

C. W. LAWRENCE.
GRINDING MILL.

No. 272,272.

Patented Feb. 13, 1883.

FIG. 1.

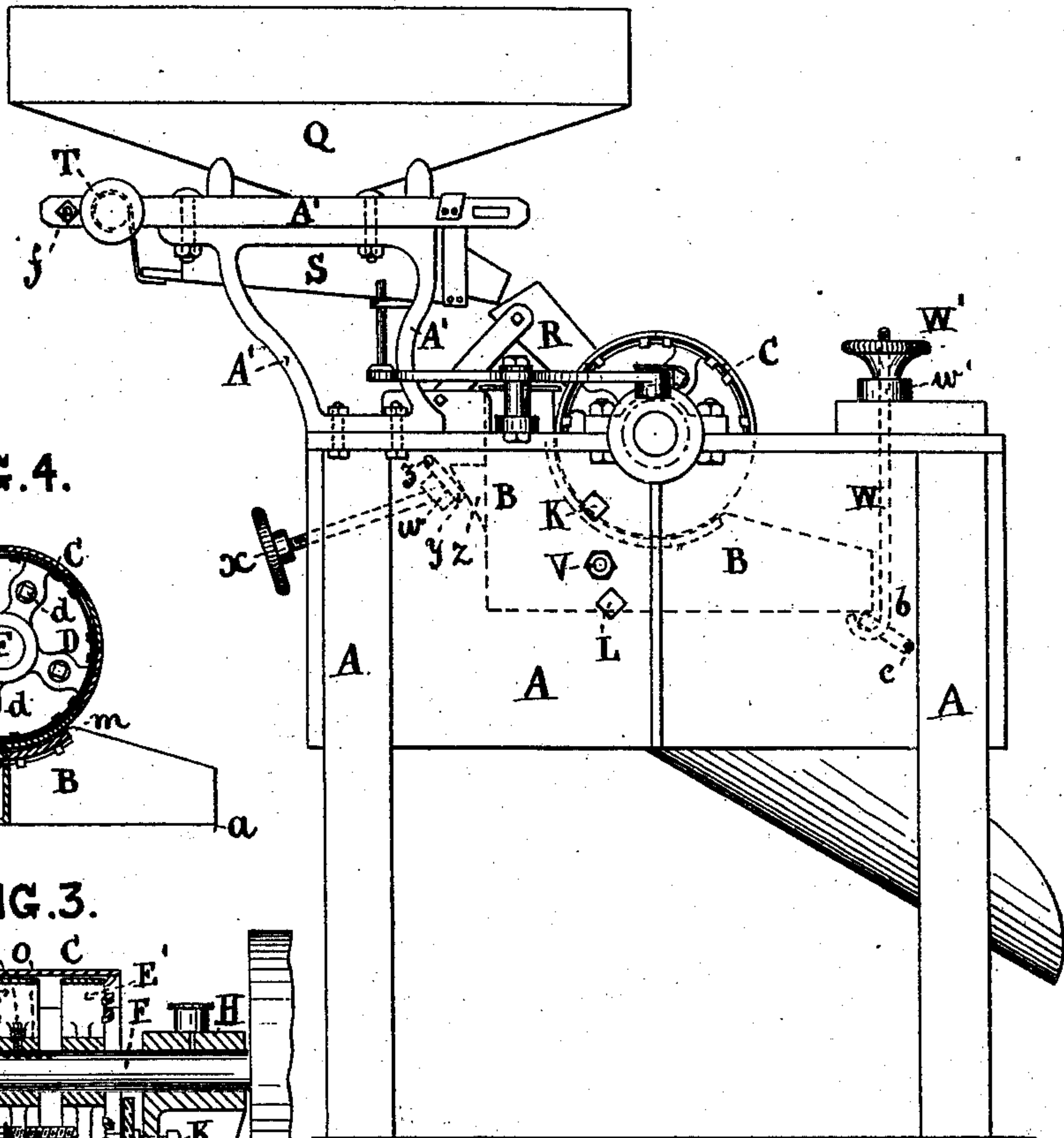


FIG. 4.

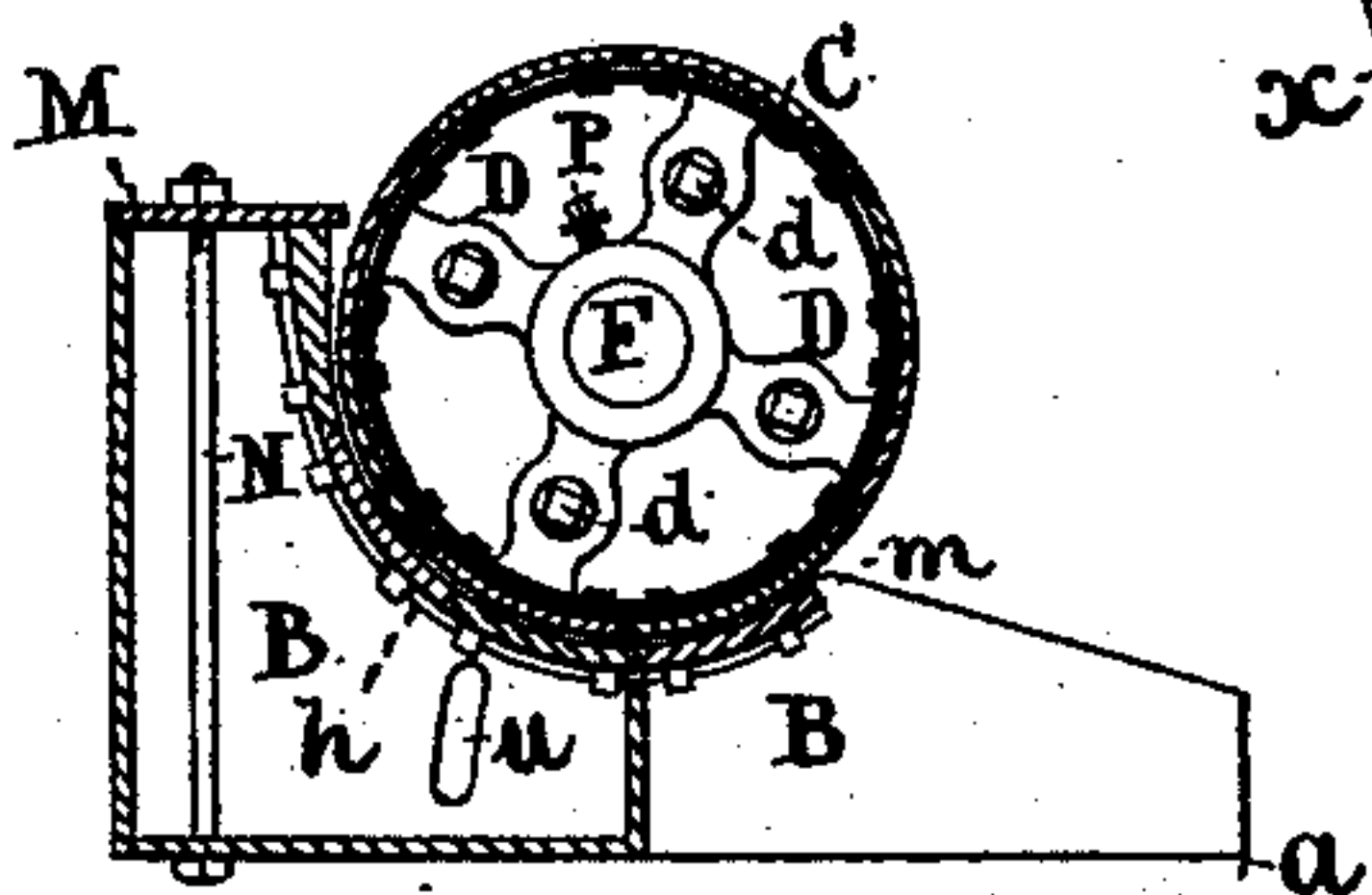


FIG. 3.

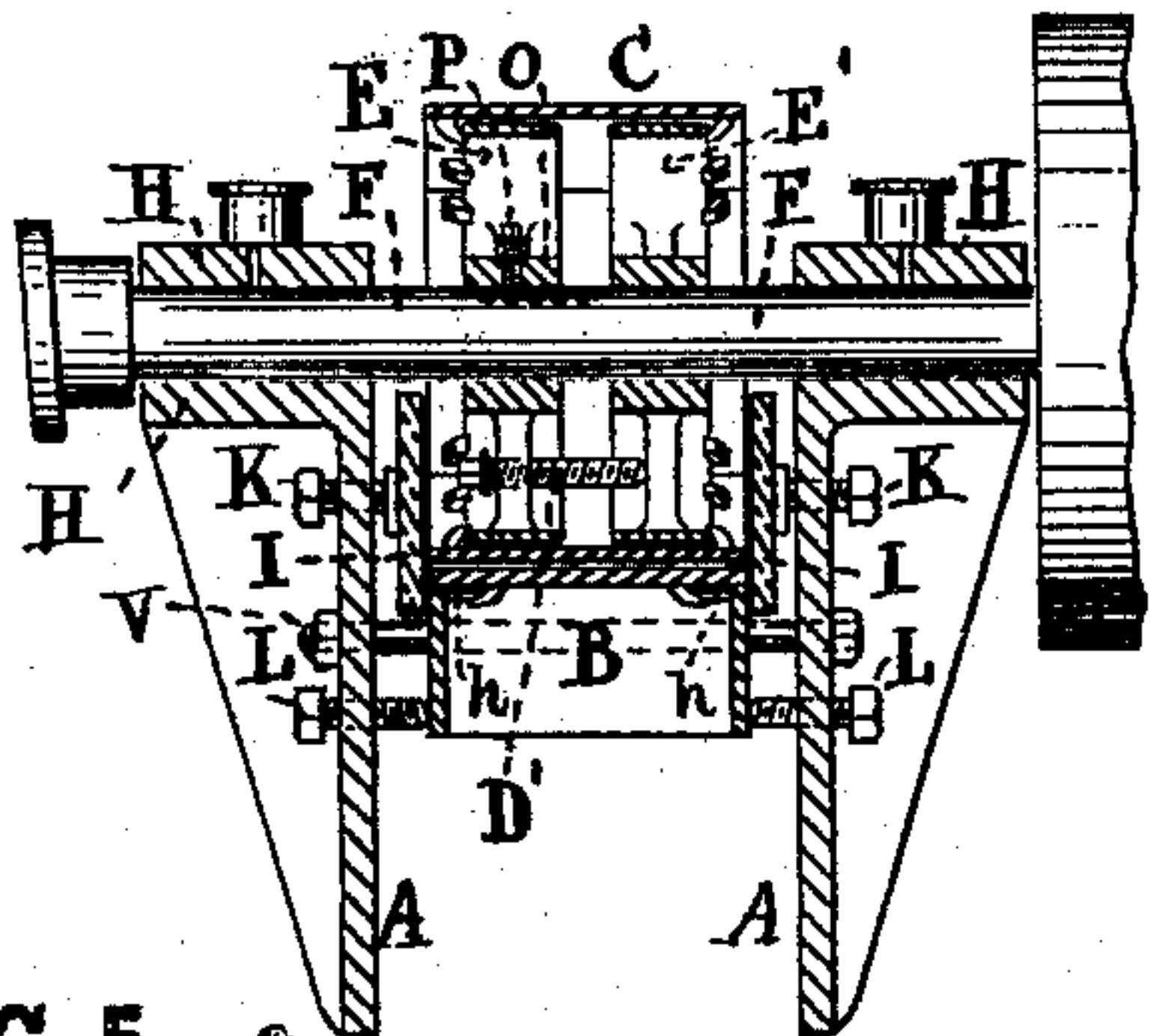


FIG. 2.

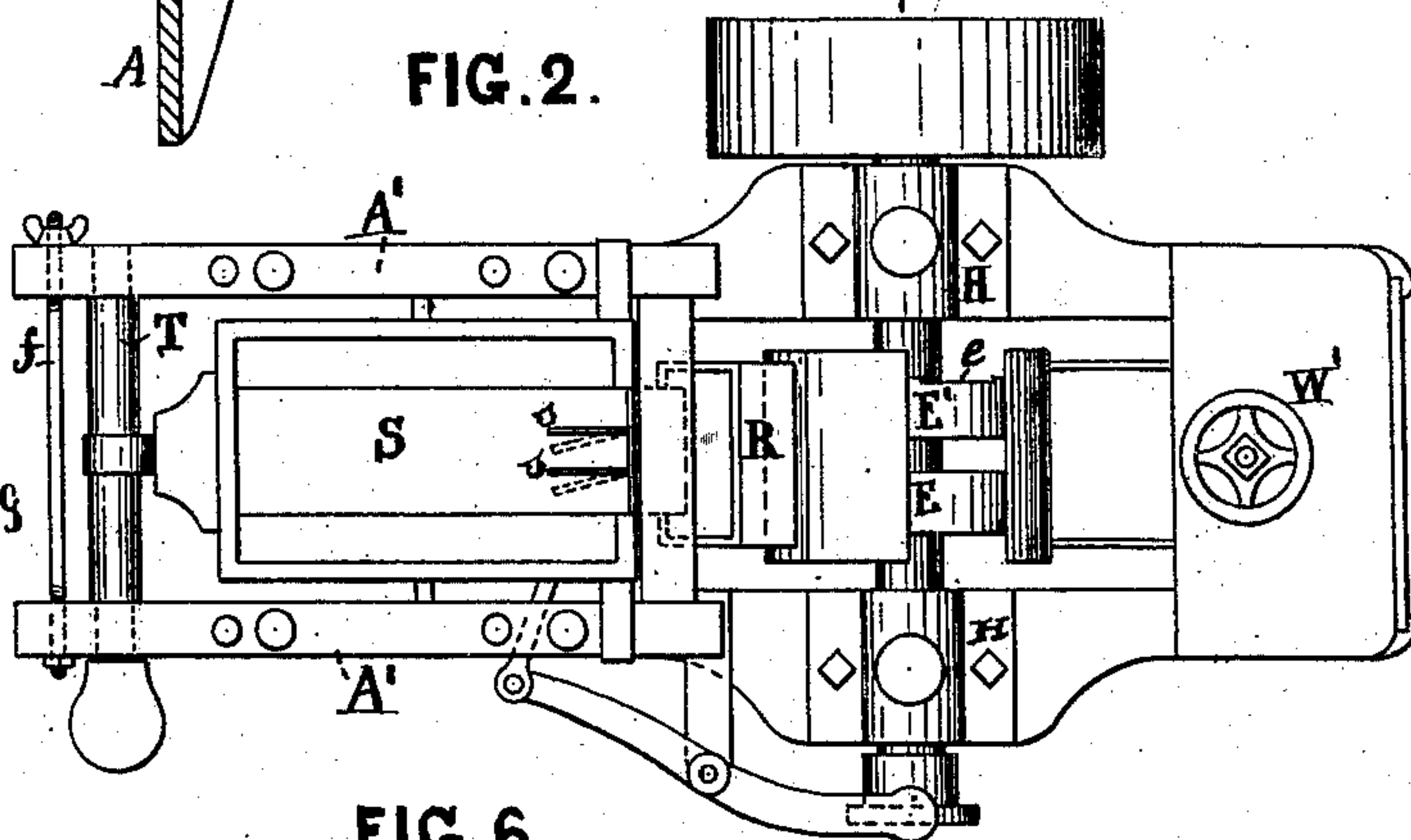


FIG. 5.

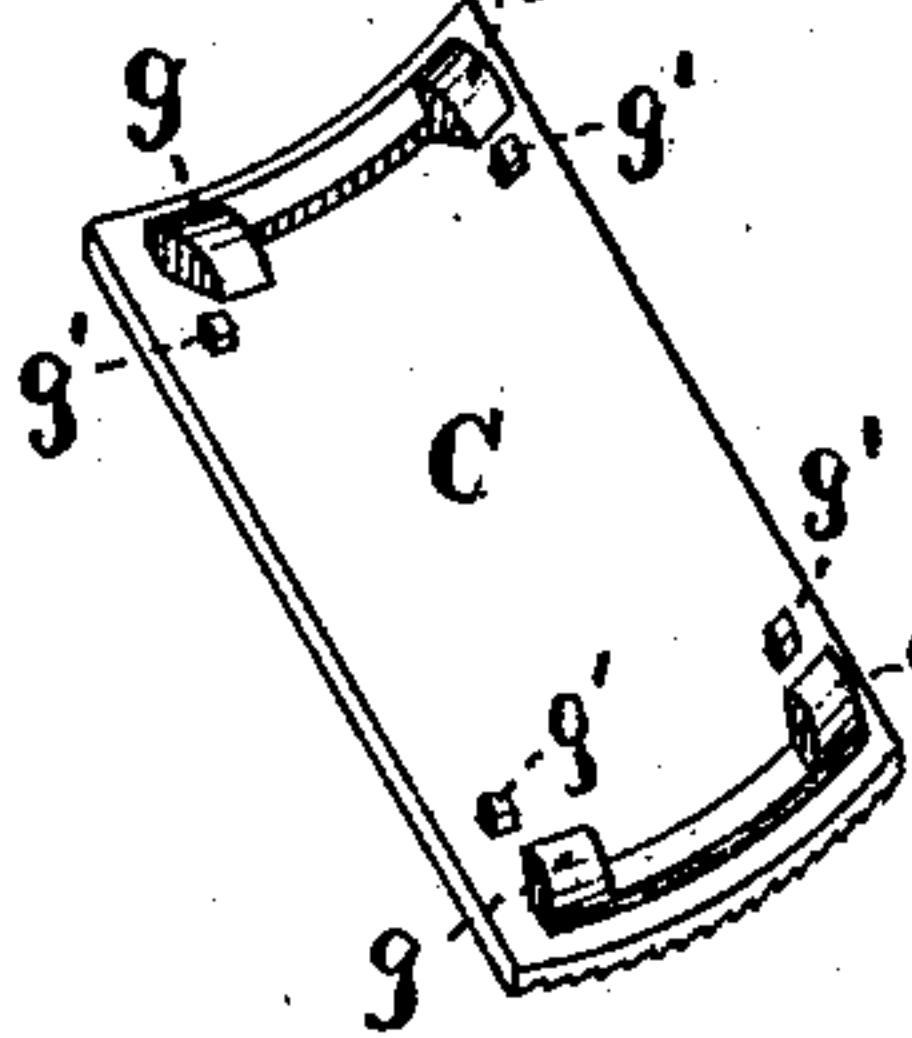
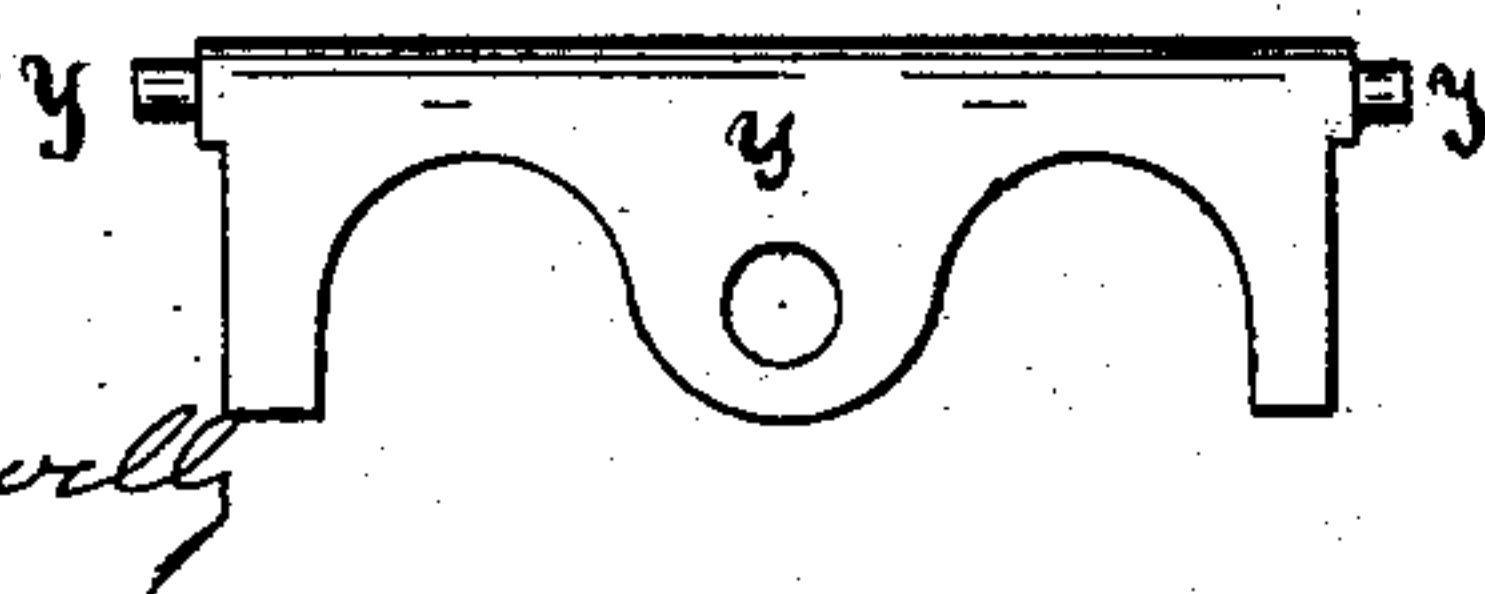


FIG. 6.



Witnesses

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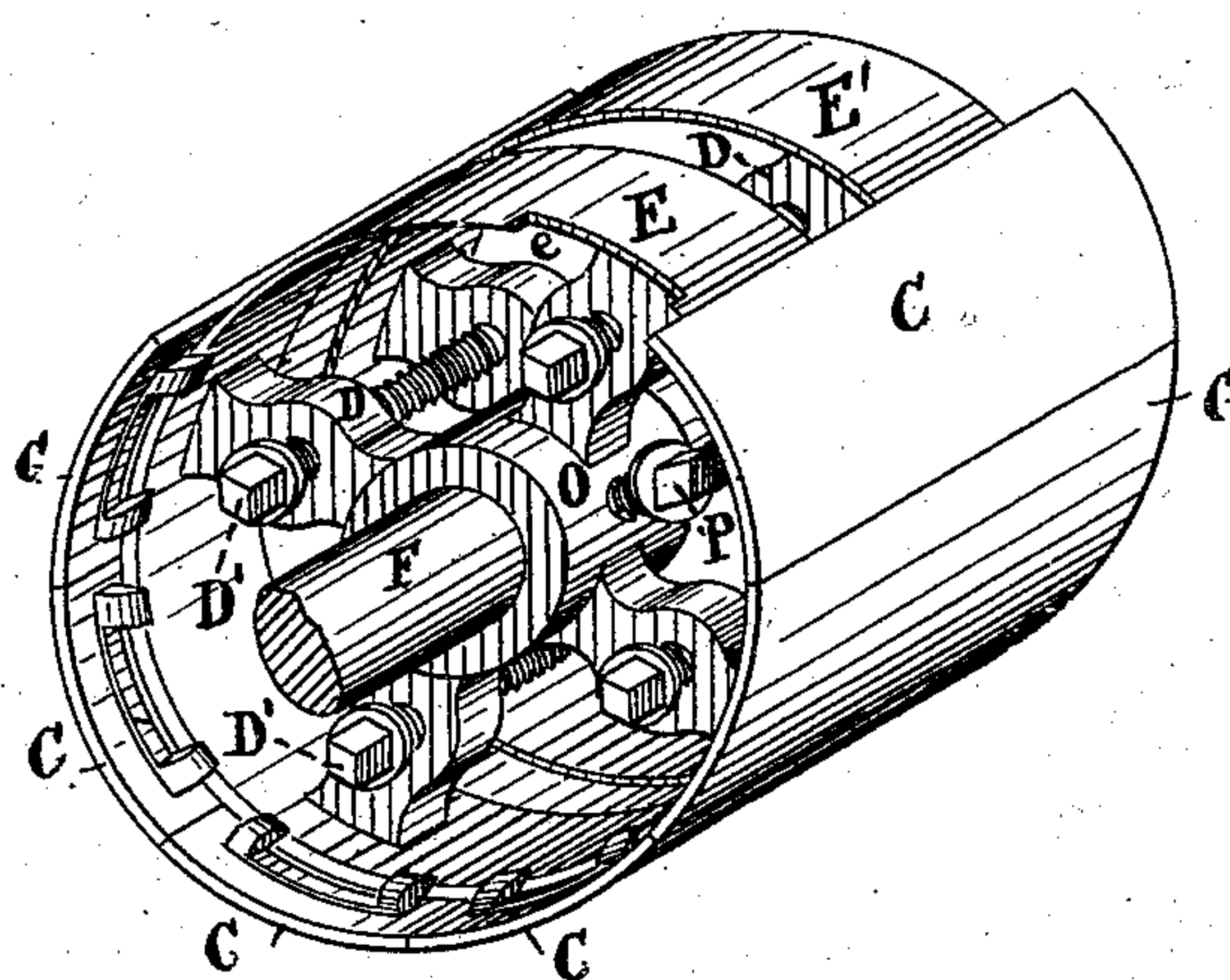
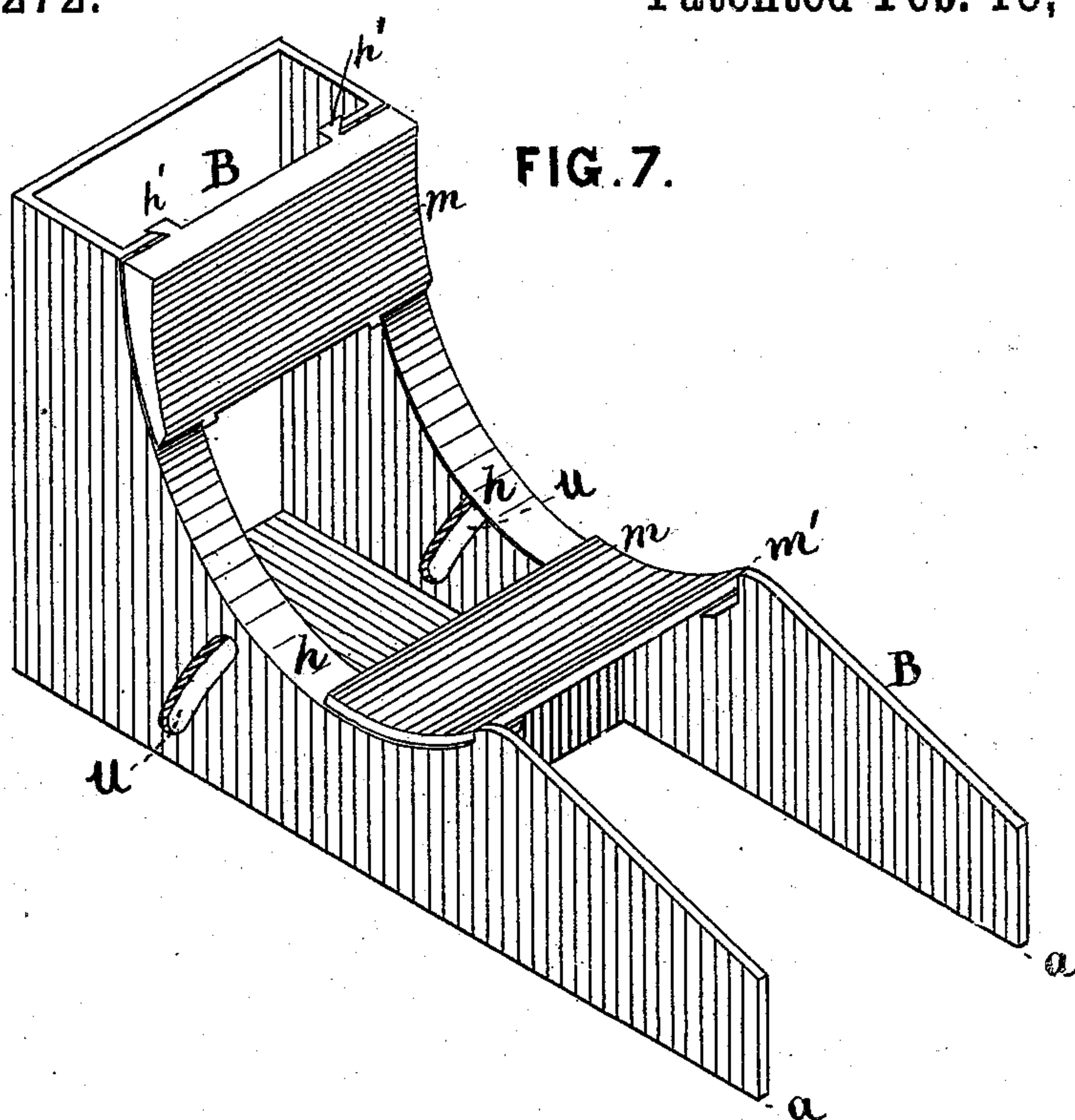
(No Model.)

2 Sheets—Sheet 2.

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Witnesses

6. Blanta.

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UNITED STATES PATENT OFFICE.

CHARLES W. LAWRENCE, OF CHELSEA, ASSIGNOR TO THE LAWRENCE
WHITE IRON PORTABLE GRIST MILL COMPANY, OF BOSTON, MASS.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 272,272, dated February 13, 1883.
Application filed March 20, 1882. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. LAWRENCE, of Chelsea, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Grinding-Mills, of which the following is a specification.

My invention relates to that class of grinding-mills in which the periphery of a metallic grinding-cylinder revolves in a metallic concave; and the invention consists in constructing the metallic grinding-cylinder of a series of plates attached to two wheels or pulleys in such a manner as to enable the said plates to be readily and separately attached and detached, as required. It further consists in a means of readily adjusting the concave in relation to the grinding-cylinder; and, further, in devices more fully hereinafter described and claimed.

Referring to the accompanying drawings, Figure 1 is a side elevation of a mill embodying my invention. Fig. 2 is a plan or top view of the same. Fig. 3 is a transverse vertical section on line *z z* of Fig. 2. Fig. 4 is a longitudinal vertical section of the same through the metallic grinding-cylinder and concave. Fig. 5 is a perspective view of one of the grinding-plates, showing the under side. Fig. 6 represents the device for adjusting the concave. Fig. 7 is a perspective view of the concave-frame with two of the plates removed. Fig. 8 is a perspective view of the grinding-cylinder and pulleys with two plates removed.

A A is the main frame, supporting the bearings H H of the shaft F, to which latter the grinding-cylinder is secured. B B is the frame holding the concave.

The grinding-cylinder is composed of a series of serrated curved plates secured to two broad wheels or pulleys, E E', attached to arms D D, forming a part of the hub. Four arms and bolts are shown; but one or more bolts may be used, as desired. One of the pulleys, E', is permanently secured to the shaft F. The hub of the other pulley, E, is allowed to slide on the shaft F, and is secured in position by means of a bolt or screw, P, passing through the hub and entering a longitudinal slot in the shaft F, as seen in Fig. 3; or it may be secured by a feather on the shaft entering a recess in the

hub. The grinding-plates C are secured to the outer edges of the wheels or pulleys E E' by means of ears *g g*, cast on the under sides of the outer edges of the plates, as shown in Figs. 5 and 8. The ears *g g* project inwardly toward the center, so that when placed on the pulleys they embrace the edges of the same. When all the plates are in position on the wheels or pulleys the pulley E is forced outward by means of bolts or screws D', which pass through holes *d d* in the arms of the pulley E, and press against the arms of the fixed pulley E' until the outer edges of the pulleys bear hard against the ears *g g* of the plates C, which latter are thus held rigidly in position on the pulleys, thus constituting a dovetail joint. The ears, instead of being at the edges of the plates, may be on or near the center of the same and placed against the inner edges of the pulleys, in which case the pulleys are drawn together to be made fast to plates. As the plates C may not always be cast of the same thickness they are provided with pins or studs *g'*, Fig. 5, on their under sides, so as to enable the plates to be evenly adjusted on the pulleys and to insure a true circle on the outside of the plates, which is effected by filing or grinding down one or more of the said studs, as may be required. The plates C are set in place around the pulleys E E' as follows: At a portion of the outer edge or rim of one of the pulleys, E', a recess, *e*, is filed or cut out the width of one of the plates, sufficient to allow the ears to pass through. Each plate is then separately placed upon the pulleys at the recess, and, being held by the ears *g g*, is slid around until the cylinder is complete. The screws D' are then turned, which forces the pulley E away from pulley E', and thus tightens up the whole series of plates to form a rigid cylinder.

The concave is composed of a series of plates, *m*, similar to those of the grinding-cylinder, and are set in a bed or frame, B, as shown in Fig. 7, in which they are rigidly held. A bolt, N, Fig. 4, provided with a screw at one end, presses the plate M down upon the upper edge of the top plate of the concave, the lower plate abutting against a projection at *m'* on the bed or frame. The plates of the concave are provided on their under sides with ears *h' h'*, near

their edges, so that they can engage with the curved bearings *h h*. The plates are inserted at the upper ends of the bearings *h h*, so that they will slide down to the end of the frame at 5 *m'*, the ears and the edges of the curved bearings forming a dovetail joint similar to that shown in the cylinder-plates. A plate, *M*, resting upon the top of the upper plate of the concave and secured by a screw-bolt, *N*, holds the 10 plates firmly in position.

The concave-frame is adjusted in relation to the grinding-cylinder, so as to grind more or less fine, as follows: At the rear of the frame *B* is pivoted, at *z*, Fig. 1, a metal plate, *y*, similar to that shown in Fig. 6, so as to allow its 15 lower end to be readily moved to and fro. The plate *y* is moved by means of a hand-screw, *x*, pressing against its lower portion.

In front of the plate *y*, and between it and 20 the rear of the frame *B*, of which they form a part, are wedge-shaped pieces of metal *Z*, so arranged that when the plate *y* is pressed forward by the screw *x* it will raise and press forward the rear end of the frame *B* and cause 25 the concave to be brought nearer to the convex cylinder. When the screw is turned in the opposite direction the plate *y* will recede, allowing the concave-frame to move, and thus withdraw the concave farther from the grinding-cylinder. The end of the bolt *x* bears 30 against a piece of rubber or a spring, *w*, on the outer face of the plate *y*; or the rubber or spring may be placed between the plate *y* and the wedge *Z*. The object of this is to allow the concave-frame to yield in case of the entrance of 35 any hard substance between the concave and grinding cylinder, which would be liable to injure the mill. This adjustment of the concave for grinding more or less fine can be effected while 40 the machine is in operation and without stopping the same. The concave is held in proper position relatively to the grinding-cylinder by means of a bolt, *V*, passing through curved slots *U* in the sides of the frame, as shown in 45 Figs. 3, 4, and 7. The curvature of the slots *U* is the arc of a circle described by a radius from the point *a* and from the center of the shaft *F*.

I I are plates or boards, placed one at each 50 side of the cylinder and concave for the purpose of preventing the escape of any grain or ground substance from the opening between the concave and cylinder. They are held in position by the screw-bolts *K K*, passing through 55 the sides of the frame *A*. Between the ends of the bolts *K K* and the outer sides of the plates or boards *I I* are placed pieces of rubber, or springs, so as to allow the said plates to yield to any unevenness in the motion of 60 the cylinder.

The forward or lower end of the concave is supported on and adjusted by means of a plate, *b*, an end view of which is shown in Fig. 1, pivoted in the sides of the frame at *c*. The 65 plate *b*, which is similar to that designated *y*, (shown in Fig. 6,) is inclined upward, and to its center is attached a bar or rod, *W*, extend-

ing up to the top of the frame, and is provided with a hand-nut, *W'*, by which the rod *W* is operated to raise or lower the end of the plate 70 *b*, as desired. The ends of the concave-frame bear on the arms or projections at the ends of the plate *b*, so as to give an equal adjustment to the whole width of the said frame. A piece of rubber or other spring, *w'*, is placed between 75 the hand nut *W'* and its bearing on the top of the frame for the purpose of allowing the concave to yield in the event of any hard substance entering the mill.

A' is a frame supporting the hopper *Q* and 80 shaker *S*, which is placed underneath the hopper. At the front end of the shaker *S* are arranged two or more vertical plates of tin or other suitable material, *s s*, made parallel to the sides of the shaker, and are designed as guides 85 for the grain passing out of the shaker to the chute *R*. The plates *s s* are soldered at one end to the end of the shaker, so that they can be turned one way or the other at their free ends for the purpose of guiding the grain and 90 preventing it from accumulating too much at one side of the shaker in case it or the machine is not on a level. The shaker *S* is supported at the rear by a strap depending from a roller, *T*, by which the inclination of the shaker is 95 adjusted, and a reciprocating motion is imparted to it by means of an arm connected with an eccentric or cam, to which motion is imparted from the main shaft in any well-known manner. At the rear ends of the frame *A'* is 100 a screw-bolt, *f*, Fig. 2, which serves to press the said ends together and hold the roller *T* in place, and thus prevent the unrolling of the strap when the shaker is adjusted to the proper inclination. 105

The mill may be made of capacity to be run by horse or steam power, and it is capable of being reduced in size, so as to be perfectly operative by hand-power.

By the above-described construction a mill 110 can be made of equal capacity and having a grinding-surface equal to a burr-stone mill, doing the same amount of work and of equal quality with the same, without the inconvenience and expense required in dressing such 115 mills, as the plates in my mill can be easily removed and replaced by a new one in a few moments by an unskilled operator.

What I claim as my invention is—

1. The grinding-cylinder composed of a series of metal plates, *C*, provided with ears *g*, in combination with the wheels *E E'*, shaft *F*, and adjusting-screws *D'*, as and for the purpose set forth. 120

2. The combination of the shaft *F* and pulleys or wheels *E E'*, the latter having the recess *e*, with the plates *C*, having ears *g g*, substantially as described. 125

3. The concave composed of a series of metal plates, *m*, provided with ears *h'*, in combination with the curved bearings *h h*, frame *B*, plate *M*, and screw-bolt *N*, as shown and described. 130

4. The plate *b*, constructed as described and

pivoted to the frame A, in combination with the concave-frame B, the rod W, and nut W', as and for the purpose set forth.

5 5. The plates s s, composed of tin or sheet metal, in combination with the shaker S, and attached to the front end of the latter, so that the free ends of said plates may be turned to one side or the other independently of each other, as and for the purpose set forth.

10 6. The combination, with the frame A' A', of the roller T, the bolt f, the shaker S, and the suspending-strap, as shown and described.

7. The combination of the plates C, provided with pins or studs g' g' on their under sides, with the wheels E E', substantially as and for 15 the purpose set forth.

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

CHARLES W. LAWRENCE.

Witnesses:

J. H. ADAMS,
E. PLANTA.