

(Model.)

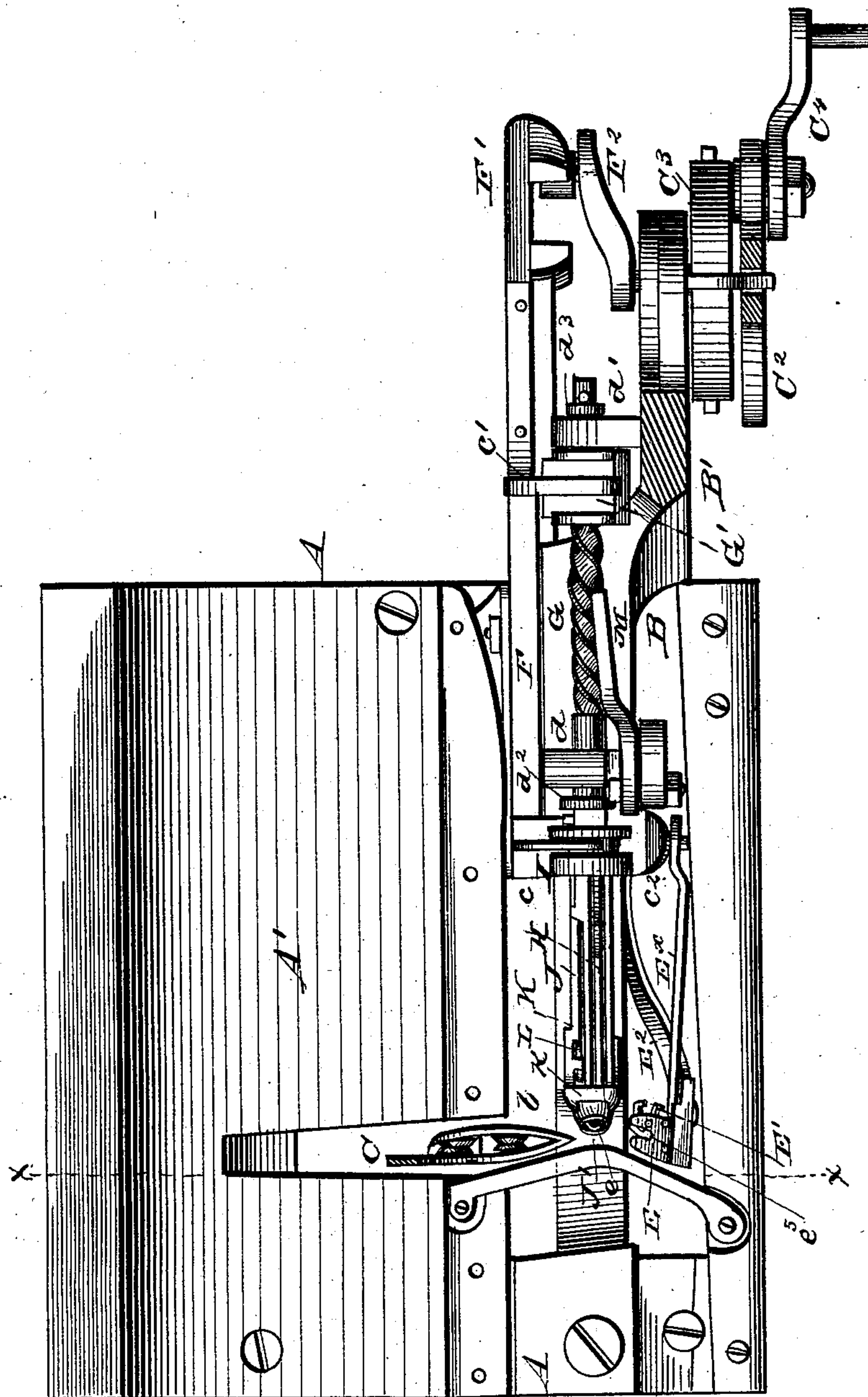
4 Sheets—Sheet 1.

C. LIDREN.
GRAIN BINDER.

No. 287,694.

Patented Oct. 30, 1883.

Fig. 1.



Witnesses:

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W. R. Keyworth

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by

W. Alexander

Attorney.

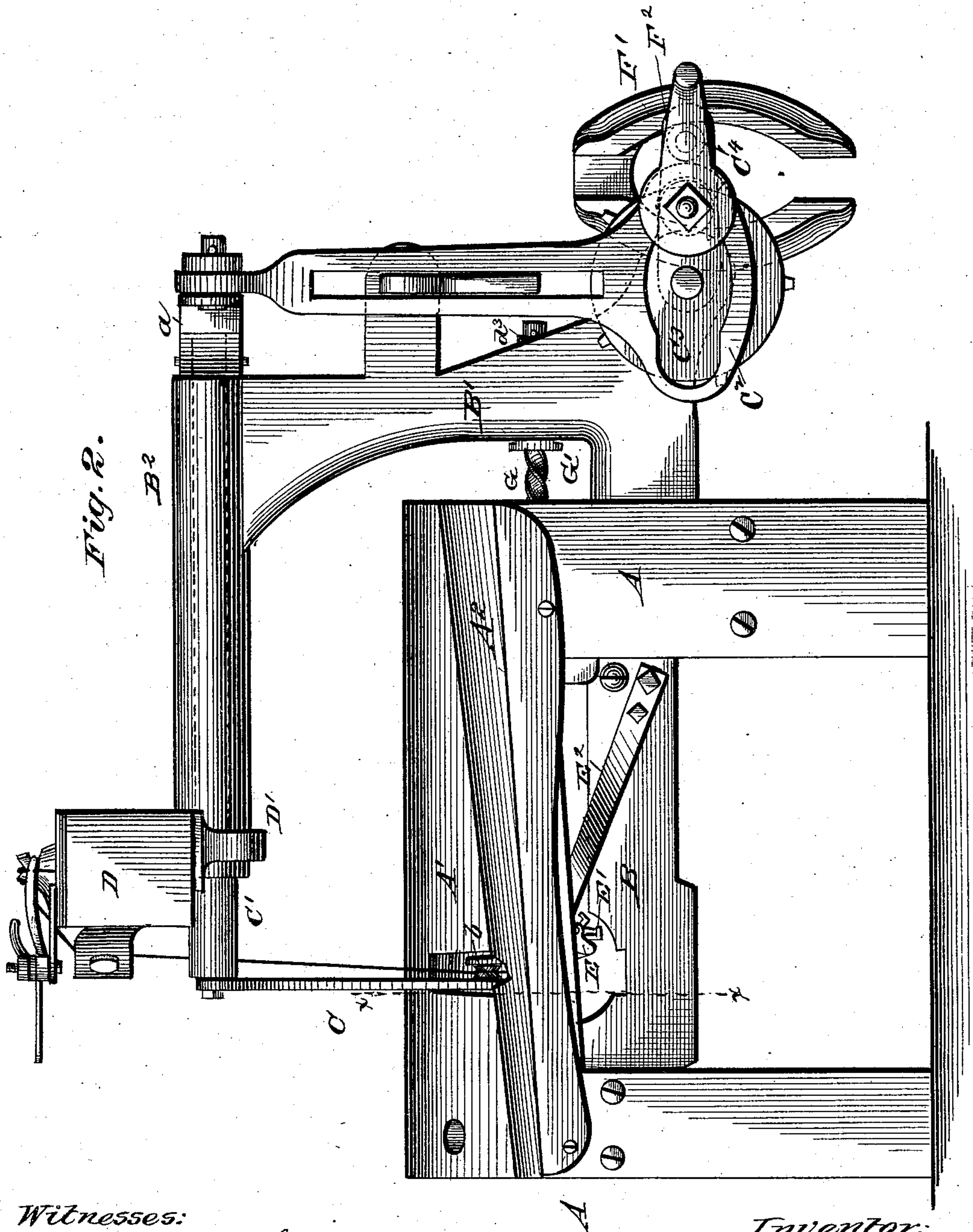
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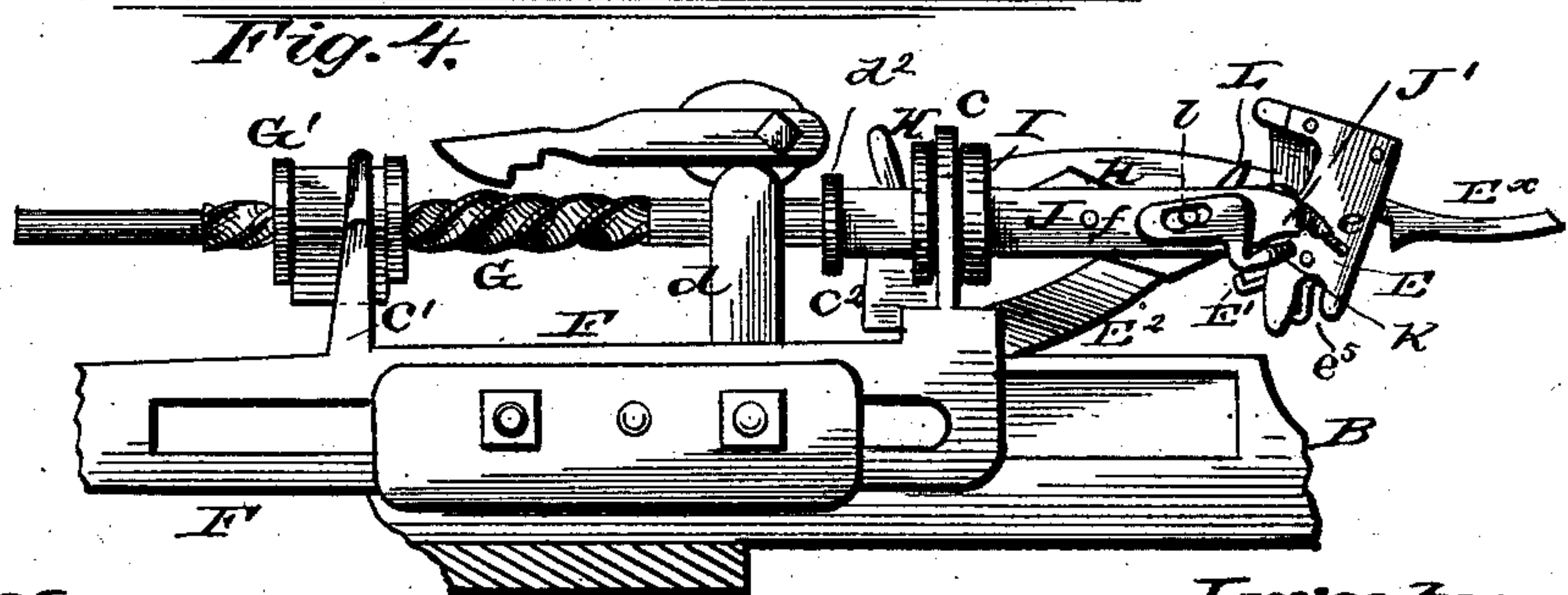
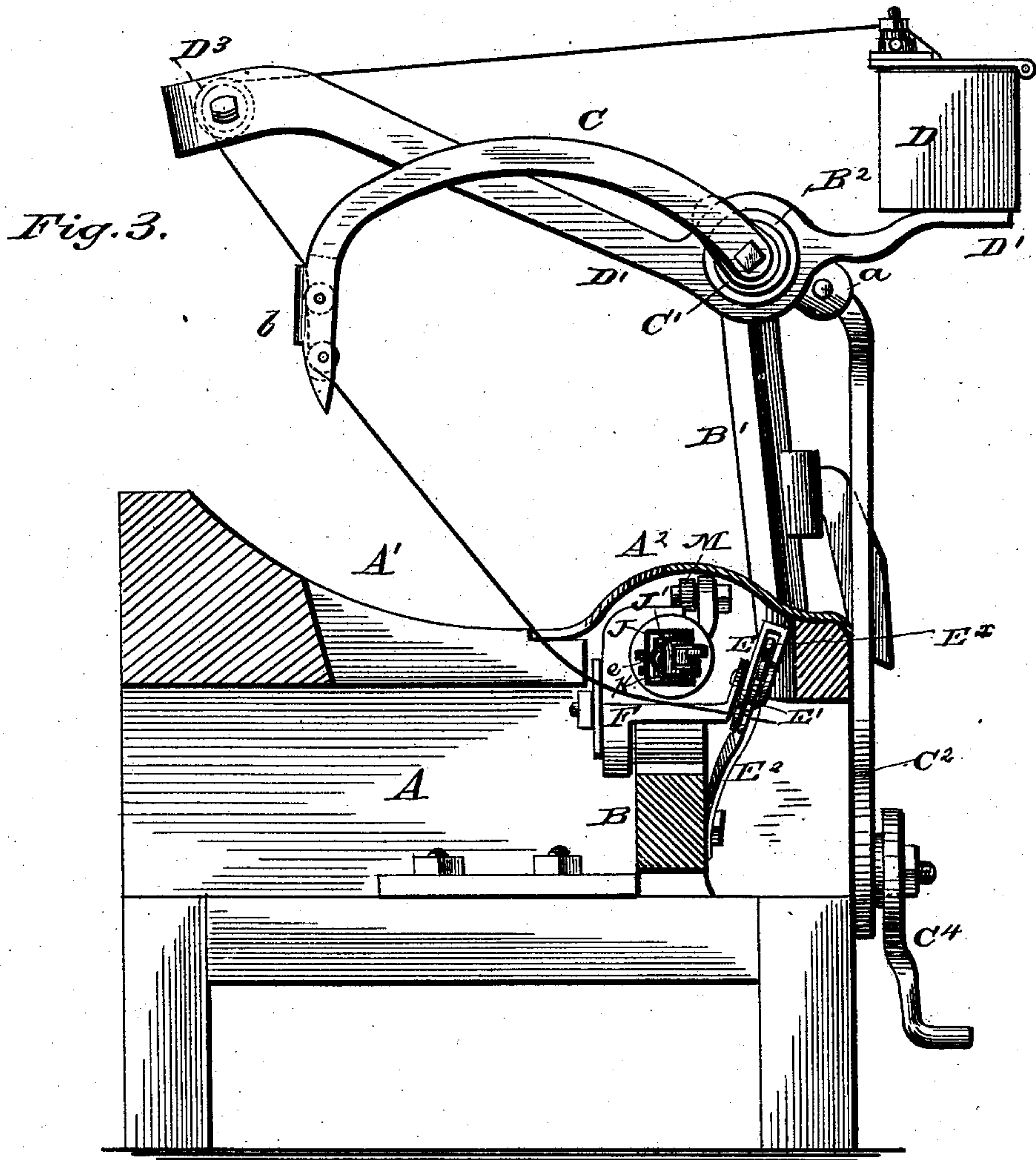
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(Model.)

4 Sheets—Sheet 4.

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Fig. 5.

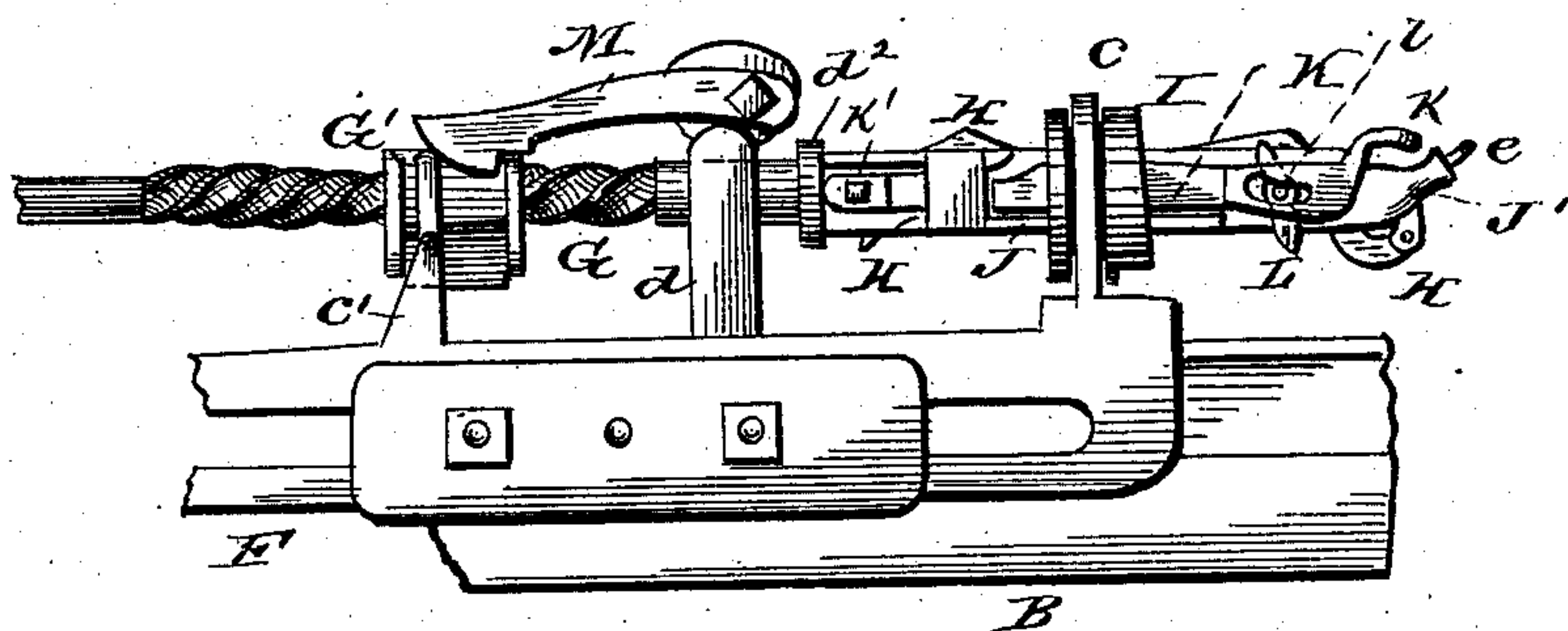


Fig. 6.

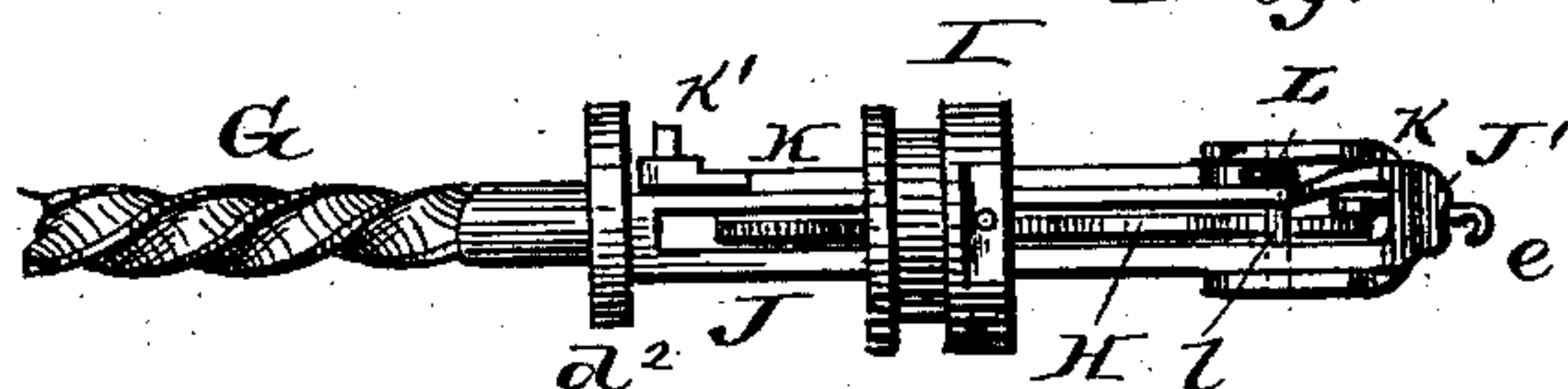
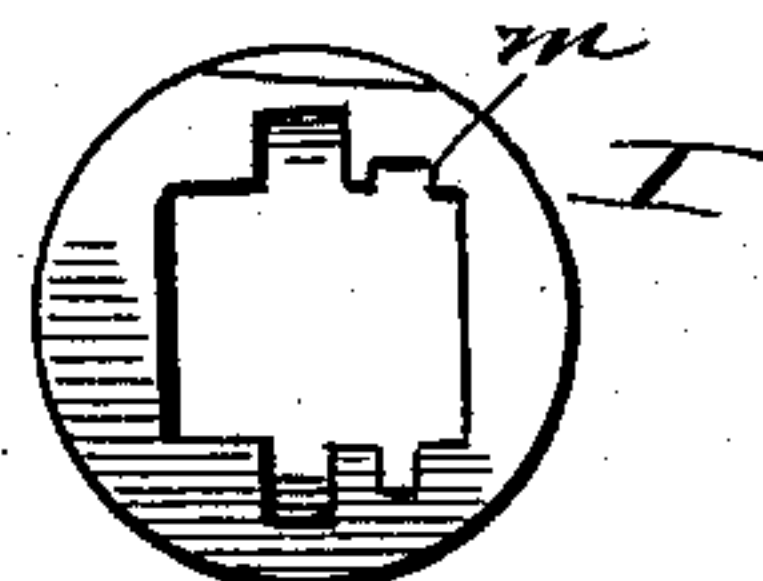


Fig. 7.



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UNITED STATES PATENT OFFICE.

CHRISTOPHER LIDREN, OF LAFAYETTE, INDIANA, ASSIGNOR TO HIMSELF
AND RELIEF JACKSON, OF SAME PLACE.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 287,694, dated October 30, 1883.

Application filed March 19, 1883. (Model.)

To all whom it may concern:

Be it known that I, CHRISTOPHER LIDREN, of Lafayette, in the county of Tippecanoe and State of Indiana, have invented certain new and useful Improvements in Grain-Binders; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 is a top view of my improved grain-binder, parts of which are broken away to show the knot-forming devices. Fig. 2 is an outer side elevation of the binding and knot-forming devices and the cams which are used to time the movements thereof. Fig. 3 is a vertical cross-section taken in the plane indicated by dotted line *xx* on Figs. 1 and 2. Figs. 4, 5, 6, and 7 are enlarged details of the knot-forming devices.

This invention relates to grain-binders which are applicable to harvesting-machines, and designed for tying a knot in a cord-band about a bundle of grain; and it relates to novel improvements on the binder for which Letters Patent have heretofore been granted to me on the 31st day of January, 1882, which improvements will be fully understood from the following description, when taken in connection with the annexed drawings.

The main frame A of the machine, as represented in the drawings, is simply designed to support the working parts of the binder, and may be constructed in any convenient manner adapted to the style of harvesting-machine with self-raking attachments to which it is desired to apply my improvements.

It will be seen that I show a concave receptacle, A', to receive the loose grain or gavel, and also a convex metal guard, A², to prevent the straws from becoming entangled with the knot-tyer and to aid in supporting the grain while it is being bound.

B designates the lower horizontal portion of a strong casting underlying the binding-table; B', the upright part thereof, and B² the upper horizontal tubular arm thereof, which latter extends over the supporting-table high enough to be out of the way of the gavels.

C designates a curved vibrating binder-

arm, which is fast on an oscillating shaft, C', that passes through the overhanging arm B², and bears a crank, *a*, on one end, to the wrist-pin of which is attached a guided pitman having a cam-slotted yoke, C², on its lower end. Through the yoke C² passes freely a wrist-pin, which is fixed eccentrically to the face of the wheel C³, and carries an ordinary friction-roller, and to this wrist-pin a crank, C⁴, is secured, to which a pitman-rod is applied (not shown in the drawings) for the purpose of operating it. By the revolution of the wheel C³ the curved binder-arm C receives vibration, and by the peculiar formation of the slot in the yoke C² the proper pauses of the binder-arm C will be obtained at the termini of its up and down strokes.

The free end of the binder-arm C is constructed with a pointed sheath, *b*, provided with grooved rollers, and through this sheath *b* the binding-cord passes from a spool-box, D. The spool-box D is secured on one end of an arm, D', fixed on the tubular overhanging arm B², on the opposite end of which arm D' is a guide-loop and a tension and guide wheel, D³. The cord passes from the spool in the box D through the top of the latter, and is acted on by an adjustable spring tension device. The cord thence passes around the tension-wheel D³ and through the sheath *b* of the binder or cord-delivery arm. This binder-arm is arranged in such a plane that it will deliver the binding-cord through or across a crotch, *e*⁵, made in the lower end of the bearing E for the intermittently-revolving cord holder and cutter E', actuated by a pawl, E^x, which bearing is on the free end of a spring-arm, E², that is rigidly secured to one side of the lower horizontal portion, B, of the main casting above described.

F designates a slotted endwise-reciprocating bar, which is suitably guided on one side of the portion B of the main casting, and which is provided with two bifurcated carriers, *c c'*, and also with an angular offset, *c*², to which is pivoted the hooked pawl E^x, that actuates the cord holder and cutter E'. On the rear end of the bar F is a bifurcated cam, F', of the form shown in the drawings, and between the concave forks of this cam works the wrist-pin of a crank-arm, F², which is keyed on the shaft

of the wheel C³. By curving the forks of the cam F', as shown, the proper pauses of the bar F will be obtained at the termini of its strokes.

G designates a worm-shaft, which is the knotter-shaft, and which is free to turn and also to receive endwise movements in stationary bearings *d d'*. The endwise movements of the knotter-shaft G are limited by stop-collars *d² d³*, and also by the throw of the forked carrier *c'* on the bar F, acting in the grooves of a nut, G'.

It will be seen that the rotary movements of the knotter-shaft G are transmitted to it by the sliding bar F and its forked carrier acting on the nut G', which is bored out to receive the worm of the knotter-shaft. I thus convert reciprocating motion into rotary motion.

It will also be seen that the transverse grooves in the upper and lower sides of the nut G' are of such width (predetermined) that the bar F has at certain times short endwise movements in dependent of the worm-shaft. The object of this will be explained hereinafter.

On the forward part of the knotter-shaft G, in front of the collar *d²*, is a longitudinally-slotted bar, J, the forward end of which terminates in a curved, tapered, and perforated nose, J'. Through this curved nose plays the hook *e*, which draws the ends of cord through the loop formed on the nose, and thus completes the knot.

The shank of the hook *e* is pivoted to an angular lever, H, which is pivoted in the slot of the bar J, and has its fulcrum at *f*. This hook is protruded and retracted at proper times by means of an annularly-grooved revolving hub or sleeve, I, which is caused to slide back and forth on the bar J by means of the forked carrier *c* on sliding bar F. The hub I is caused to revolve by the turning of the slotted bar J and its knotter-shaft G.

On one side of the bar J is a straight stiff bar, K, which is endwise movable and suitably guided. The front end of this bar K is forked at *k*, so that in its forward motion one fork will pass on opposite sides of the nose J', through which the hook *e* plays, for the purpose of catching and holding the cord during the act of forming the loop. The sides of this bar K, which lie on each side of bar J, are slotted diagonally, and a fixed pin, *l*, passes through said slots, as shown in the drawings. It will thus be seen that the forked end *k* of the cord catcher and looper moves inward toward the knotter-head, as well as forward to catch the cord.

L designates a short lever or dog, which is pivoted to the pin *l*. One end of this dog passes freely through a notch or groove in one of the sides of the bar K, and the other end of the dog is so located that as the annularly-grooved hub I is about to reach the terminus of its forward stroke said end will pass into a groove, *m*, Fig. 7, in hub I, and as this hub or collar starts to move backward the end of the dog falls into a hole in the hub, and it will force the bar K forward and cause its end *k*

to catch the binding-cord, while the knotter is revolved and the knot tied. At the rear end of the bar K a lug, *k'*, is formed on it. Now, as the hub or collar I is drawn backward, when it reaches said lug, it will move the bar K backward a short distance, thereby releasing the cord from the knotter-head and allowing the knot to pass off freely.

M designates a gravitating latch, which is pivoted to the front bearing, *d*, of the worm-shaft. The office of this latch is to hold the nut G' from sliding backward on the knotter-shaft for a short period of time during the recession of the hub I, thus holding the knotter-head in position until it has caught the cord preparatory to forming a knot, after which the latch will release said nut and allow the same to be moved backward to the terminus of the worm-screw. During the forward strokes of the nut G' it is not arrested by the latch M.

The loose grain is delivered upon the concave receptacle A when the arm C is in the position shown in Fig. 3, the binding-cord being held at one end by the device E. The said arm is then brought down about the mass of grain and the cord is caused to encircle the bundle. The cord is then delivered into the crotch *e⁵* and caught by the holder E. The knotter-head is then advanced and the two portions of the cords are caught and held firmly. The knotter-head then receives about one rotation and a quarter, the hook *e* is projected, and catches those portions of the cord which cross the twisted loop. At the same time the knotter-head is retracted, the said hook is also retracted, the loop is shed from the knotter-head, and the expansion of the bundle, when released from the arm C, draws the knot tight. The ends of the cord are then severed by the action of the device E' on the cutting-edge of the plate E. During the formation of a knot the knotter-head is allowed to rotate without moving the nut G'. This takes place during the first stage of forming the knot, when the cords are being formed into a loop on the knotter-head, and during the operation of the hook *e* in drawing the cords through said loop.

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

1. The combination of the slotted bar on the front end of the knotter-shaft, carrying the nose of the knotter-head, and the endwise-movable straight bar K, having its front end forked to form cord catching and looping hooks, all constructed and adapted to operate substantially in the manner and for the purposes described.

2. The combination of the slotted bar J, having the nose of the knotter-head on one end, and caused to rotate and also to move endwise, the straight bar K, having cord catching and looping hooks on the end *k*, the pivoted dog, the sliding hub, constructed as described, to project the bar K, and the rear lug, all

constructed and adapted to operate substantially in the manner and for the purposes described.

5 3. The combination of the latch M, pivoted on the frame, with the grooved sliding nut, the forked carrier, and the worm-shaft bearing on one end devices for tying a knot, all constructed and adapted to operate substantially in the manner and for the purposes described.

10 4. The combination of the main cast-metal bearing-frame B B' B², the sliding bar bearing the bifurcated carriers, the worm-shaft, the sliding nut thereon, the slotted bar on the end of the worm-shaft bearing the knotting devices, the hub on the bar, and the latch M, pivoted on the frame, all constructed and adapted to operate substantially in the manner and for the purposes described.

20 5. The combination, with the sliding bar F,

which actuates the nut G', and the hub or collar I, of the knotter-shaft and its knot-tying devices, the pawl E^x, and the revolving cord-holder E', all constructed and adapted to operate substantially in the manner and for the purposes described. 25

6. The combination of the binder-arm-operating pitman, having the cam-slotted yoke C², and the cam F', which actuates the sliding bar F, actuated by a crank on the drive-wheel, and adapted to operate said parts substantially in the manner and for the purposes described. 30

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses. 35

CHRISTOPHER LIDREN.

Witnesses:

J. T. ROSEBERRY,

W. H. RICHEMEYER.