

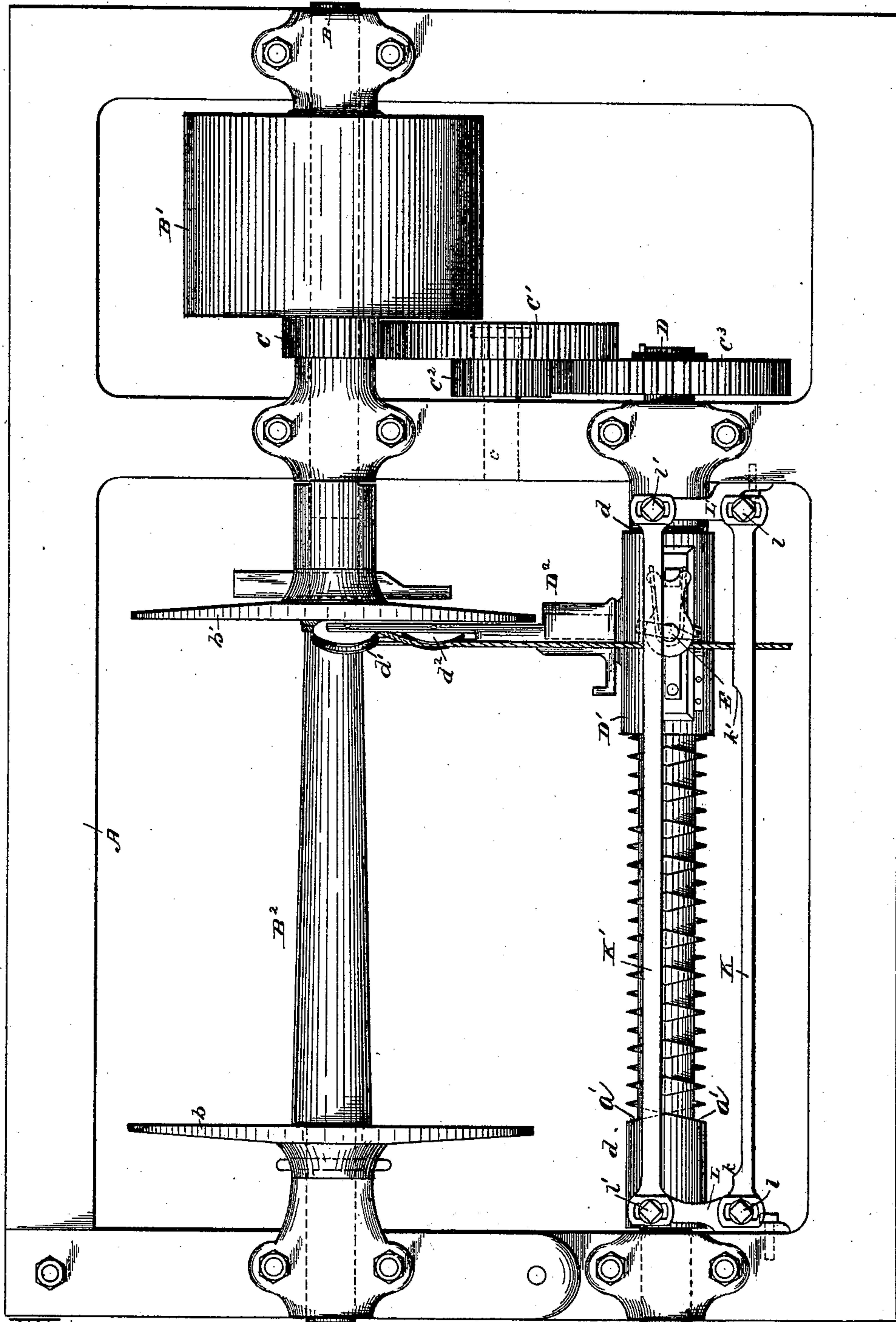
(No Model.)

2 Sheets—Sheet 1.

A. C. MILLER.  
MACHINE FOR BALLING CORD, &c.

No. 465,282.

Patented Dec. 15, 1891.



Witnesses:-

A. W. Weaver  
H. Robertson

Inventor:-

Andrew C. Miller  
By A. W. Smith & Son,  
Attorneys.

(No Model.)

2 Sheets—Sheet 2.

A. C. MILLER.  
MACHINE FOR BALLING CORD, &c.

No. 465,282.

Patented Dec. 15, 1891.

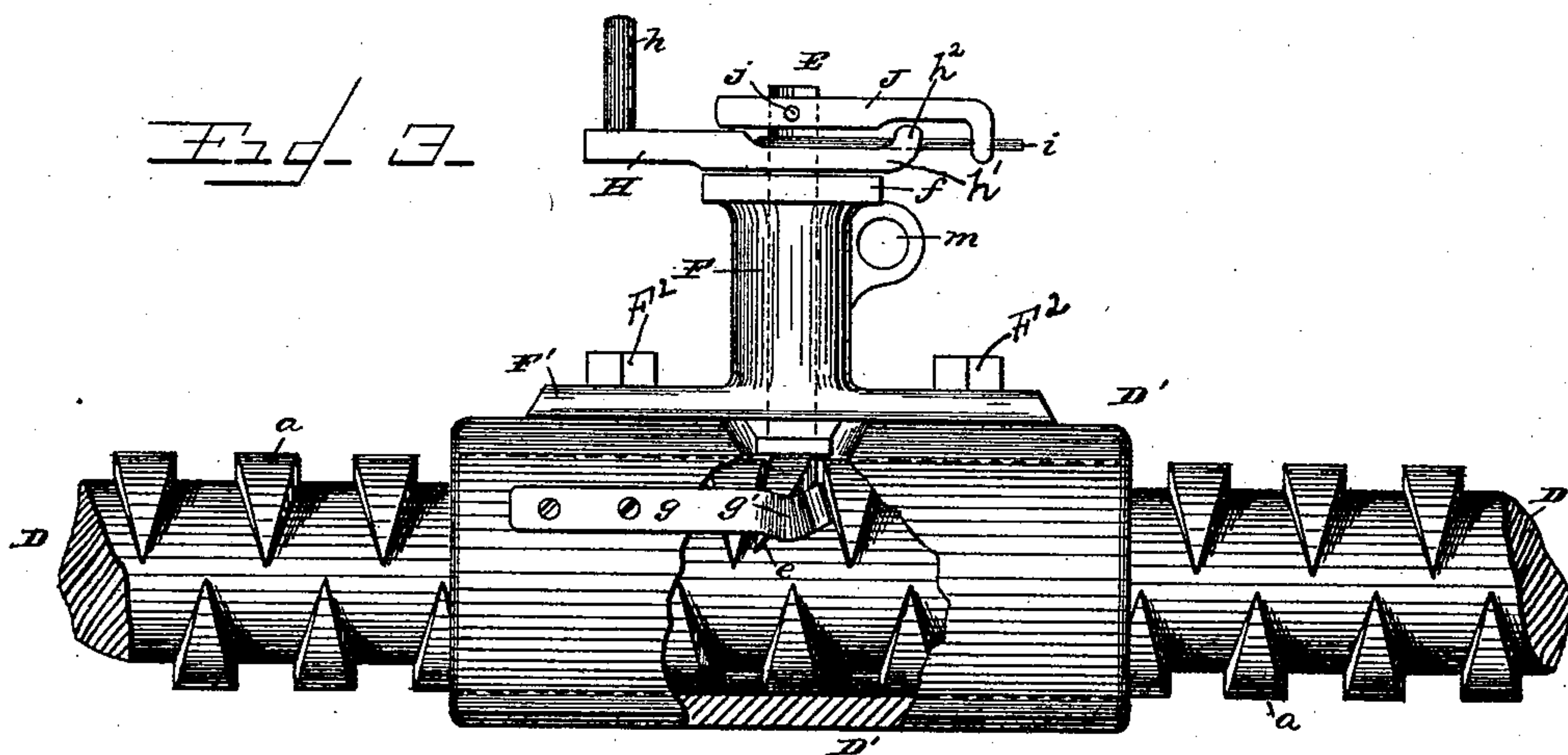
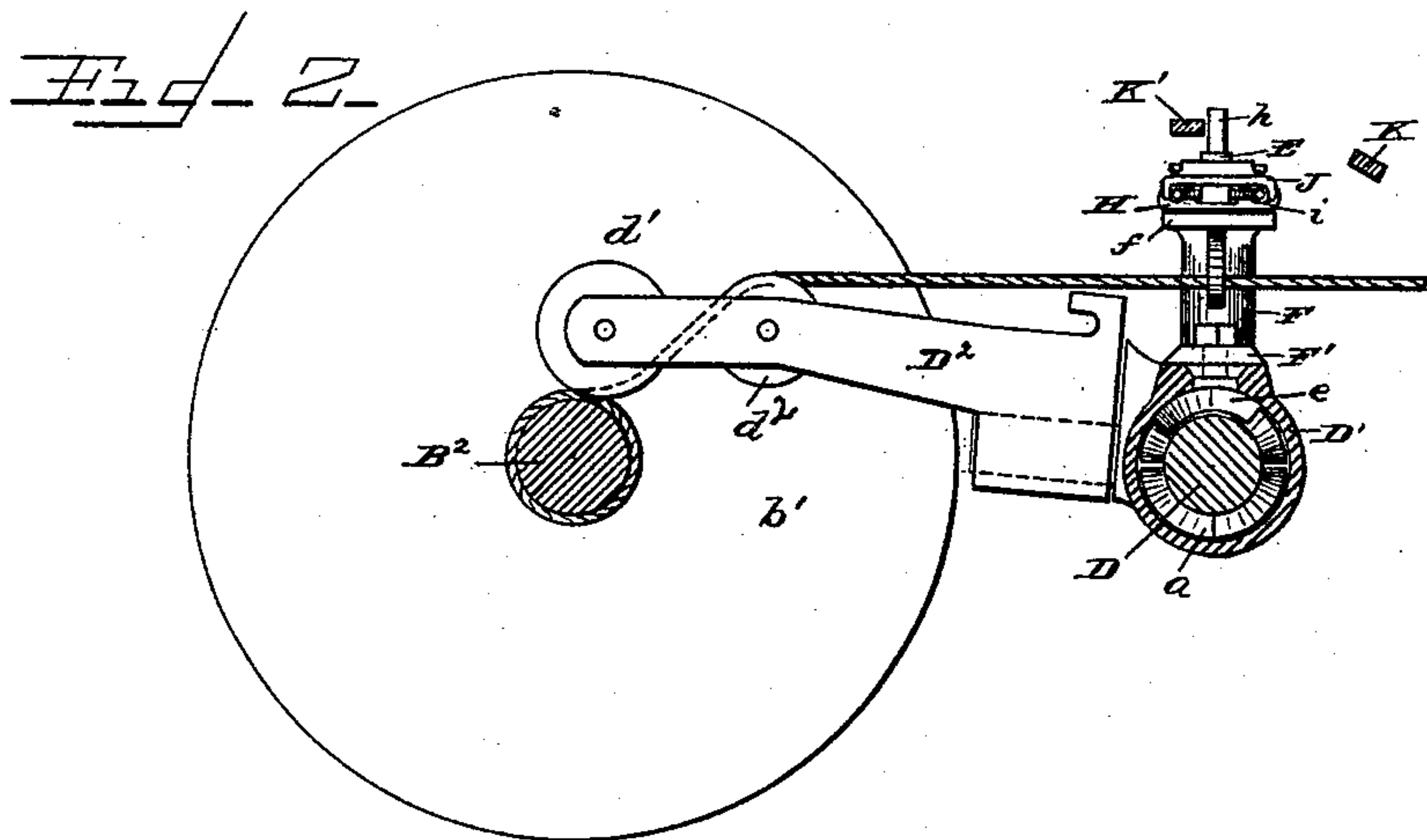
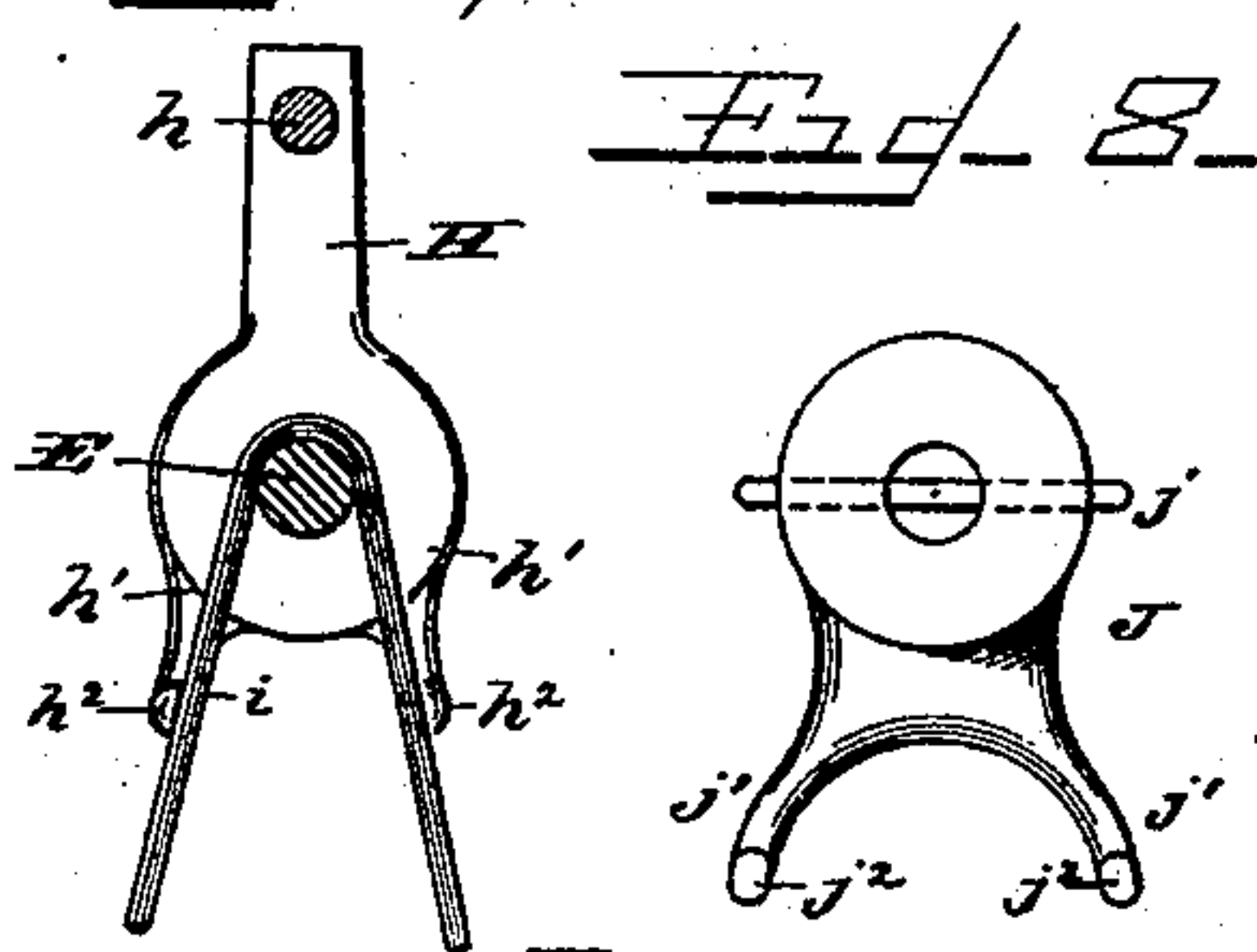
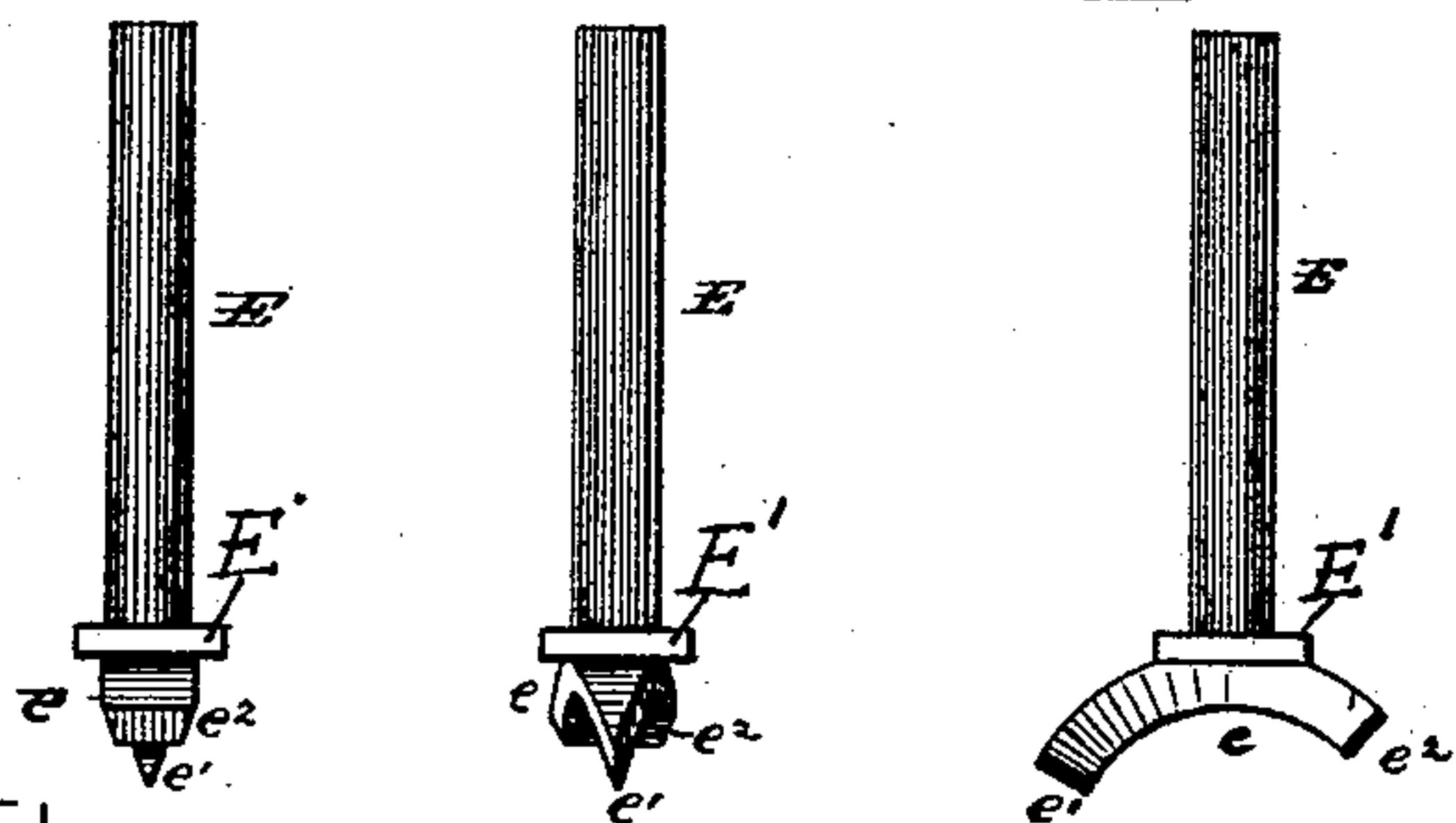


Fig. 4 Fig. 5 Fig. 6 Fig. 7



Witnesses:  
A. V. Weaver  
H. T. Robinson

Inventor  
Andrew C. Miller  
By A. M. Smith & Son.  
Attorneys.



# UNITED STATES PATENT OFFICE.

ANDREW C. MILLER, OF AUBURN, NEW YORK.

## MACHINE FOR BALLING CORD, &c.

SPECIFICATION forming part of Letters Patent No. 465,282, dated December 15, 1891.

Application filed February 9, 1891. Serial No. 380,758. (No model.)

*To all whom it may concern:*

Be it known that I, ANDREW C. MILLER, a citizen of the United States, and a resident of Auburn, in the county of Cayuga and State of New York, have invented a new and useful Improvement in Machines for Balling Cord, &c., of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making  
10 part of this specification.

My present invention relates to certain improvements on the machine described in Letters Patent No. 443,103, granted to me December 23, 1890, and in my pending application,  
15 Serial No. 369,078, filed October 23, 1890; and its object is to enable me to dispense with the clutches, notched bars, latches, and actuating-belts therein described.

It consists in the combination, with the shaft  
20 carrying the spool or mandrel on which the ball is wound, of a shaft provided with a right and left hand or double screw and geared to and actuated from the main or mandrel shaft and carrying the cord-guide, in the construction and arrangement of the shoe or tongue  
25 actuating the cord-guide sleeve and engaging the screw, and in the arrangement of means for automatically reversing said shoe or tongue or changing it from the right to the left hand  
30 screw-thread, and vice versa, all as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a plan or top view of so much of a balling-machine as is necessary to show my improvements. Fig. 2 represents a transverse section through the main or mandrel shaft and cord-guide shaft and sleeve, showing the cord-guide and the tongue or shoe for actuating it in side elevation. Fig. 3 is a front elevation,  
40 enlarged, of a portion of the screw-threaded shaft, the cord-guide sleeve thereon partly broken away to show the cord-guide shoe and the devices for reversing or shifting said shoe. Figs. 4, 5, and 6 show, respectively, a rear,  
45 front, and side elevation of the cord-guide-actuating shoe and its shaft or pivotal shank. Fig. 7 is a plan view of the shifting-lever, and Fig. 8 a bottom view of the shifting-fork connected with the pivotal shank of the cord-  
50 guide shoe for vibrating the latter.

A indicates the frame of the machine, which

may be similar to that described in my application referred to; B, the main or mandrel shaft mounted thereon and having a band-pulley B' fast on it, to which motion is communicated from any suitably-arranged driving-shaft, which may be made to drive any desired number of machines such as will be described, placed side by side or otherwise suitably arranged and connected, each independently of the others, with such driving-shaft.

C is a small gear wheel or pinion fast on the inner side of the pulley B' or on the shaft B, adjacent thereto, as shown, and in mesh  
65 with a larger gear-wheel C', journaled on a stud-shaft c on the frame and carrying a small gear-wheel C<sup>2</sup>, in mesh with a gear-wheel C<sup>3</sup>, fast on a screw-threaded shaft D, also journaled in suitable bearings on the frame, as  
70 shown.

The shaft B carries the tapering mandrel B<sup>2</sup>, with its end disks or heads b and b' secured to it as described in my former application or in any suitable manner, said mandrel and disks forming the removable spool on which the ball is wound.

The shaft D is provided between its bearings on the frame with right and left hand screw-threads forming two intersecting spiral  
80 ways or tracks, each extending a distance on said shaft equal to the space between the heads b and b' of the mandrel B<sup>2</sup>, lying opposite thereto, as shown. The shaft D has a sleeve D' journaled on it of an internal diameter slightly greater than the external diameter of the shaft D, so that it can rock easily on the periphery of the screw-threads thereon, or on the extensions of the shaft, as at d,  
90 beyond the ends of the thread.

The rocking cord-guide arm D<sup>2</sup>, carrying the grooved guiding-pulleys d' and d<sup>2</sup>, is pivotally secured to the sleeve D', with its free end overlying the mandrel. The upper side or wall of this sleeve D' is perforated to permit the insertion of a rock-shaft E, journaled in an upright sleeve F, secured through a suitable base-plate F' and screws F<sup>2</sup> to the upper face of the sleeve D'.

To the lower end of the shaft E is secured  
100 a shoe or tongue e, made triangular in form and curved from its point e' to its heel e<sup>2</sup> to



conform to the periphery of the shaft D, on which, between the screw-threads thereof, said shoe rests and moves. This shoe conforms in shape, substantially, to one-half of one of the double-pointed sections *a* of the right and left hand screw-thread, so that when its heel end is in line with the widest or most nearly contiguous portions of two adjacent sections of said thread the point of the shoe can be vibrated to cause the shoe to follow either the right or left hand spiral track or thread, and so reverse the direction of its lateral movement by the screw, as required.

The shaft E has a collar E' on it adjacent to the shoe *e*, which overlies and rests on adjacent screw-threads of the shaft D and underneath the bearing of shaft E in sleeve F and prevents end-play of the shaft E. A flat spring *g* is secured to the side of the sleeve D', and its bent free end *g'*, passing through an opening in the sleeve, rests on the point of the tongue or shoe *e* at one side or the other thereof, and serves to hold it against accidental displacement or movement from one path or track to the other.

The upper end of the sleeve F has an annular flange or head *f* formed on it, and upon said head the bifurcated end of a lever H rests, said lever surrounding the shaft E and its arms *h'* and *h'* embracing between them a spring *i*, bent into U shape, and the loop of which embraces and is free to turn on the shaft E as the lever H is vibrated. The arms of the spring *i* rest between upturned spurs *h*<sup>2</sup> on the ends of the arms *h'* and *h'*, as shown. The opposite end of the lever H is provided with an upright spur or pin *h*, for a purpose which will appear.

Directly over the lever H is a shifting-fork J, a bottom view of which is shown in Fig. 8. It is provided with a cylindrical hub, which surrounds and is fastened by a pin J or otherwise to the shaft E. The arms *j'* and *j'* of this fork are provided with pendent spurs *j*<sup>2</sup>, which stride the extended arms of the spring *i* and rest in contact with the outer faces thereof.

The frame A has standard elbow-shaped brackets L L' secured to it, the horizontal upper ends or arms of which overhang the screw-shaft D, and upon these arms are secured by suitable bolts *l'* two parallel bars K and K'. The ends of these bars, resting on the brackets, are expanded in width and slotted transversely of such width to permit the adjustment of the bars forward and backward or nearer to or farther from each other on the bolts *l'* for limiting the vertical movements of the cord-guide arm D<sup>2</sup>. The inner or rear face of the bar K, controlling the uplift of the cord-guide arm, is cut away between the points *k k'*, marking the ends of the transverse movements of the pin *h'*, upon which the bars K and K' act for reversing the movement of the cord-guide, and this cut is rounded at said points *k* and *k'* for giving rounded

outer ends to the layers of cord and ball, as desired. The pin *h* on the lever H reaches up between the bars K and K' and is acted on thereby as the cord-arm is raised or lowered for vibrating the lever, and with it the shoe *e* for reversing the direction of movement of the cord-arm. The lever H acts through the U-shaped spring *i* on the arms *j' j'* of the shifting-fork, its first action being to deflect one of the arms of the spring by its pressure against one of the arms of the shifting-fork and the resistance of the shoe due to its position relative to the screw-thread or the pressure of the spring *g* until the resistance of said spring *g* and the shoe is overcome, when the spring acts to throw the point of the shoe *e* quickly to the opposite track to that in which it was previously moving, and so to reverse the direction of its lateral movement in a manner that will be readily understood. By making the tongue or shoe short and tapering from heel to point, as explained, it can be readily vibrated from the right to the left hand spiral track or way, and vice versa, at any point where said tracks or ways intersect each other, which is indispensable to the winding of the layers in the tapering form described in my former patent referred to, and which is effected through the rising and falling movements of the cord-guide arm acting on the pin *h* to bring it into contact with the bars K and K', and thus, through the connections described, to reverse the shoe *e* and the direction of movement of the cord-arm, as required. The inclined walls *a'* at the ends of the screw-threads serve to automatically reverse the shoe at said ends whenever the shoe reaches them. *m* indicates a guide-eye on the sleeve F, through which the cord passes to the guide-pulleys *d'* and *d'*. It will thus be apparent that the shifting of the shoe *e* is effected in two different ways and at four different points—viz., the two ends of the double screw-threaded shaft D and the two bars K and K'.

The operation of winding the ball may be briefly described as follows: The machine is started with the cord lying on the mandrel at the right-hand end thereof, as shown in Fig. 1. The pin *h* being in engagement with the bar K', the cord-arm at first tends to feed toward the right; but this movement is quickly changed by the engagement of the shoe with the right-hand end of the screw-rod, which makes the cord-arm tend to feed toward the left. Meanwhile a layer or two of cord has been laid on the mandrel, and the instant the end of the cord-arm has traveled over the same and reached the plane of the mandrel again it is once more shifted to the right, and then back again to the left, as before described. Thus it is seen that the initial movement of the cord-arm is merely a sort of wobbling or vibration within very short limits until a considerable "bunch" of cord has been laid, forming a tapering or conical base. The machine thus continues to operate until the ball is of



the desired diameter (regulated by the position of the bar K) at the right-hand end of the mandrel, when the pin *h* (as the cord-arm moves to the right) strikes the bar K, the latter henceforth acting in place of the end of the screw-thread to shift the shoe *e*. The shifting is now done entirely by the bars K and K' until the cord reaches the left-hand end of the mandrel and begins to fill up against the disk *b*, when the end walls *a'* of the double thread at the left hand act to do the shifting in lieu of the bar K', which can no longer act for the reason that the cord-arm cannot descend sufficiently close to the mandrel to bring the pin *h* against said bar K'. The shifting is henceforth done by the said wall *a'* at the left-hand end of the double thread and by the bar K, when the cord-arm moves to the right until the ball is completed.

By the employment of the screw-shaft with its right and left hand spiral ways and the pivoted shoe moving in said ways, as described, I am enabled to dispense with the band-pulleys running in opposite directions and the shifting-clutches heretofore employed for reversing the movement of the shaft, as under the arrangement described the cord-guide-actuating shaft is rotated continuously in one direction.

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

1. In a machine for balling cord, a shaft having duplex reverse intersecting threads, in combination with a cord-guide arm journaled on said shaft and adapted to rock thereon as a center, a tongue or shoe pivotally connected with said cord-guide arm, and means for automatically shifting said tongue or shoe at any point along the said shaft, as specified.

2. In a machine for balling cord, a shaft having duplex reverse intersecting threads, in combination with a cord-guide arm journaled on said shaft, a tongue or shoe pivotally connected with said cord-guide arm, and means controlled by the movements of the cord-guide arm for shifting said tongue or shoe at any point along the shaft for changing

the direction of travel of said cord-guide arm.

3. The combination, in a machine for balling cord, of the cord-guide-actuating shaft provided with intersecting spiral ways, the cord-guide arm pivoted on said shaft, the tongue or shoe pivotally connected with said arm and moving in said ways, the shifting-lever connected with said shoe, and the parallel bars on the frame acting on said lever for vibrating the shoe from one to the other of said spiral ways, substantially as described.

4. In a machine for balling cord, the cord-guide arm, the screw-shaft having the intersecting right and left hand spiral ways, and the pivoted shoe traveling in said ways for actuating the cord-arm, in combination with the lever for vibrating said shoe from one spiral way to the other and parallel bars for vibrating said lever, one of which is cut away or deflected from a right line on its operative face for shaping the ends of the layers of cord, substantially as described.

5. The combination, with the screw-shaft having the intersecting right and left hand spiral ways, of the cord-arm pivoted to vibrate on said shaft, the shoe pivotally connected with said cord-arm and traveling in said ways, means, substantially as described, for vibrating said shoe, and a spring bearing against said shoe for holding it in its shifted position and against accidental displacement, substantially as set forth.

6. The combination, in a machine for balling cord, of the pivoted cord-guide arm, the right and left hand screw and the shoe engaging said screw for actuating said arm, the shifting-fork, lever, and spring for vibrating said shoe, and the adjustable parallel bars operating on said shifting-lever for vibrating said shoe, substantially as and for the purpose described.

In testimony whereof I have hereunto set my hand this 5th day of February, A. D. 1891.

ANDREW C. MILLER.

Witnesses:

A. WOODRUFF,  
J. LAURENE PAUL.