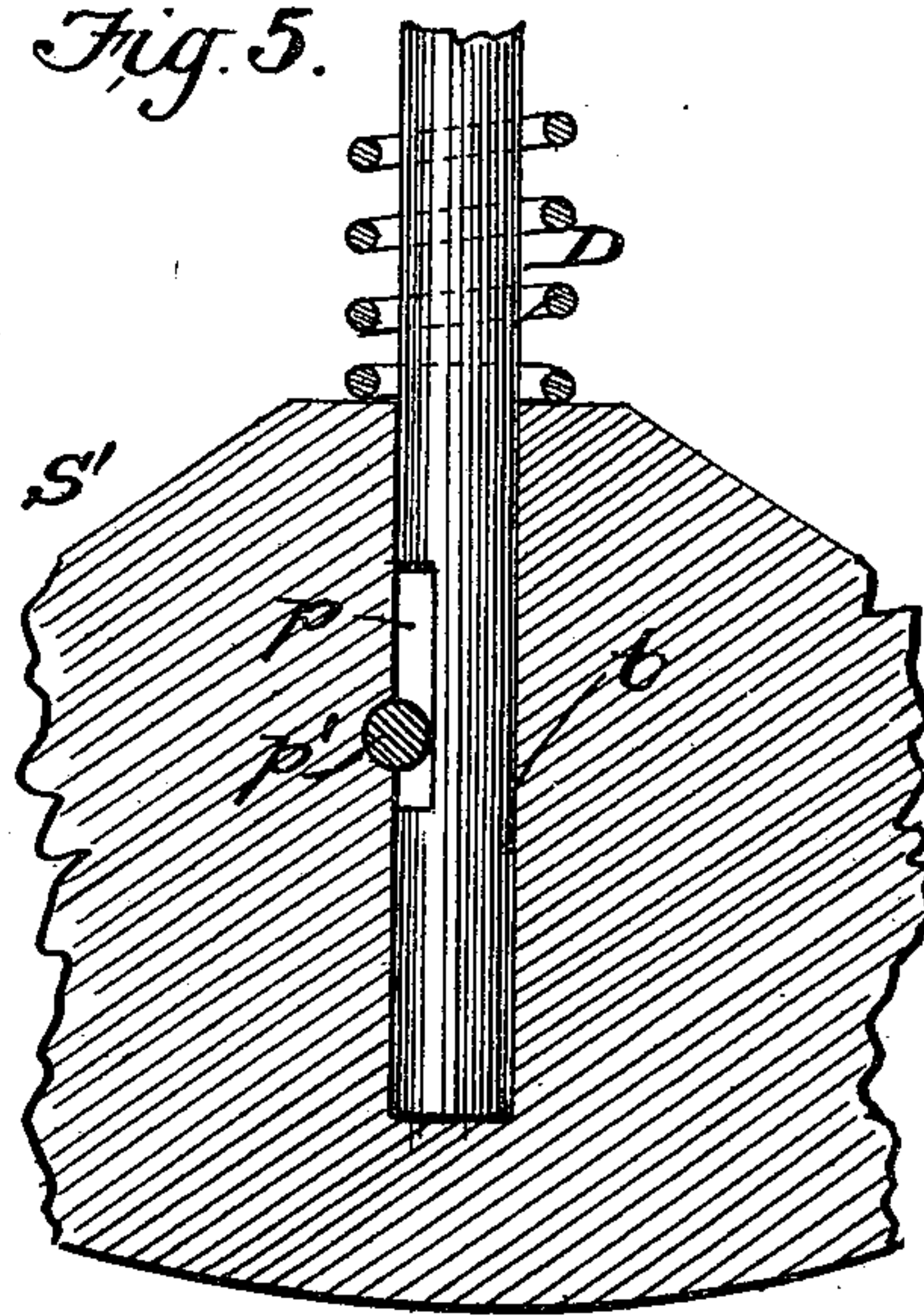


Fig. 5.



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# UNITED STATES PATENT OFFICE.

ALBERT C. CALKINS, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO  
FREDERICK W. BRAUN, OF SAME PLACE.

## ORE-PULVERIZER.

SPECIFICATION forming part of Letters Patent No. 675,264, dated May 28, 1901.

Application filed July 10, 1900. Renewed April 24, 1901. Serial No. 57,274. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT C. CALKINS, of Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Improvement in Ore-Pulverizers, of which the following is a specification.

My invention is designed to provide a convenient and effective device for further reducing or pulverizing crushed ore preparatory to the separation of the precious metals which it contains, the same being specially designed for the use of assayers and chemists. It belongs to that class of devices in which a concave bed-plate having a screen on one side is provided with an oscillating shoe or muller spring-seated and working over the concave bed-plate to comminute the ore between it and the bed-plate; and it consists in the peculiar construction and arrangement of the devices involving a new mode of action and a more convenient, effective, and rapid result, as will be hereinafter fully described with reference to the drawings, in which—

Figure 1 is a perspective view of the entire device. Fig. 2 is a vertical longitudinal section. Fig. 3 is a plan view with the oscillating shaft, its handle, and the screen removed; and Figs. 4 and 5 are details.

Referring to Fig. 1, A represents any suitable bench, table, or platform to bring the device up to the level of convenient operation by hand.

B is the bed-plate, whose bottom surface *nn*, Fig. 2, is the curve of a true circle. This trough-shaped plate is closed in on the sides by cheek-pieces, in which are formed bearings *cc* to receive a concentric rock-shaft C. The bottom and sides of the bed-plate are cast in one piece, with a suitably-flanged base, by which it may be fixedly bolted to its subjacent support. At one end of the concave bed-plate there is formed an open space between flanged guides *bb*, which latter receive a detachable screen F, held in place by a wooden frame *f'*, as seen in Fig. 2, or by wedges, as seen in Fig. 1. This screen is offset a little from the circular line of the inner face of the bed-plate for the purpose hereinafter described.

E is a handle-socket rigidly fixed to rock-shaft C outside the bed-plate, which socket

is provided with a handle *e*, by which the rock-shaft C is oscillated. To the rock-shaft is detachably secured two radial pins D D, extending downwardly into the trough-shaped space of the bed-plate, where they loosely enter holes *tt* in the side pieces S' of an iron or steel shoe or muller S. This shoe is forced downwardly with an elastic pressure by helical springs *d* on the pins D. Said shoe is made in a peculiar way. Its lower surface *m* is for the most part the curve of a circle struck by a radius from the center of shaft C, and it is concentric with the bearing-surface of the bed-plate, so that these two surfaces fit together closely and with an exact correspondence. The outer edges *oo* of the shoe are brought also to a sharp edge, and in the center of the shoe there is an opening *s*, passing through the same and countersunk on its lower face with a gradual curve, as seen in Fig. 2. The side pieces S' S' of the shoe are also thicker in the middle opposite the openings *s* and taper with a divergence to the outer edges *oo* of the shoe on each side, as seen in Fig. 3. The function and value of this peculiar construction of shoe is as follows: When the shoe is oscillated by the handle *e* over the bed-plate, the smallest particles of crushed ore are caught between the surfaces *m* and *n* and further comminuted, while the larger particles are pushed up along the upturned ends of the bed-plate and fall over the sharp edges *o* of the shoe and pass to the upper side of the shoe, tumbling, as the shoe rises, down to the opening *s*, through which they pass to the countersunk space below, where they are caught between the shoe and bed-plate and crushed finer. Without such opening *s* in the shoe and the sharp edges *o* the larger particles of ore are continually rooted up on the side of the shoe and fall back again on the reverse movement on the same side of the shoe and fail to get between the two rubbing-surfaces at all, being simply pushed up and dropped back again in the same place without effective result. In my invention the crushed ore follows on each side of the shoe a continuous cycle of travel, the particles passing up and over the outer sharp edges of the shoe and down over the top of the shoe to the center, at which point they are re-



turned to the space between the two rubbing-surfaces by passing through the central hole *s*, where they are caught by the inclined countersunk surfaces of the shoe about the hole and effectively crushed against the middle of the bed-plate. The taper of the side pieces *S'* of the shoe (seen in Fig. 3) is designed to direct the return of the ore to the central hole *s* and to give room also for the socket-holes *t*, that receive the radial pins *D*. These pins play loosely in said holes, but are prevented from coming entirely out by a slot and pin *p p'*, as seen in Figs. 4 and 5. There are no discharge-outlets for my device; but when the ore is being pulverized the shoe is raised entirely out of the bed-plate, and the comminuted ore is brushed up from time to time against the screen *F* to let the finer particles pass through, the larger particles being allowed to drop back and be further acted upon by the oscillating shoe.

To avoid wear on the screen *F*, it is, as before stated, offset a little distance from the circular line of bearing of the shoe, so that the latter does not act upon the same, and the opposite side of the bed-plate may also near the top depart a little tangentially from the curve of the circle to avoid throwing any portion of the coarse ore particles over the edge of the bed-plate in case it does not freely tumble over the sharp edge *o* of the shoe.

I do not claim, broadly, the concave bed and oscillating shoe, nor the broad idea of a spring-seated shoe, nor the screen on one side, as I am aware that these features are old.

I am also aware that a circular muller which has a motion in a horizontal plane has been constructed with a central eye for the ore to pass through, like the eye of an old-fashioned disk millstone, but with its central upper surface higher than its outer edges.

In my invention the middle of the upper surface of the muller is lower than its outer edges and its outer edges are sharp, which construction gives an inward tumble to the ore, which passes over the outer sharp edges with a reactionary fall as each edge rises and passes down to the middle of the muller and through the hole in the center in two practically continuous cycles of circulation, which give an entirely new action and new result, due to the correlated agencies described.

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

1. A crushing and grinding device, com-

prising a concave bed and an oscillating shoe or muller having its upper surface lowest in the middle and having in its middle an opening through the same to the space between the shoe and bed, substantially as and for the purpose described.

2. A crushing and grinding device comprising a concave bed, and an oscillating shoe or muller having in its middle an opening through the same to the space between the shoe and bed, and said shoe having also its outer edges reduced to a sharp angle to permit the coarse particles to tumble over the same in returning to the middle of the shoe substantially as described.

3. A crushing and grinding device comprising a concave bed, and an oscillating shoe or muller having in its middle an opening through the same having countersunk edges on its lower side substantially as and for the purpose described.

4. In a crushing and grinding device the combination of a grinding-bed and a grinding shoe or muller vibrating over the same, said shoe or muller having its outer edges made sharp and having a hole through its middle to permit the coarse particles passing over the sharp edges to gain access to the space between the grinding bed and muller substantially as described.

5. In a crushing and grinding device, the combination with a concave bed-plate; of a shoe or muller having sharp outer edges, a hole through the center and side walls converging toward the hole in the center substantially as and for the purpose described.

6. In a crushing and grinding device, the combination of a concave bed-plate, curved to the arc of a circle, a shoe or muller having a concentric axis and having its working face curved to the same arc and having side walls thickest in the middle, and tapering to the outer edges, and having vertical sockets in these thickened middle parts, a rock-shaft with radial pins entering said sockets and loosely connected to the shoe, and helical springs surrounding said pins and exerting an elastic pressure on said shoe substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALBERT C. CALKINS.

Witnesses:

SIDNEY J. PARSONS,  
J. R. SMITH.