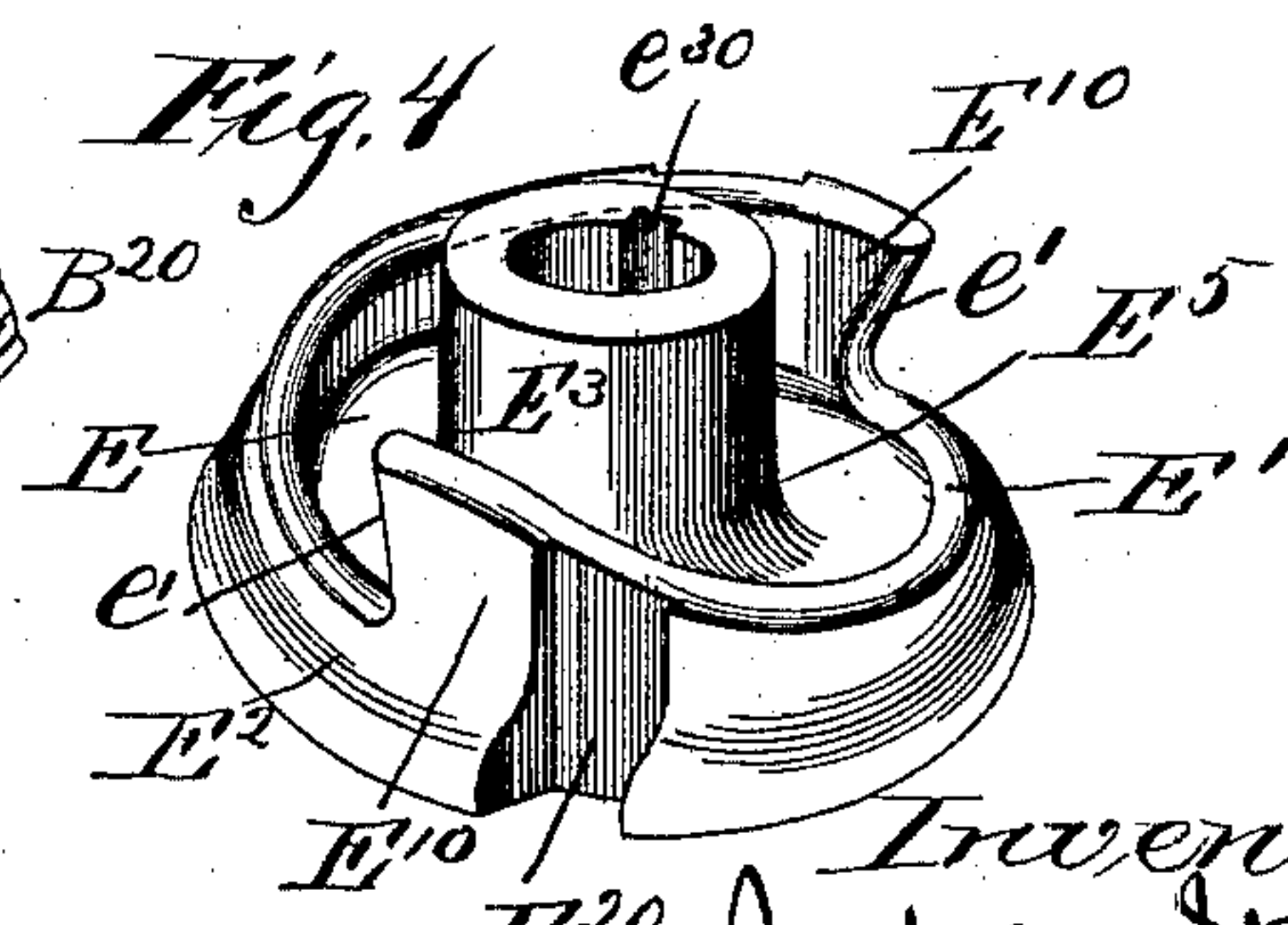
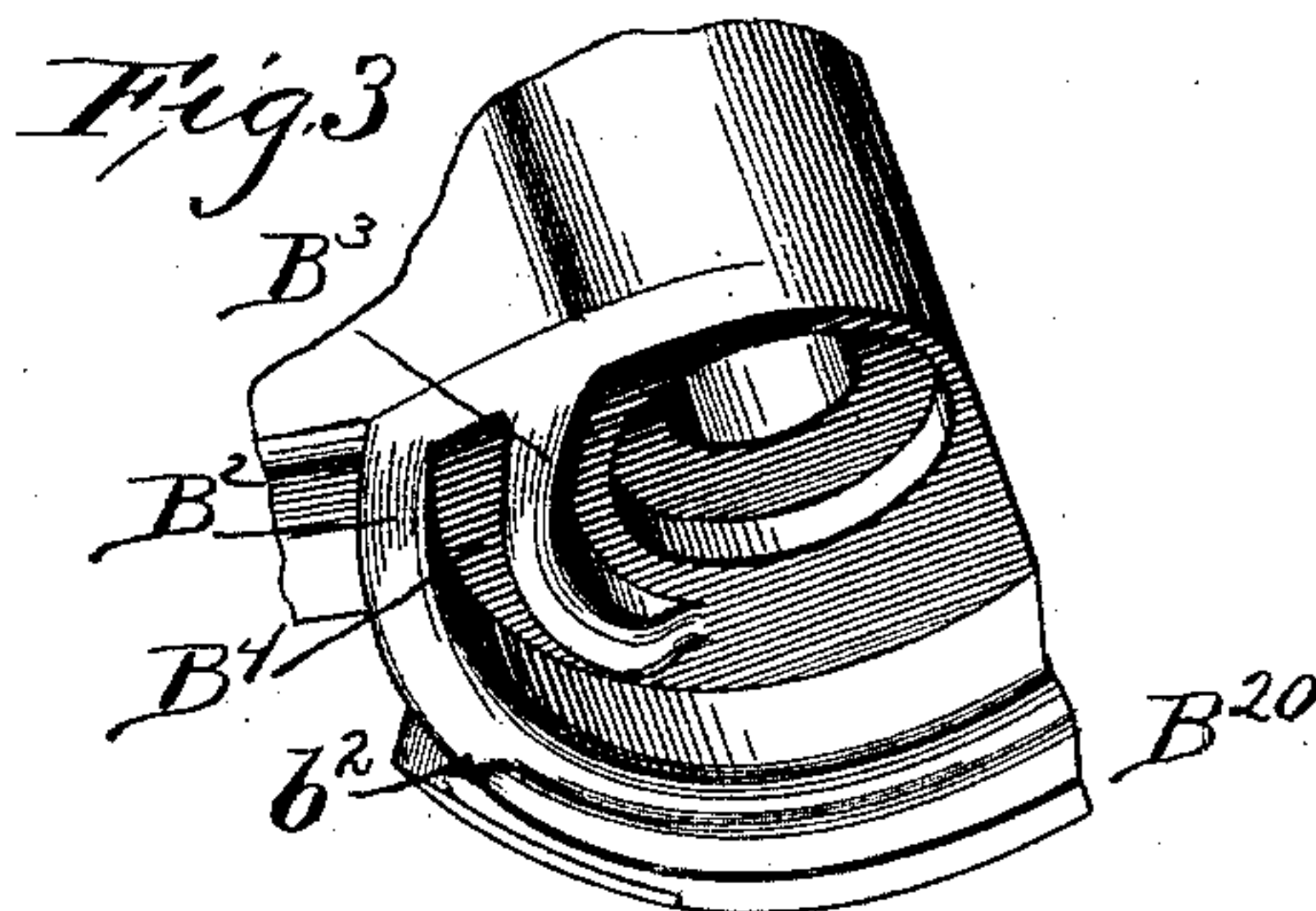
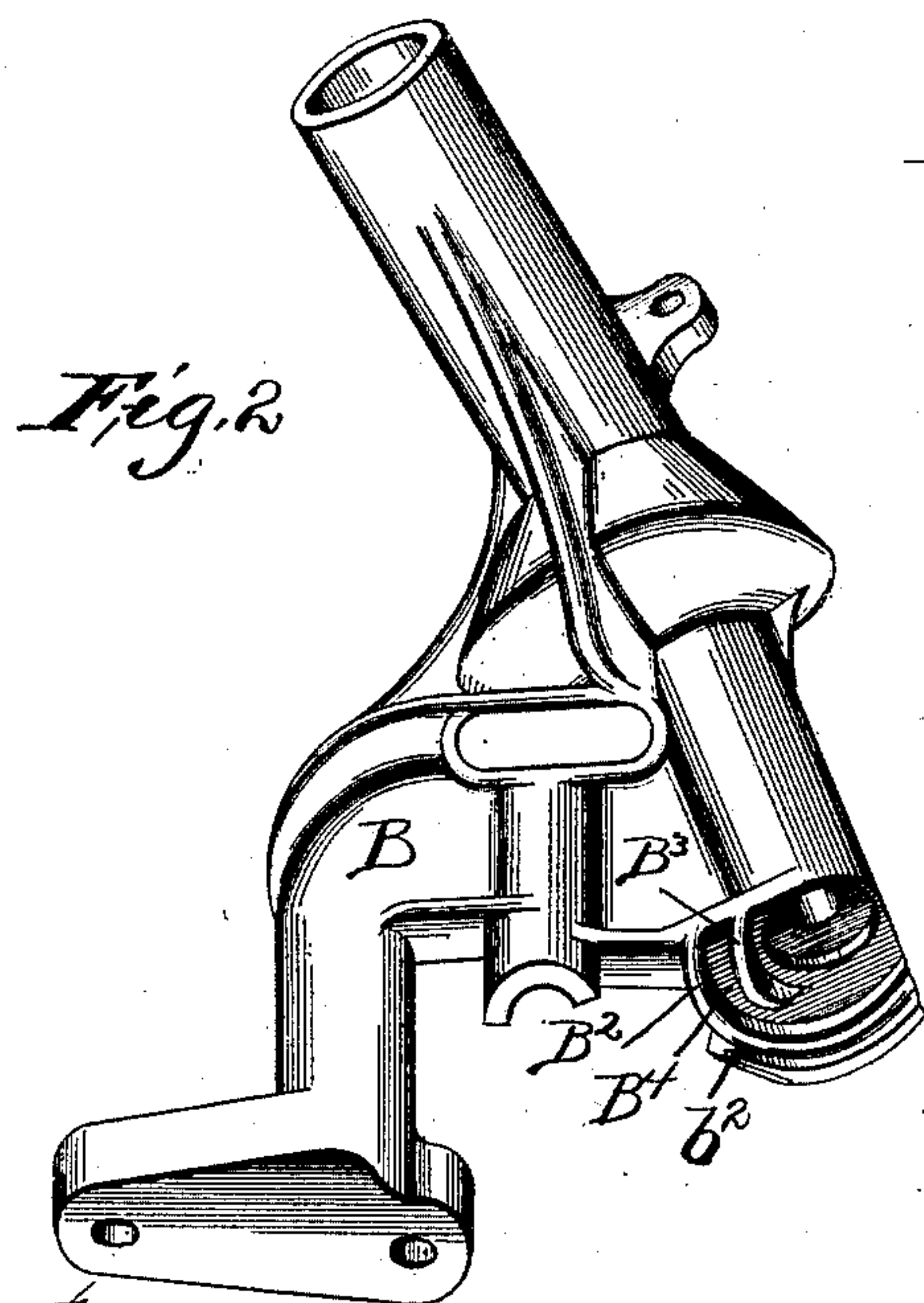
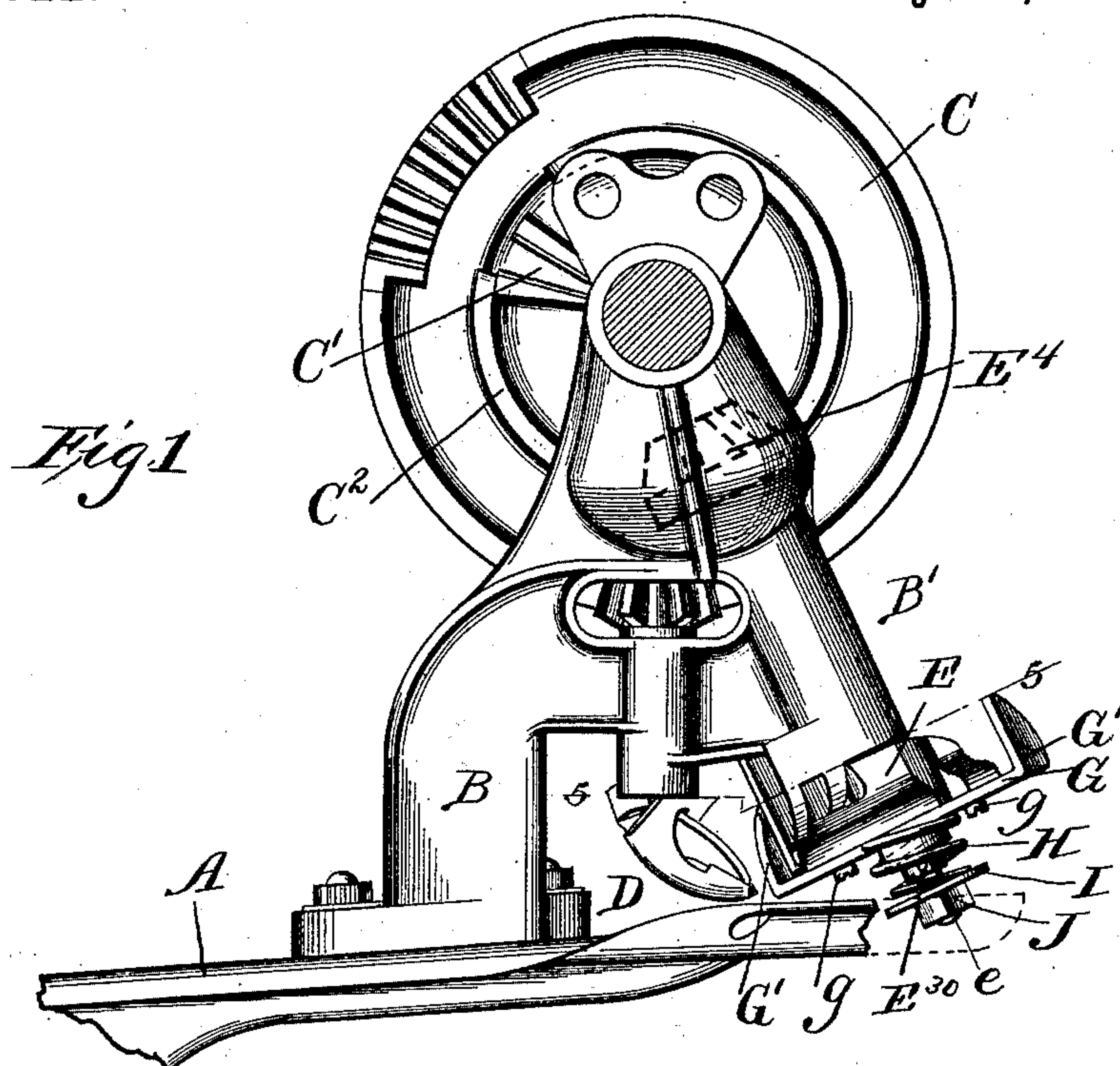


3 Sheets—Sheet 1.

No. 475,822.

Patented May 31, 1892.



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(No Model.)

3 Sheets—Sheet 2.

A. STARK.
CORD KNOTTER FOR GRAIN BINDERS.

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Fig 5

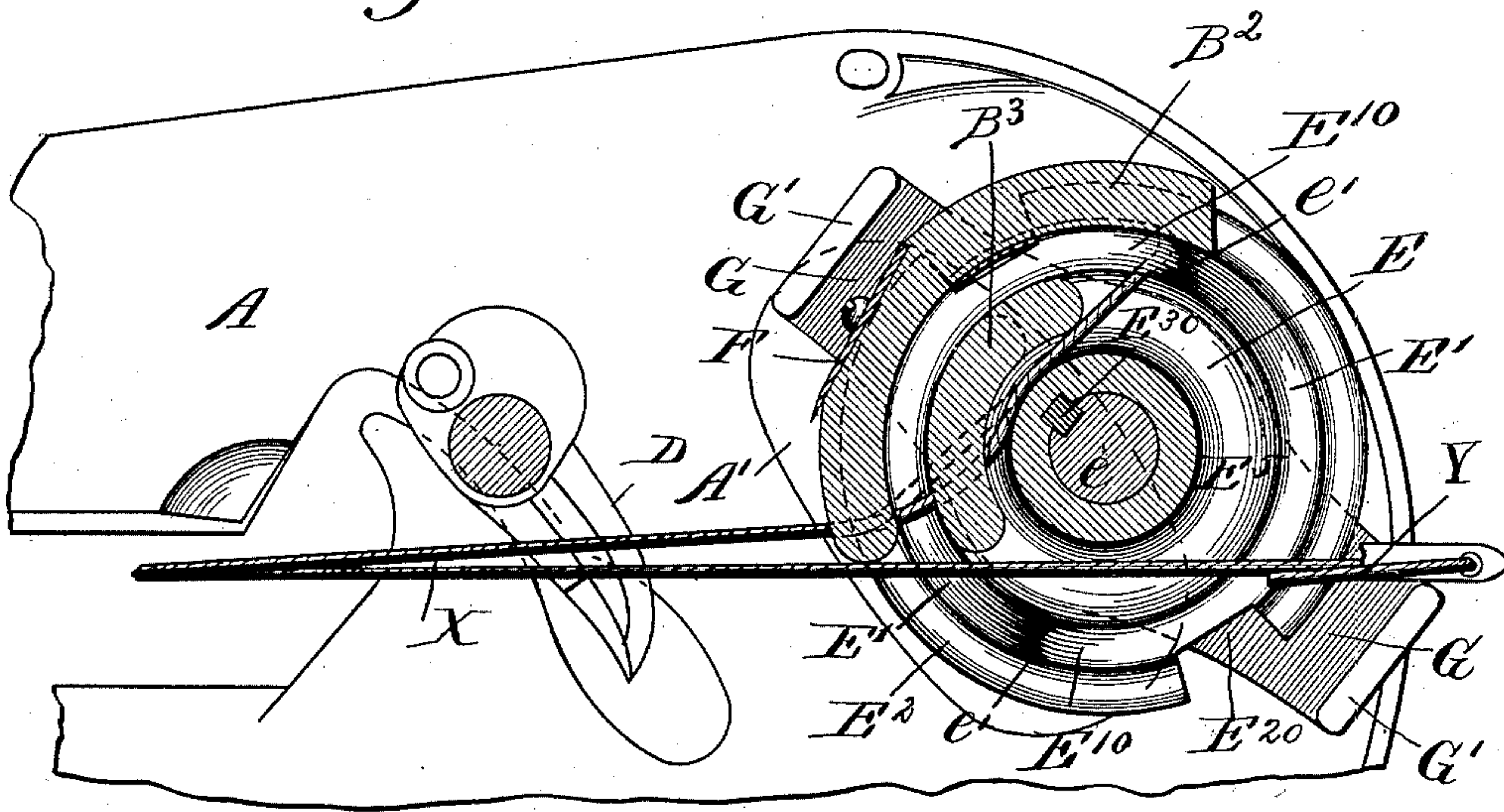
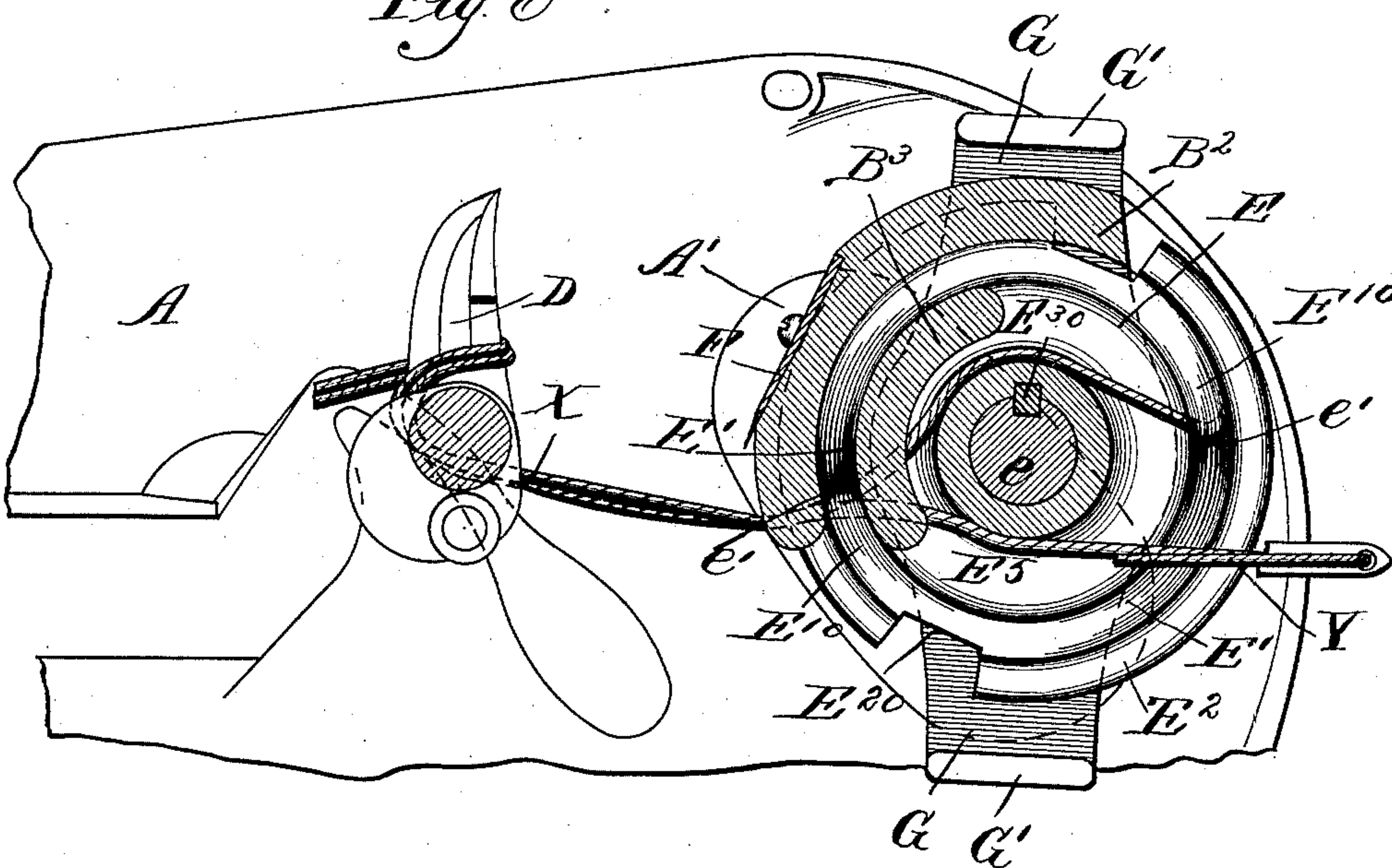


Fig 6



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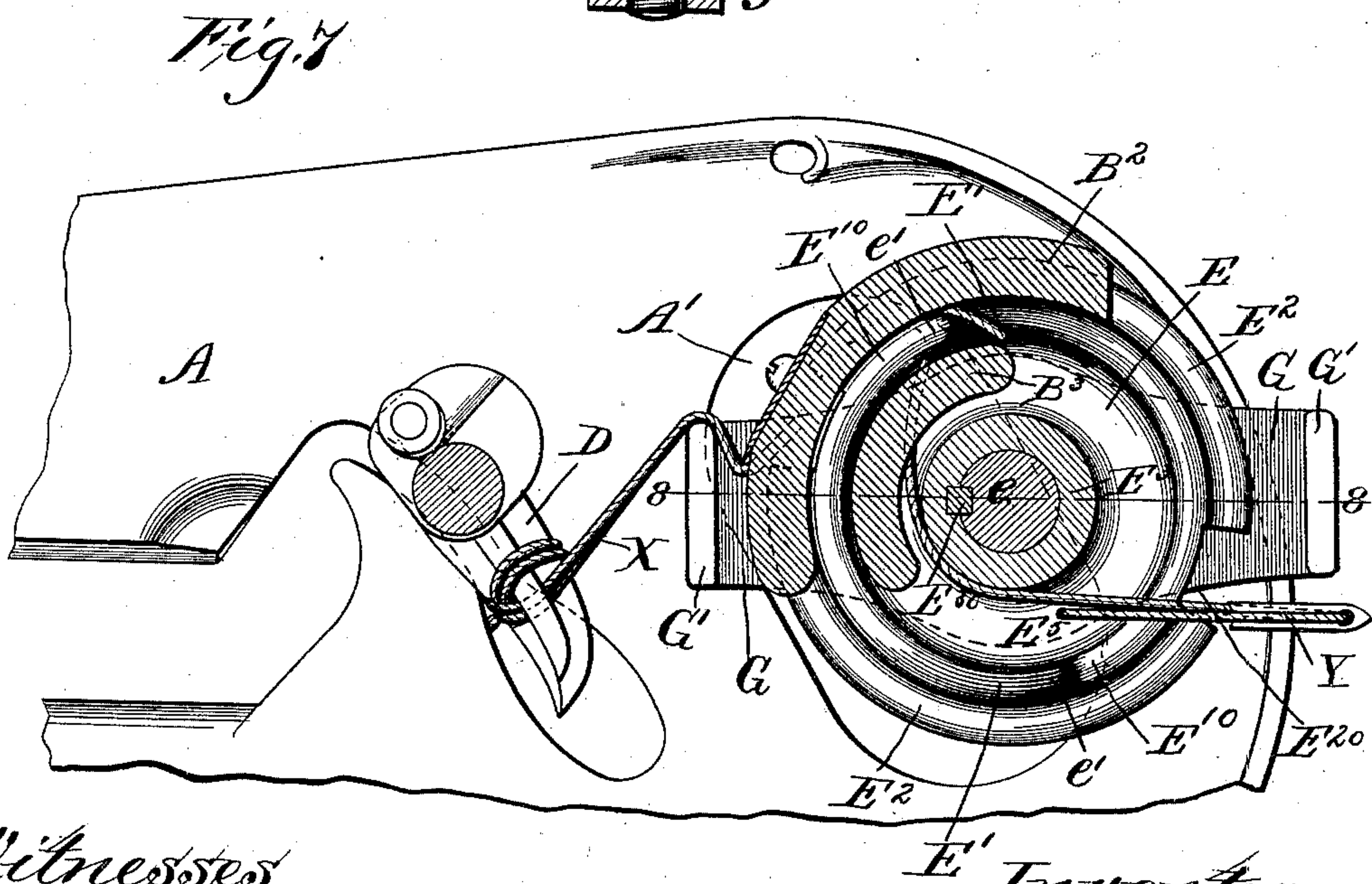
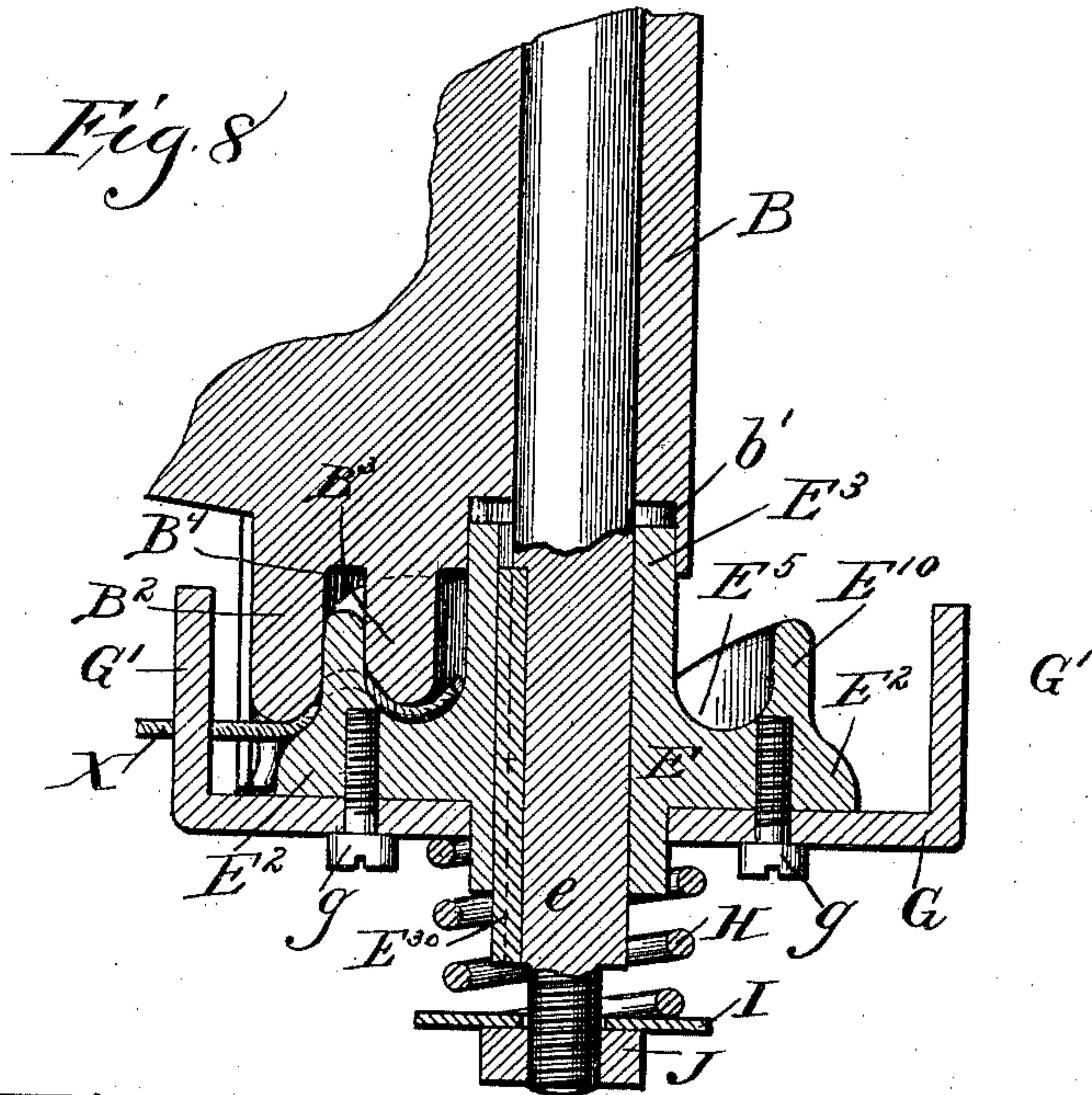
(No Model.)

3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

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CORD-KNOTTER FOR GRAIN-BINDERS.

SPECIFICATION forming part of Letters Patent No. 475,822, dated May 31, 1892.

Application filed October 17, 1891. Serial No. 409,063. (No model.)

To all whom it may concern:

Be it known that I, ANDREW STARK, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Cord-Knotters for Grain-Binders, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.
In the drawings, Figure 1 is a front elevation of a knotter-frame and knotting mechanism in the position of rest. Fig. 2 is a perspective of the frame. Fig. 3 is an enlarged detail perspective of the end of the holder-shaft bearing, which comprises a fixed saddle for the holder. Fig. 4 is a perspective of the holder-disk. Fig. 5 is a sectional plan at the planes indicated by the broken line 5 5 on Fig. 1, showing the parts at position of rest. Fig. 6 is a similar view showing the parts in the position occupied after the knotter-bill has made about five-eighths of its revolution and showing the holder just releasing at one end and having grasped at the other the holder-cord. Fig. 7 is a similar view showing the holder and knotter-bill in the position occupied just prior to the severing of the cord. Fig. 8 is a section at the line 8 8 on Fig. 7.

A is the breast-plate.

B is the knotter-frame.

C is the knotter-actuating wheel.

D is the knotter-bill.

E is the holder-disk.

F is the knife for severing the cord.

G is an arm rigid with the holder-disk, which forces the cord into the knotter-bill and against the knife.

H is a spring, which operates upon the holder-disk to force it up into the saddle.

I and J are respectively a washer and nut on the end of the holder-spindle *e*, by which the spring H is retained and between which and the holder-disk it reacts.

The holder employed in this machine is of a form commonly known as "crown-disk" or "cup-holder," being modified in some respects from any crown-disk holder heretofore shown. It is adapted to co-operate with a fixed saddle to hold the cord, such saddle being formed rigid with the knotter frame or bearing of the holder-spindle, and, as illustrated, it is formed

integrally with said frame and bearing, comprising the flanges B^2 and B^3 , with the intervening groove B^4 concentric with the axis of the holder-shaft bearing, all on the side of the holder-shaft bearing toward the knotter-bill spindle-bearing. The holder-shaft *e*, journaled in the frame in the customary manner, is driven by the engagement of the pinion E^4 , fast at its upper end with the segment-rack C' of the knotter-actuating wheel C. The pinion E^4 has two delay-surfaces at opposite sides co-operating with the delay-surface C^2 of the knotter-actuating wheel to hold the pinion, its shaft, and the holder thereon at rest during the intervals between the engagement of the segment-rack C' , so that the holder is given half a revolution for each complete revolution of the knotter-actuating wheel C—that is to say, for each knotting operation. The holder-disk E is feathered on the shaft *e*, meaning by this word "feathered" to cover any connection by which the disk is adapted to have motion longitudinally on the shaft while it is rotated thereby. Preferably the shaft-bearing at the lower end is rabbeted or enlarged, so that the hub E^3 of the holder-disk is admitted into such enlargement, which is seen at b' in Fig. 8 and which is deep enough to allow for the longitudinal movement of the holder permitted by the spring H without causing the end of the hub at any time to emerge from said cavity. The advantage of thus housing the end of the hub in the bearing is that thereby there is avoided all danger of lodgment of cord ends or straw or refuse upon the upper end of the hub, between it and the lower end of the bearing, which might embarrass the action of the holder. A key or feather E^{30} is shown in Figs. 7 and 8, taking into a groove e^{30} in the hub of the holder (see Fig. 4) and serving as the connection for purposes of rotation between the shaft *e* and the holder-disk E. The shaft extends down through the hub, emerging therefrom at the under side of the holder, protruding some distance, and at the end it is adapted to receive the nut J and the washer I above the nut, between which and the bottom of the holder there is coiled about the protruding end of the shaft the spring H, which, reacting upon the nut and washer and thereby upon the shaft E at one end, operates

at the other end upon the holder, tending to force it upward on the shaft.

The holder E has its flange E' comprising two segmental portions E¹⁰ E¹⁰, with an interval between them, whereby it is adapted to perform its function twice in each complete revolution, the upstanding advancing edge e' of each flange-segment being adapted to engage the cord and carry it under the saddle, the flange passing through the saddle and emerging therefrom at the farther limit, releasing the cord at proper times and discharging the fag ends. The details of this operation will be hereinafter described.

The knife F is secured rigidly to the outer side of the outer wing or rib of the saddle, or, to state the position more generally, it is secured to the bearing of the holder-shaft at the side toward the knotter-bill, the cutting-edge of the knife being a little rearward of the plane which contains the axes of the bill and holder. The cord is carried against this knife in the knotting operation by the upstanding finger G' of the arm G, rigid with the holder-disk, and the exact time of cutting with respect to the other processes is thereby determined by the location of this arm on the holder, as hereinafter explained. The holder, having duplicate members on opposite sides of an axial plane, has necessarily two of the arms G with upstanding fingers G', and preferably these arms are both formed on a single plate, which is apertured at the center to permit it to be passed onto the hub of the holder and which may be secured to the holder by screws g. To all intents and purposes it is a part of the holder-disk, which may be made in a separate piece and afterward attached, if found more convenient than to make it integral with the disk.

The holder-disk comprises, besides the upstanding flange E', a flange E², which protrudes horizontally at the base of the holder, its upper surface, however, being blended in flowing curves with the upright outer wall of the flange E'. The upper surface of the holder-disk inside the upright flange, between the latter and the hub, is upwardly concave, and is denoted by the letter E⁵, merging in the inner upright wall of the flange E'. The flange E' is adapted to pass easily, but without much room to spare, through the groove B⁴ of the saddle, and the lower edge of the inner rib or wing B³ of the saddle is conformed approximately to the concave surface E⁵ of the holder-disk, and the outer wing or flange B² of the saddle is conformed to the ogee curve of the flange E² for a short distance at the forward end. This flange has the part B²⁰, which extends down outside of the convex curve of the ogee flange E², cut away back to a point a little rearward of the edge of the knife F, forming at that point a shoulder, which is recessed and constitutes a notch b². The operation of this holder is as follows: At the conclusion of each knotting operation the holder-cord X is left in the holder at the posi-

tion shown in Fig. 5, the end which has just been severed by the knife lying under the flange B² between it and the ogee flange E² of the holder-disk, but with the extreme end just at the notch E²⁰, or barely reaching across it, and held chiefly by being grasped between said flanges B² and E² at the portion extending from the most advanced edge of the notch E²⁰ to the upstanding edge E', which has been concerned in the knotting operation just finished, and, being folded around that upstanding edge it extends past the rear end of the flange B³, between it and the upwardly-concave surface E⁵ of the holder disk, and thence, being folded under the forward edge of said flange, extends out over the edge of the flange E¹⁰ of the holder-disk and under the overhanging edge of the flange B² and thence over the knotter-bill. The strain of packing the bundle may draw this cord farther under the flange B³, and such an alternative position of the cord is illustrated in dotted line in Fig. 5. In any event it will be in the first place firmly grasped between the flanges E² and B², with whatever firmness the spring H is able to give in such grasp, and it will be held more or less wedged under the forward end of the inner flange B³, if it is not pulled positively and entirely under that flange. The pressure of the spring is designed to be made sufficient, so that in view of the positive grasping of the cord between the saddle-flanges and the holder-surfaces, and particularly in view of the folding of the cord sharply around the upstanding edge e' of the holder-flange segment E¹⁰, very little, if any, cord will be drawn through the holder during the packing of the bundle.

When the spool-cord Y is by the needle laid alongside the holder-cord, the knotter-bill and holder start at about the same instant, and by the time the knotter-bill has made five-eighths of a revolution the upstanding edge e' has entered the saddle, carrying both cords with it, and by the same movement the notch E²⁰ of the other segment is brought opposite the end of the outer flange B² of the saddle and the holder end of the cord is thereby released; but in order that the end may not be thus released until after the same cord has been carried into the saddle far enough so that the grasp of the saddle and holder flanges upon it at the mouth of the saddle is sufficient to prevent its escape the flange or wing B² must be long enough to reach from the advance edge of one of the holder-segments on around in the direction of rotation as far as to the remote edge of the notch which pertains to the other segment. The rotation of the knotter up to this stage will have drawn some cord through the holder, if the bundle is very tight, or otherwise it may have taken all needed cord from the bundle. From this point on both cords are carried together by the advancing edge e', while the knotter-bill continues its revolution, the jaws opening and receiving the cord at the position shown in

Fig. 6. During this portion of the revolution of the knotter it will probably draw some portion of the cord needed for the knot through the holder; but just after passing this position the upstanding finger G' of the arm G , having now collided with the cord which is stretched from the knotter-bill to the holder, forces the cord back into the jaws of the bill, and the heel of the vibrating jaw, being now released from its controlling-cam, is pulled shut, thereby affording a small amount of cord, which is, however, taken up immediately by the arm G as it folds the cord back over the knife-edge. The taper of the bill, permitting the cord to slide forward on it, will also afford a little more cord at this stage, and there may be a little cord yielded through the holder; but the principal effect of the continued motion after the bill passes the position shown in Fig. 6 until it reaches that shown in Fig. 7, which is the position of rest, is to tighten the cords on the bill and strain the cord against the knife and cause it to be severed. It is immaterial how soon after the knotter comes to rest in the position shown in Fig. 7 the cord parts at the knife-edge, and this will depend upon the condition of cord and knife and tension of the spring; but in any event the cord will part at some stage after the knotter-bill comes to rest and before the holder completes its rotation and comes to rest in the position shown in Fig. 5. The fag end of cord will be carried out from under the saddle-flange B^2 at the same time substantially or very soon after the holder end is released by the notch, and whenever said fag end does thus pass beyond the grasp of the saddle it will slide off from the sloping surface of the flange E^2 and probably drop outside the breast-plate. If it should chance to lodge on the breast-plate, it will escape through the opening A' .

I claim—

1. In a cord-knotter, in combination with a knotter-actuating wheel, the knotter-frame, the holder-shaft journaled thereon and having a beveled pinion rigid with it engaged and actuated by suitable teeth on the knotter-actuating wheel, the holder-saddle rigid with the frame and the crown-disk holder feathered on the holder-shaft at the opposite

end of the bearing of the latter from said beveled pinion, and the spring which yieldingly forces the holder toward said bearing and into the saddle, whereby the movement of the holder as the spring yields and reacts is effected without affecting the relation of the pinion to said actuating-wheel, substantially as set forth.

2. In a cord-knotter, in combination, substantially as set forth, the rigidly-fixed saddle, the crown-disk holder movable in the direction of its axis and having its upstanding flange adapted to pass through the saddle as the holder revolves and having also the horizontal or flaring flange E^2 , the saddle having its outer wing or flange B^2 shaped at the lower edge to conform substantially to the flange E^2 of the holder, and the spring which tends to cause the cord to be yieldingly grasped between the flanges B^2 and E^2 .

3. In a cord-knotter, in combination, a cord-holder having upstanding segmental flanges to engage the cord and having recesses E^{20} on the outer face of the flanges in position to allow the release of the cord, as and for the purpose set forth.

4. In a cord-knotter, in combination, substantially as set forth, a rigidly-fixed saddle, a crown-disk holder and the spring which forces it yieldingly toward the saddle, the holder having the notch E^{20} , and the saddle having its outer wing B^2 extending through an arc not less than that from the advance edge of one of the segments E^{10} of the holder to the more remote side of said notch, measuring in the direction of rotation of the holder.

5. In a cord-knotter, in combination, substantially as set forth, a revolving cord-holder disk having an upstanding flange to receive and carry the cord and an outwardly-extending flange at the base of the upstanding flange adapted to assist in holding the cord, and a cord-clamp adapted to co-operate with said flanges.

In testimony whereof I have hereunto set my hand, at Chicago, Illinois, in the presence of two witnesses, this 6th day of October, 1891.

ANDREW STARK.

Witnesses:

CHAS. S. BURTON,
JEAN ELLIOTT.