

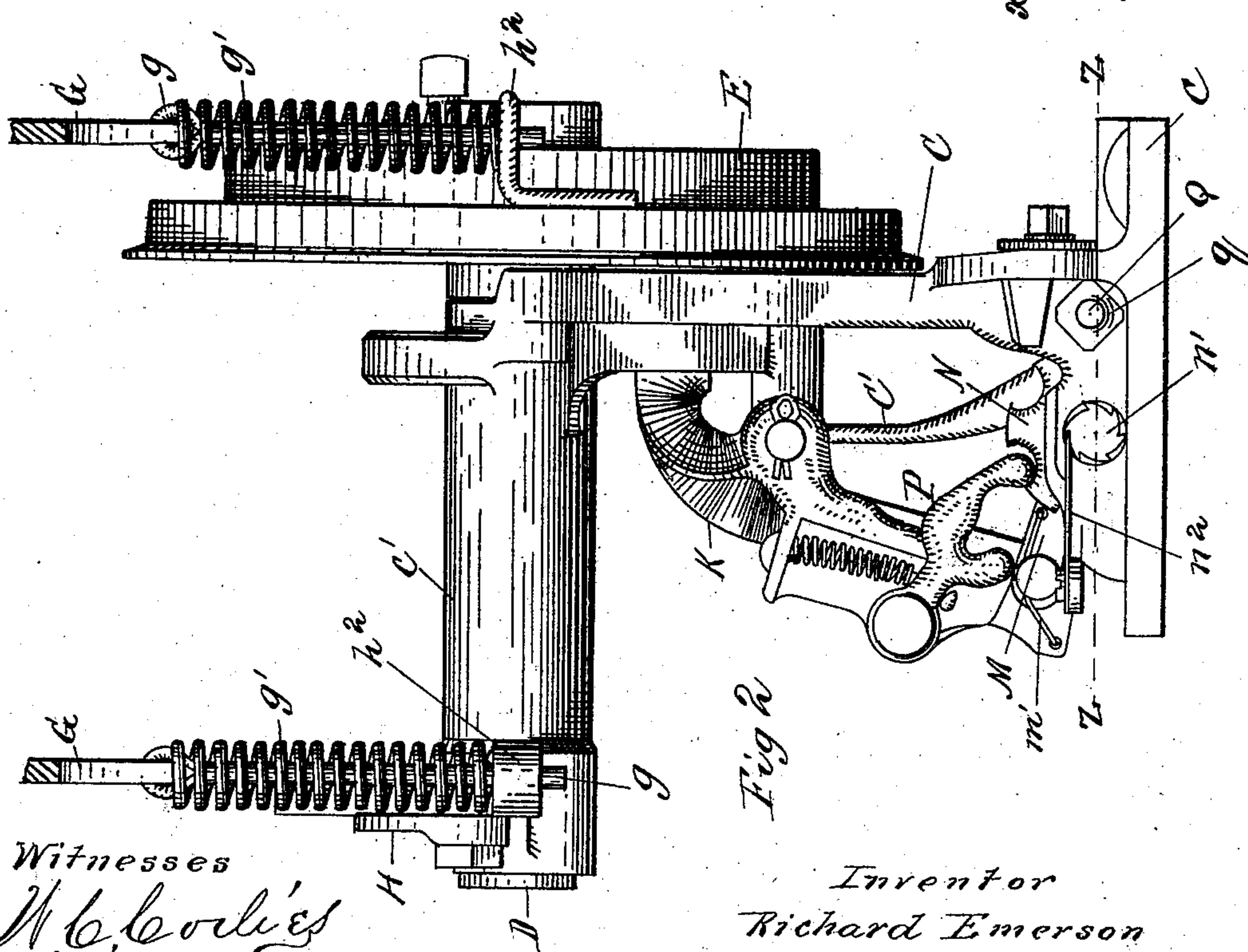
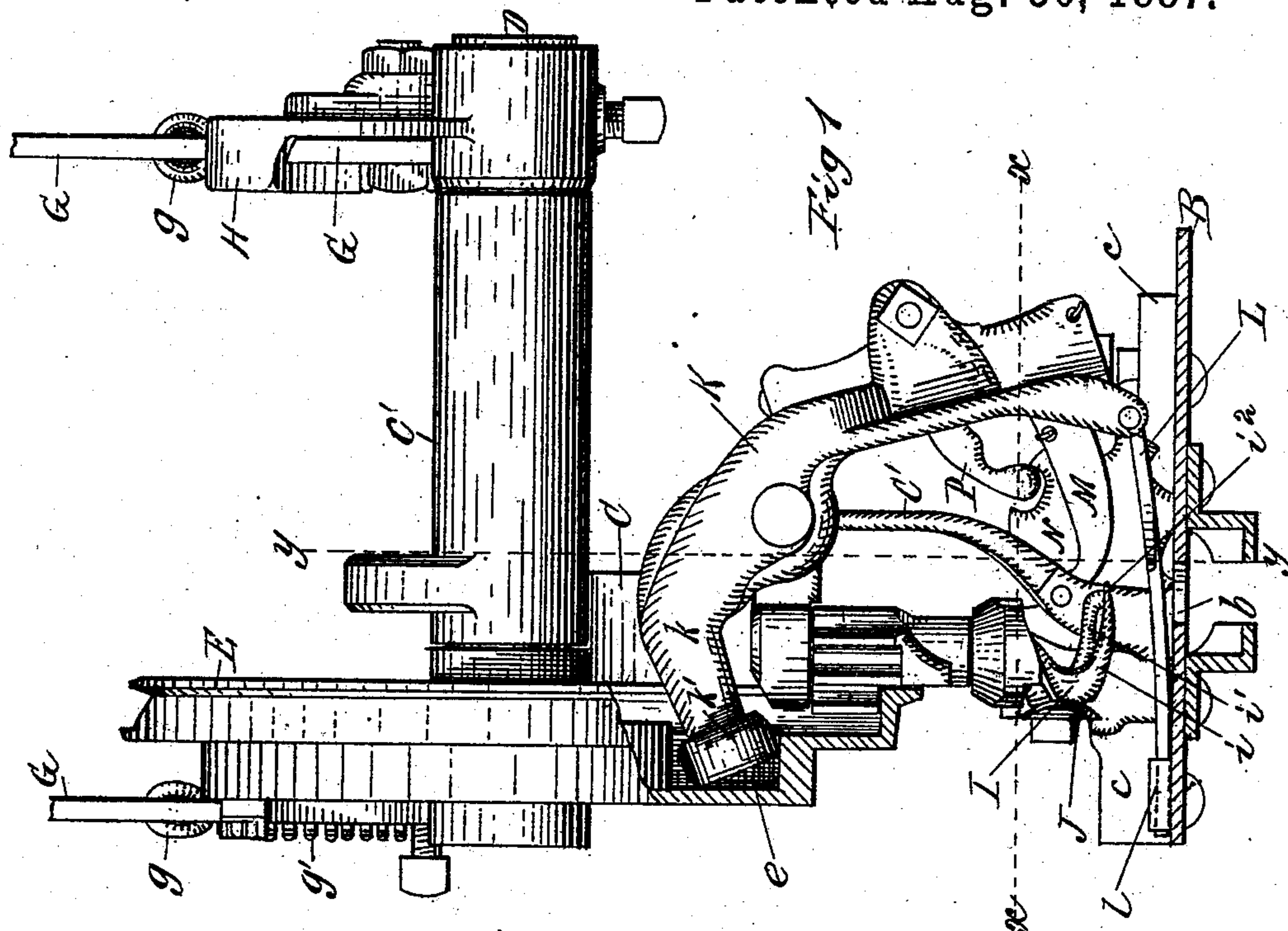
(No Model.)

3 Sheets—Sheet 1.

R. EMERSON.
GRAIN BINDER.

No. 369,172.

Patented Aug. 30, 1887.



Witnesses
H. C. Cook's
Irene Miller.

Inventor
Richard Emerson
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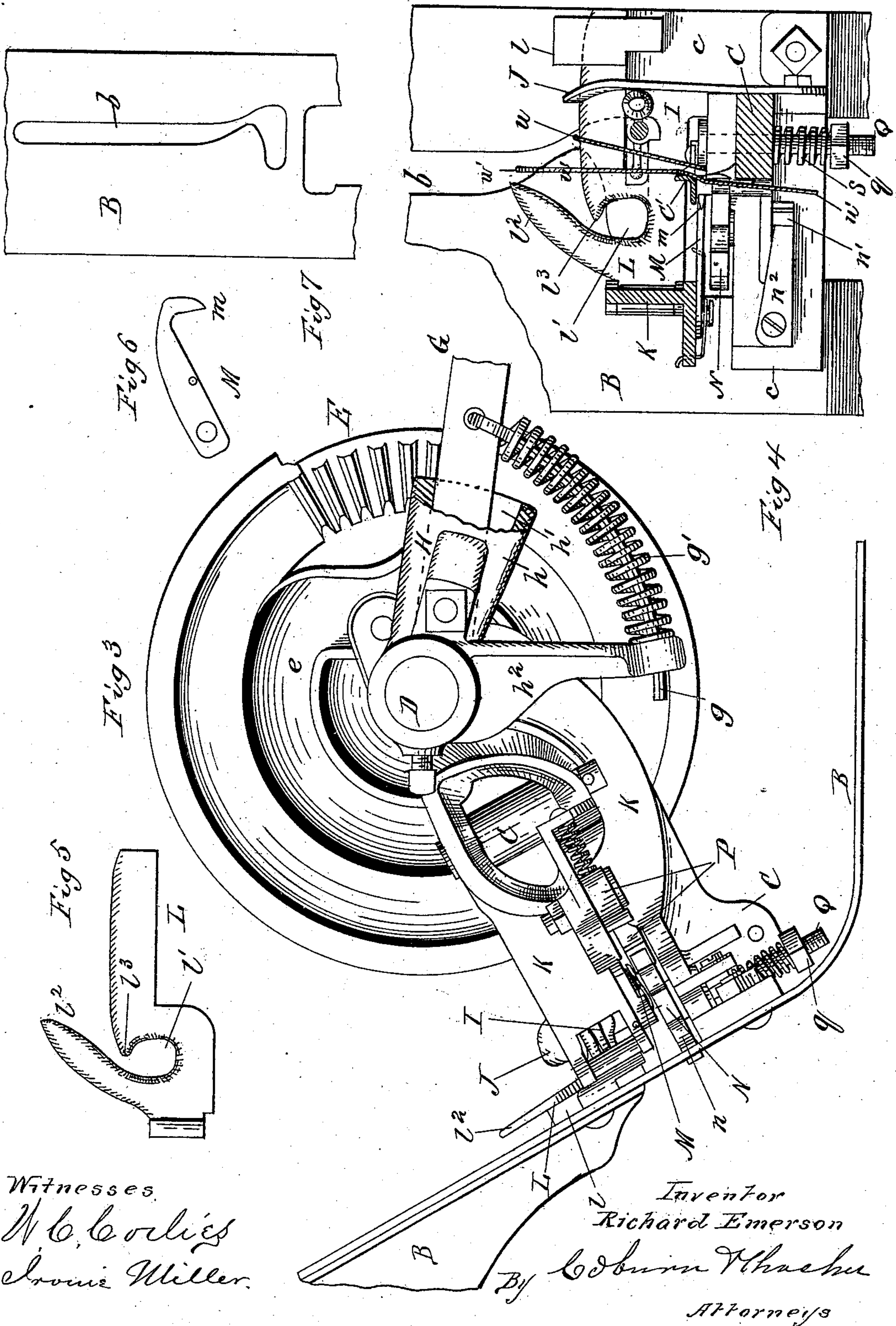
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3 Sheets—Sheet 2.

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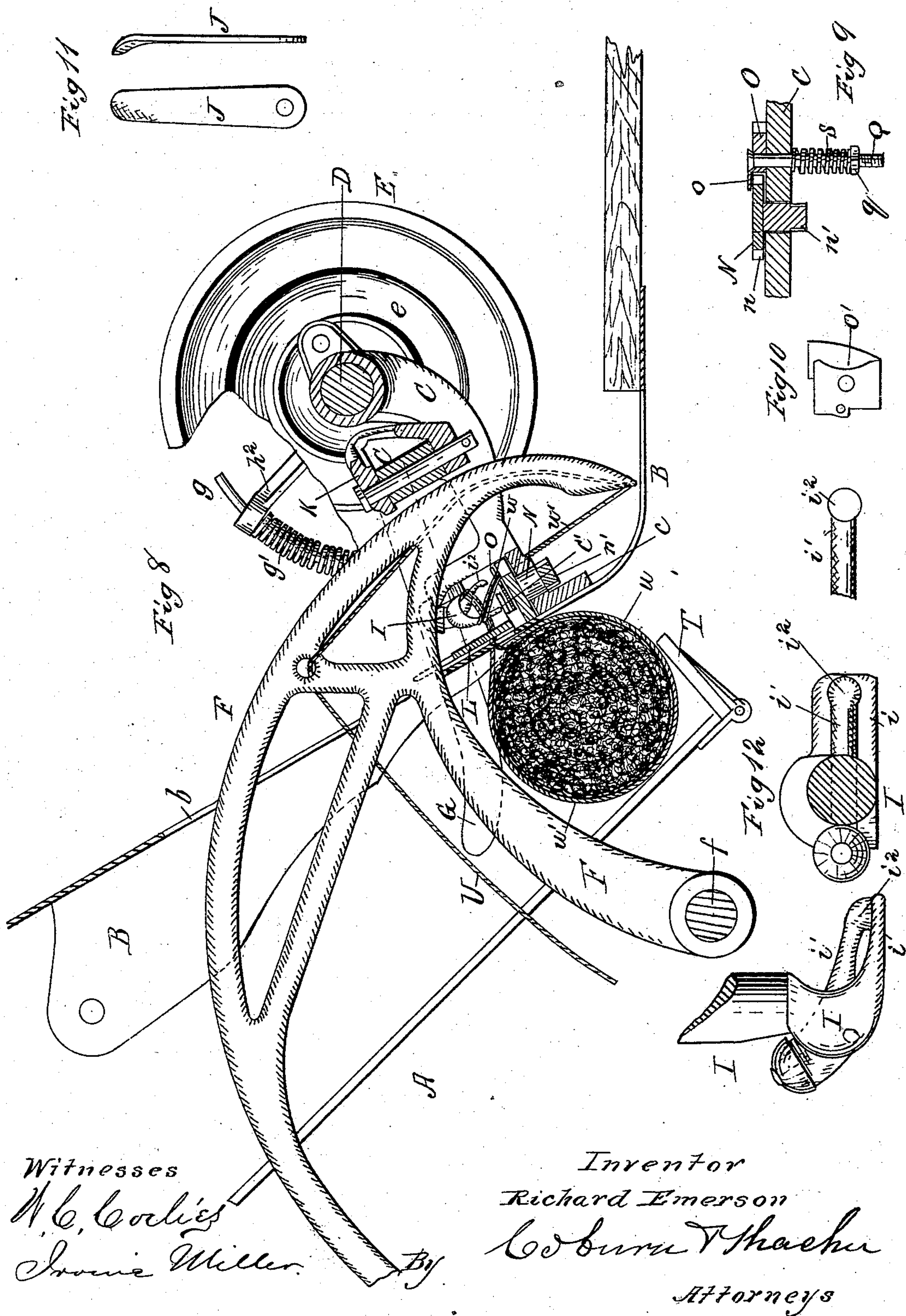
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UNITED STATES PATENT OFFICE.

RICHARD EMERSON, OF SYCAMORE, ILLINOIS, ASSIGNOR OF ONE-HALF TO
HORATIO H. MASON, OF SAME PLACE.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 369,172, dated August 30, 1887.

Application filed July 8, 1885. Serial No. 171,025. (No model.)

To all whom it may concern:

Be it known that I, RICHARD EMERSON, a citizen of the United States, residing at Sycamore, in the county of De Kalb and State of Illinois, have invented certain new and useful Improvements in Grain-Binders, which are fully set forth and described in the annexed specification, reference being had to the accompanying drawings, in which—

10 Figure 1 represents a plan view of the breast-plate, knotter-frame, and adjacent devices of a grain-binder, the breast-plate being in section and a portion of the gear and cam wheel being broken away; Fig. 2, a bottom plan of the same, the breast-plate being removed; Fig. 15 3, a rear side elevation of the same; Fig. 4, a detail section taken on the line *x x*, Fig. 1; Fig. 5, a plan of the cord-guide and stripper detached; Fig. 6, a similar view of the cutter detached; Fig. 7, a detail elevation of the upper part of the breast-plate; Fig. 8, a section taken on the line *y y*, Fig. 1, the needle-arm and a portion of the deck being also represented; Fig. 9, a detail section of the cord- 25 holder, taken on the line *z z*, Fig. 2; Fig. 10, a bottom plan of the clamping-piece of the cord-holder detached; Fig. 11, side and edge views of the knotting-hook spring detached, and Figs. 12 detail views of the knotting-hook 30 detached.

The figures of the drawings are on three scales. Figs. 1 to 6, inclusive, are all on one scale; Figs. 7 to 11, inclusive, are all on the same scale, but about one-third smaller than the preceding, and Fig. 12 is on a larger scale 35 than the first named, being very nearly full size.

My invention relates to grain-binders in which cord or twine is used as the band material—a type of binder which is now very well known and in common use, and therefore requiring no special description here.

The present improvements relate to the mechanism by means of which the cord is 45 placed around the bundle and then secured, and also some devices operating in conjunction with the mechanism just specified.

The other parts of the grain-binder, as a complete machine, may be of any ordinary construction, and it is not necessary to describe 50

and illustrate these general features of the grain-binder in this case.

I will proceed to describe in detail the construction and operation of those parts of the machine which relate to my improvements and are necessary to an understanding of their construction and operation, and will then point out definitely in the claims the special improvements which I believe to be new and wish to protect by Letters Patent. 55 60

In the drawings, A represents the deck of the binder, which is inclined, as usual, and B the breast-plate. The knotter-frame C is practically a single standard or bracket, the foot *c* of which is firmly bolted to the breast-plate, 65 and the upper or outer end of which is provided with a long sleeve, *c'*, which serves as a journal-bearing for the main shaft D of the binder, this being a shaft common to binders generally known as of the "Appleby" type, 70 to which is secured a gear and cam wheel, E, which drives the knotter, and also imparts the required movement to other devices acting in conjunction with the knotter.

The breast-plate B is provided with a slot, 75 *b*, for the accommodation of the needle-arm F, which must pass through this slot to place the cord around the bundle and bring it to the knotter, as shown in Fig. 8 of the drawings, the needle-arm being mounted on the rock- 80 shaft *f*, as usual. The main arm of the knotter-frame is at one side of the path of the needle-arm, and a guide or arm, C', fastened to the foot of the knotter-frame, passes upward and outward, so as to stand on the other side 85 of the path of the needle-arm, as shown in Figs. 1 and 2 of the drawings. The outer end of this guide-arm may be left free or attached to any suitable support, and in placing the cord the end of the needle-arm passes between 90 the two.

Discharge-arms G are secured to the main shaft, one on each side of the gear and cam wheel. These arms are constructed and secured to the shaft in such way that they not 95 only perform the usual function of discharging the bundle after it is bound, but also serve as elastic compressors. In order to effect the latter operation, brackets or holders H are fastened to the shaft. These bracket-holders are 100

forked, one branch, h , being wide and enlarged at its outer end, through which a slot, h' , is cut. The arms G are passed through these slots and pivoted to these branches of the holders. The other branch, h^2 , of the holder serves to support and form a bearing for one end of a curved rod, g , the other end of which is linked to the arm G . This rod is left free to slide back and forth through the end of the branch h^2 , a hole being made through the latter for this purpose, and is surrounded by a coiled spring, g' , which fills the space between the arm G and the branch h^2 and operates to throw the arm forward to its farthest limit in the slot within which it may be vibrated, as shown in Fig. 3 of the drawings. Obviously, if the discharge-arms meet with resistance as they are carried around by the shaft in the usual direction, they will yield on their pivots, forcing back the springs until the limit of the slots is reached. Now, these arms are arranged on the shaft relatively to the gear and cam wheel somewhat different from the usual position. They are set forward, as it were, so that they are brought into contact with the bundle about the time the tying commences and will then yield, but at the same time compress the bundle under the action of the springs while the cord is being tied. The relative position of the parts during this operation is shown in Fig. 8 of the drawings, and the compression is to give slack cord, as usual.

The knotting-hook I is at the lower end of a short shaft mounted, as usual, on the knotter-frame and provided with the ordinary small pinion, with which a short gear-section on the wheel E engages to produce the necessary rotation. This knotting-hook is of the ordinary tying-bill type, having a stationary jaw, i , and a pivoted jaw, i' ; but the former is made somewhat wider than usual and the front end or toe of the latter is enlarged to make a kind of head, i^2 , which sets flatly on the surface of the stationary jaw, leaving a small space between them, when closed, as shown in Fig. 12 of the drawings.

A spring, J , is fastened to the knotter frame at one end and extends upward to the knotting-hook, so as to come in contact with the heel of the pivoted jaw to act upon the same in a well-known way. This spring is not new of itself; but I have changed its form, giving it a slight curve and twist inward, as shown in Figs. 4 and 11 of the drawings. This form of the free end of the spring adapts it to the position of the roller on the heel of the pivoted jaw when it is brought around to the spring by the revolution of the knotting-hook, and gives to it a full bearing-surface, and at the same time turns it in the proper direction to effect the closing of the jaws as is required.

A support or carrier, K , is pivoted to suitable brackets on the knotter-frame on the side opposite to the gear and cam wheel. The outer end of this carrier is curved inward, as shown in Fig. 1 of the drawings, so as to form a heel-extension, k , the extremity of which is

provided with an anti-friction roller, k' , and enters the cam-groove c in the wheel E , by means of which this carrier is vibrated upon its pivot. The inner end of the carrier extends downward nearly to the breast-plate, and to its extremity is hinged the cord-guide and stripper L . This cord-guide extends thence across the breast-plate in front of the slot therein, and its outer end is straight and passes through a loop or keeper, l , on the breast-plate. In the body of the guide is an opening, l' , extending downward from the upper edge about the same as usual; but on the side thereof, opposite to the knotting-hook, there is a finger, l^2 , projecting upward and curved inward toward the hook. On the other side of the opening there is a short point, l^3 , extending a little way inward over the said cord-opening. The slot b in the breast-plate is of the form shown in Fig. 7 of the drawings, being straight nearly its whole length from the upper end thereof, but toward its lower end bending slightly to the right and narrowed somewhat, and then very considerably enlarged to right and left, making a large opening at the lower extremity. The arrangement of the cord-guide and stripper with reference to this slot is such that the opening in the former is about opposite the enlarged opening at the bottom of the latter, and will be moved back and forth across this opening in the breast-plate as the guide is reciprocated by the vibration of the carrier on its pivot, the finger l^2 acting as a cord-placer or tucker. The cutter M is also pivoted at one end to the vibrating carrier K , as shown in Figs. 1, 2, and 4 of the drawings. At the other end of this cutter is a hook-shaped point, m , the inner edge of which is the cutting-edge. The cutter is also provided with a spring, m' , arranged to hold it up in proper working position, and at the same time permitting it to yield on its pivot when required. The stationary blade or cutting-edge against which this cutter acts is formed on the guide or arm C' , the relation of these parts being shown in Fig. 4 of the drawings. Obviously, the cutter will be reciprocated by the vibration of the carrier.

The cord-holder is of the disk variety, consisting of a notched disk, N , the notches n of which are adapted to take the cord, and a clamp or keeper, O , which is provided with a flange, o , under which the disk runs at one side thereof. The body of the clamp is cut out opposite the disk, so as to present a concave, o' , conforming to the circumference of the disk. The journal of the disk is in a raised portion or rib on the foot of the knotter-frame. It passes through this rib and carries on its other end a ratchet-pinion, n' , with which a spring-pawl, n^2 , engages and operates to hold the disk from any backward movement. A spring-pawl, P , is also pivoted to the carrier K , and is arranged to engage with the notches in the disk N , as shown in Fig. 2 of the drawings. Obviously, the vibration of the carrier will move the disk forward by means of this

pawl. The clamping-piece O is fastened to the same rib as the disk by means of a bolt, Q, which passes through it and the rib. This bolt is extended somewhat on the other side of the rib and is provided with a screw-nut, q, at its end, between which and the rib a spiral spring, S, is arranged around the bolt, as seen in Fig. 9 of the drawings. It will be seen from this description that the clamp is held in place by the force of the spring, and at the same time will yield sufficiently to accommodate the inequalities in the cord when carried into the clamping-piece by the disk, and the resistance of the spring may be regulated by adjusting the nut so as to regulate the yielding adjustability of the clamp.

At the lower edge of the deck of the binder tilting boards T may be hinged, as usual, and operated in any of the usual ways. I have shown in the drawings the cord U in connection with the devices above described to facilitate the understanding of the construction and operation of my improvements.

The operation of this mechanism is as follows: Suppose the cord to be threaded in the needle-arm and its end secured in the holder, as will be understood without further description, and the needle-arm open ready for the formation of the gavel. The cord will pass back from the cord-holder through the slot in the breast-plate, lying over the cord-guide and stripper, which at this time is in the position shown in Fig. 4 of the drawings, in which figure this strand of the cord is designated *u*. It will be understood, of course, that the cord lies across the space between the breast-plate and the deck, as it extends backward to the needle-arm, which is now behind the deck. The grain is delivered to the deck of the binder and the gavel formed the usual way, and the main shaft of the binder, being set in motion, the needle-arm closes, as shown in Fig. 8 of the drawings, thereby placing the band around the gavel and carrying these second strand of cord forward through the slot in the breast-plate down past the stationary cutter and cord-holder, as shown in Fig. 4 of the drawings, this strand being designated *u'* in this figure. It will be seen that this latter strand lies in the slot *b* somewhat above the strand *u*, and just in front of the tucker-finger. The cam-groove *e* in the wheel E is so shaped that a little before the gear-section engages with the knotter-pinion the vibrating carrier will be swung inward to its full extent, thereby reciprocating the guide and stripper inward, by which movement the cord-strand *u'* will be taken by the tucker-finger and guided down into the opening *l'*, the strand *u* also slipping into the same opening, and both strands will be brought down into proper position for the knotting-hook to take them with certainty, the finger *l'* thus effecting the same result as other cord-placers or tuckers. At the same time the cutter is reciprocated inward past the strands of the cord with which it comes in contact in this movement, but, being rounded on the outer edge

of the hook, it yields and is depressed sufficiently to pass underneath the cord. At the same time the spring-pawl, which actuates the cord-holder, is moved forward by the carrier, engages with a notch in the disk and turns it forward one notch, thereby securing the cord coming from the needle-arm, as usual. It will be understood, of course, that these parts just mentioned, all of which are attached to the vibrating carrier and moved by it, are so constructed relatively to the other parts as to perform the operations required, and as specified above. In the position of the cord-guide and stripper, after this movement, the curved projection thereon stands across the slot in the breast-plate, and there is no danger of the cord rising. It is held in the opening mentioned above. In the meantime the gear-section has engaged with the knotter-pinion, setting the knotting hook in motion, by which the loop is formed in the usual manner, and at about the moment of this engagement the compressor-arms come in contact with the top of the bundle, and as they are arranged one on each side of the knotter, as shown in Figs. 1 and 2 of the drawings, the bundle will be suitably compressed during the formation of the knot. As soon as the loop is formed and the knotter stops, another bend in the cam-groove *e* vibrates the carrier in the opposite direction from that described above, thereby pulling the cutter against the cord, severing it, and stripping the loop from the hook by the backward reciprocation of the cord-guide and stripper, which is now brought again into the position shown in Fig. 4 of the drawings. The compressor-arms, having nearly or quite reached the limit of their yielding motion, will now act to discharge the bound bundle in the usual way, and the needle arm being thrown open again, carrying the cord across the guide in the breast-plate slot, as described above.

I do not wish to be understood as limiting myself in all respects to the details of construction and arrangement as described above, for, obviously, changes may be made without departing from the main features of my invention. It will be noticed that my mechanism is simple in construction and arrangement. By pivoting the guide and stripper to the carrier I obtain a freedom of movement in the reciprocation of the former, and by attaching to this device the cutter and the actuating-pawl of the cord-holder, I am enabled to operate all these parts by the movement of a single piece—that is, the vibrating carrier K.

The enlargement or head on the end of the pivoted jaw of the knotting-hook holds the cord on the hook, and when the loop is stripped off the side projections of the head pull the free ends entirely through the loop, thereby making a hard knot instead of the usual bow-knot. The enlargement or widening of the slot *b* at the lower end permits the cord to be carried back and forward by the cord-guide and stripper, as already described.

The complete binder is intended to be pro-

vided with an automatic trip mechanism for sizing the bundles, which may be of any known construction and operation.

The provision whereby the discharge-arms 5 are made to act as compressors enables me to dispense with the separate compressing device, which is generally employed, and it will be noticed that the knotter-frame is very simple and light in construction.

I believe that, taking the mechanism as a whole, I have dispensed with a number of pieces which are found in the mechanisms usually employed in binders to perform the same operations herein described.

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

1. In a grain-binder, the discharge-arms pivoted to supports on the main shaft of the binder, in combination with the springs arranged to hold the arms forward, substantially as and for the purposes set forth.

2. The main shaft D of the binder, in combination with the forked holders H, secured thereto, the discharge-arms G, pivoted to the holders, the curved rod *g*, and the coiled springs *g'*, substantially as and for the purposes set forth.

3. The vibrating carrier K, in combination with the cutter N, pivoted to the carrier and provided with a spring whereby it is permitted to yield to pass the cord as it is moved inward, substantially as and for the purposes set forth.

4. The notched disk N, in combination with the clamp O, the bolt Q, passing through the clamp and its seat, and the spring S and nut *q*, both on the outer end of the bolt, substantially as and for the purposes set forth.

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