

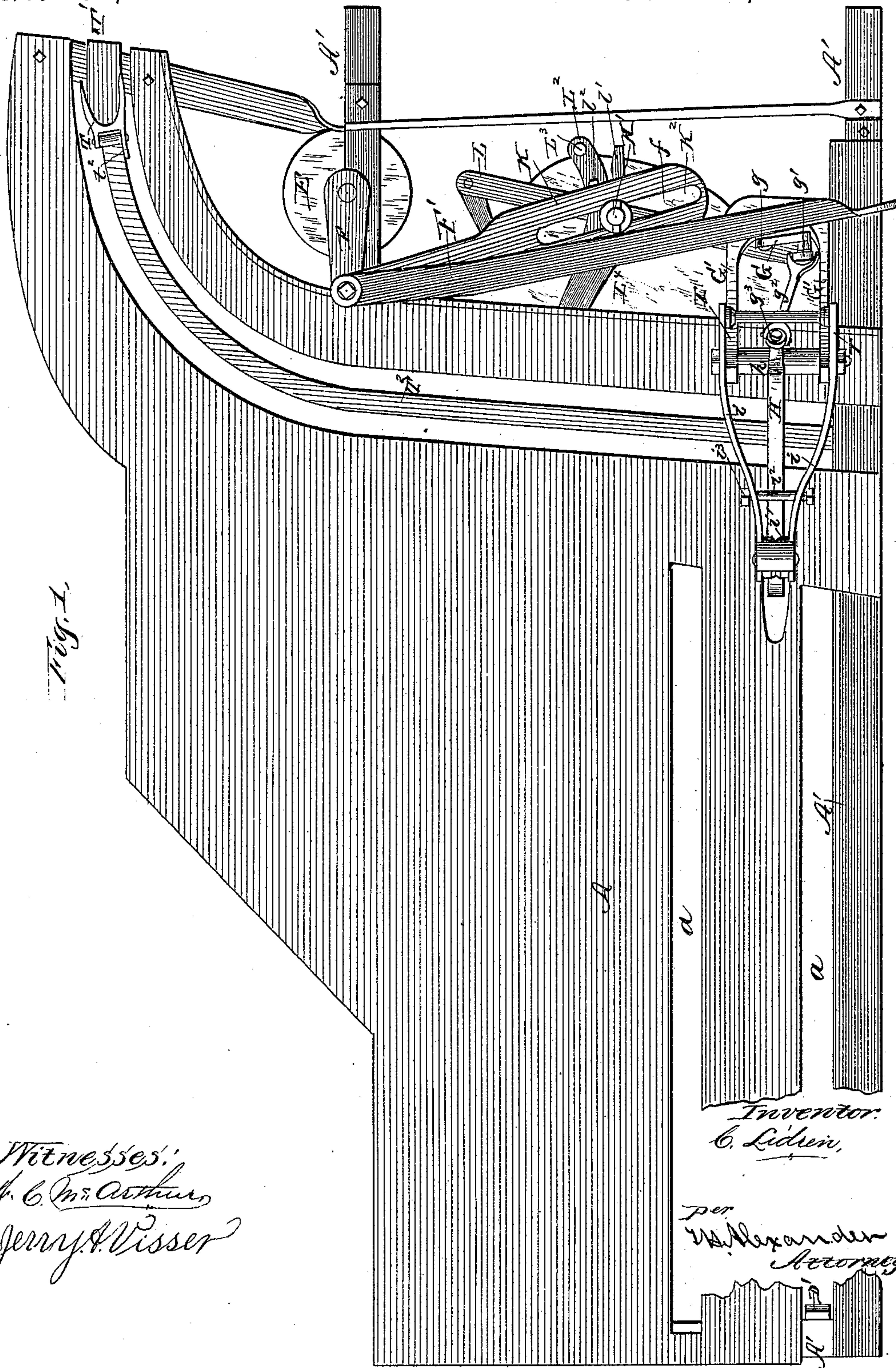
(Model.)

4 Sheets—Sheet 1.

C. LIDREN.
GRAIN BINDER.

No. 253,167.

Patented Jan. 31, 1882.



Witnesses:
A. C. McArthur,
Jerry A. Visser

Inventor:
C. Lidren,

per
W. Alexander
Attorney

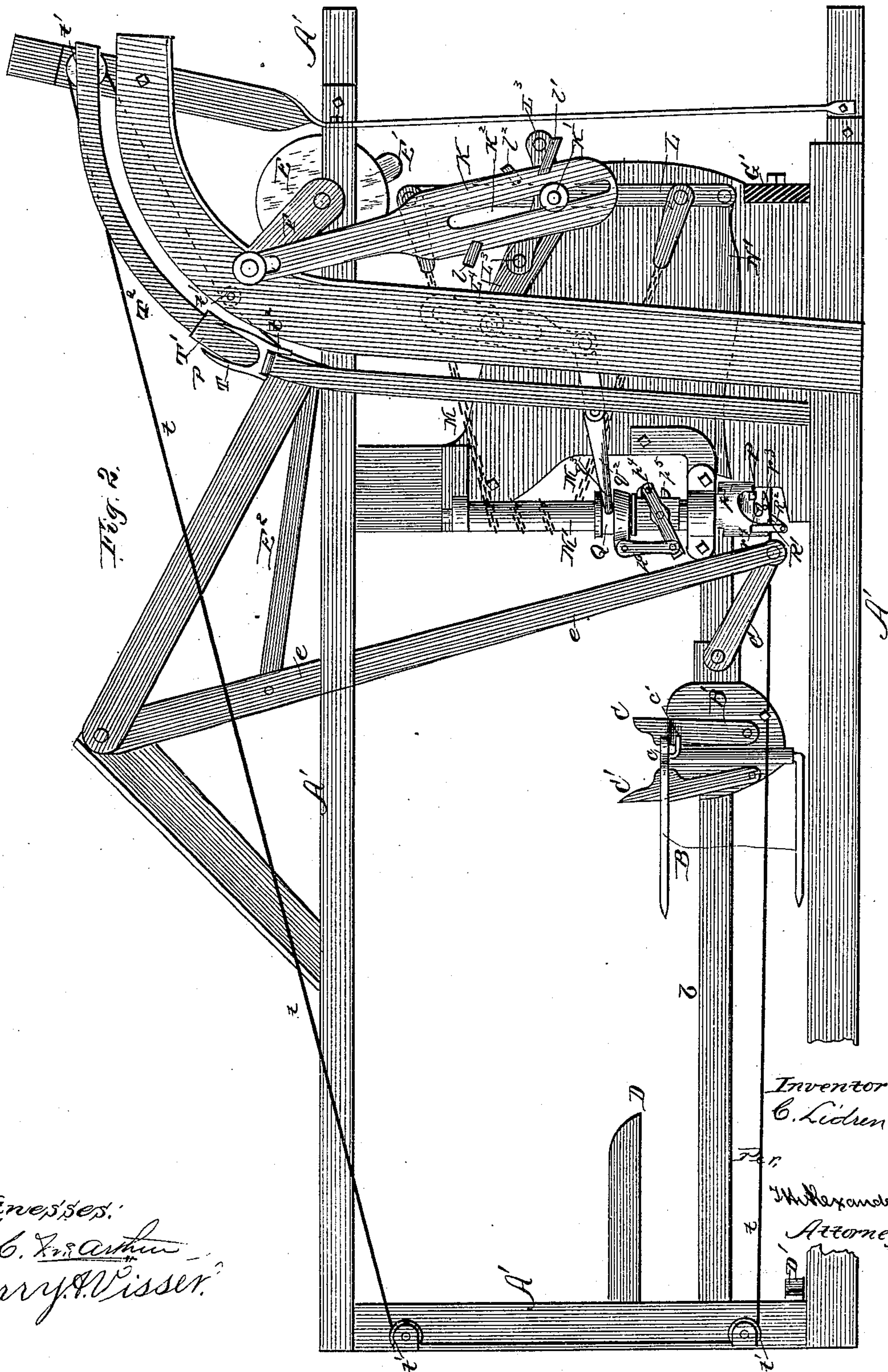
(Model.)

4 Sheets—Sheet 2.

C. LIDREN.
GRAIN BINDER.

No. 253,167.

Patented Jan. 31, 1882.



Witnesses:
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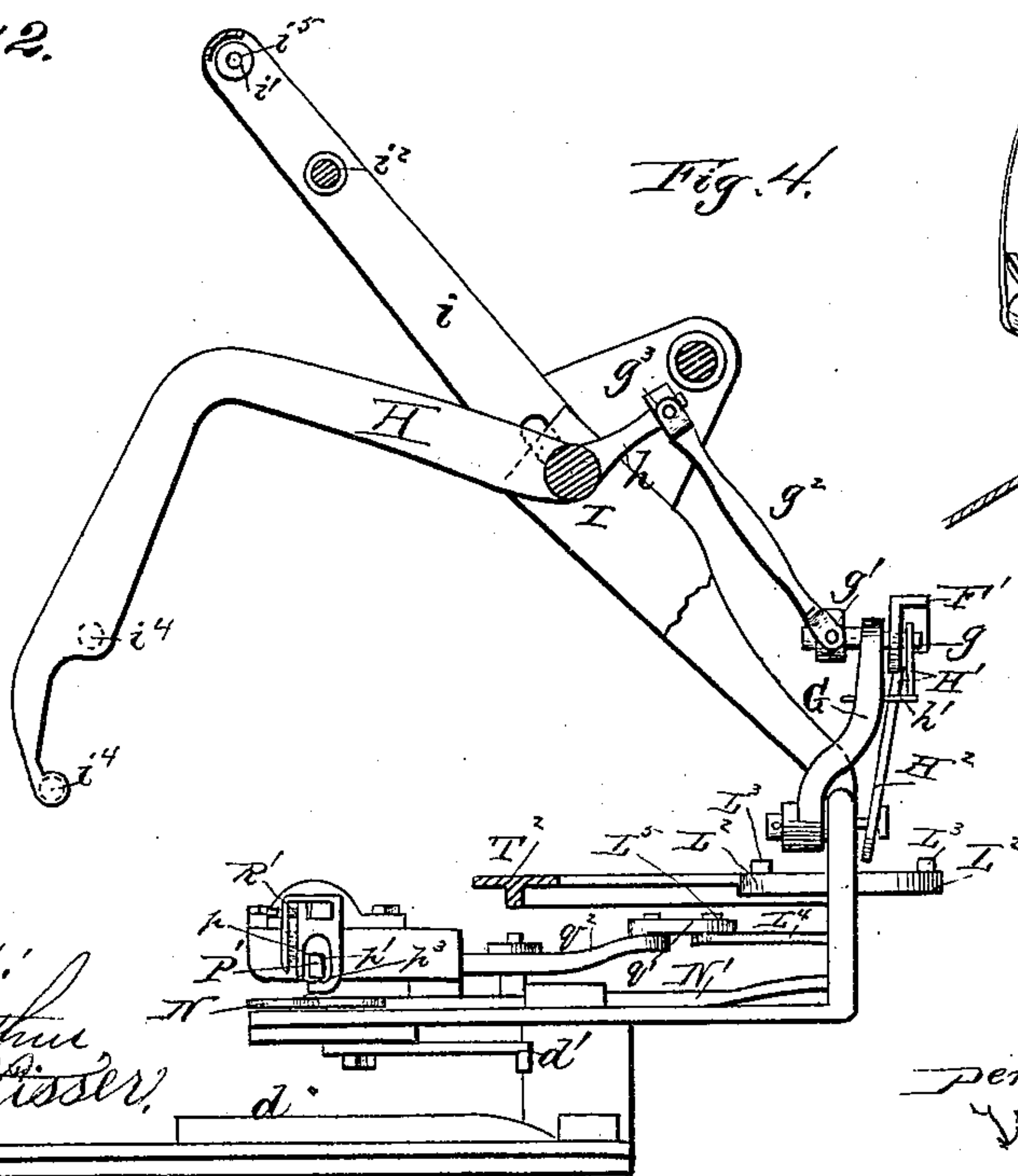
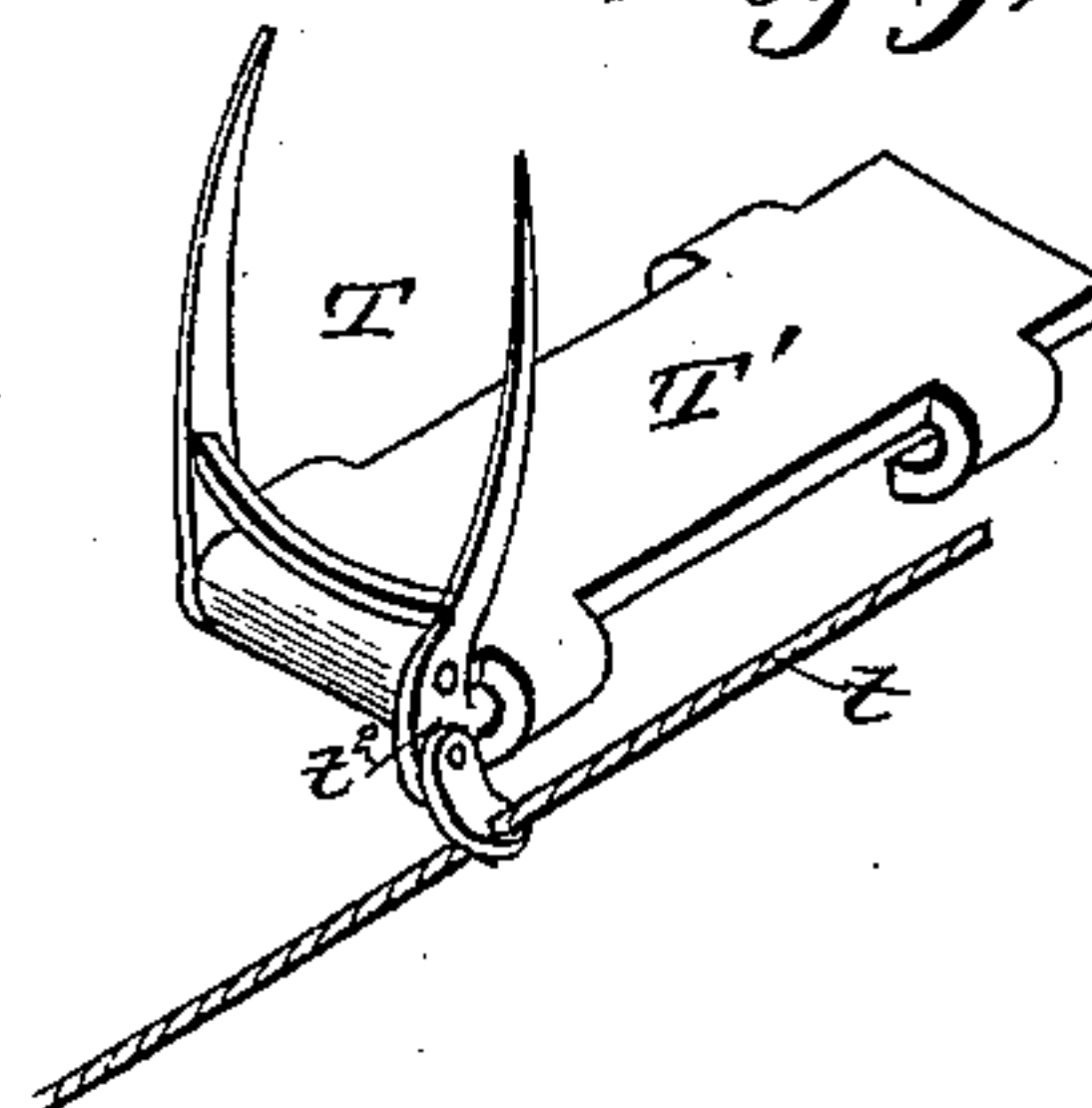
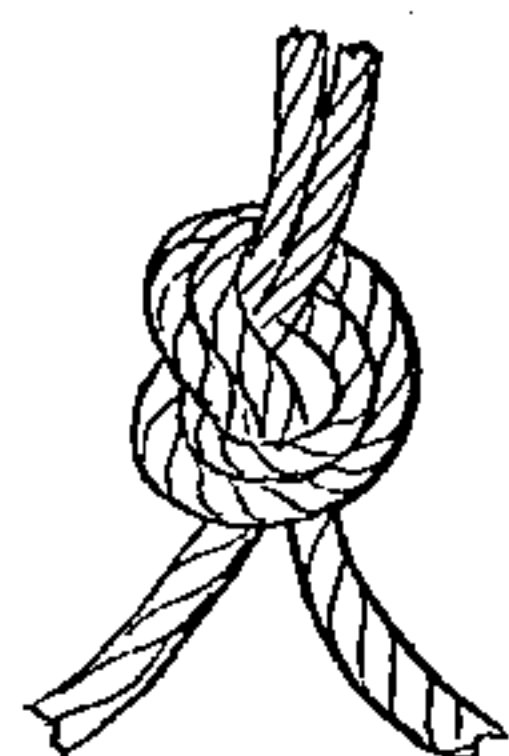
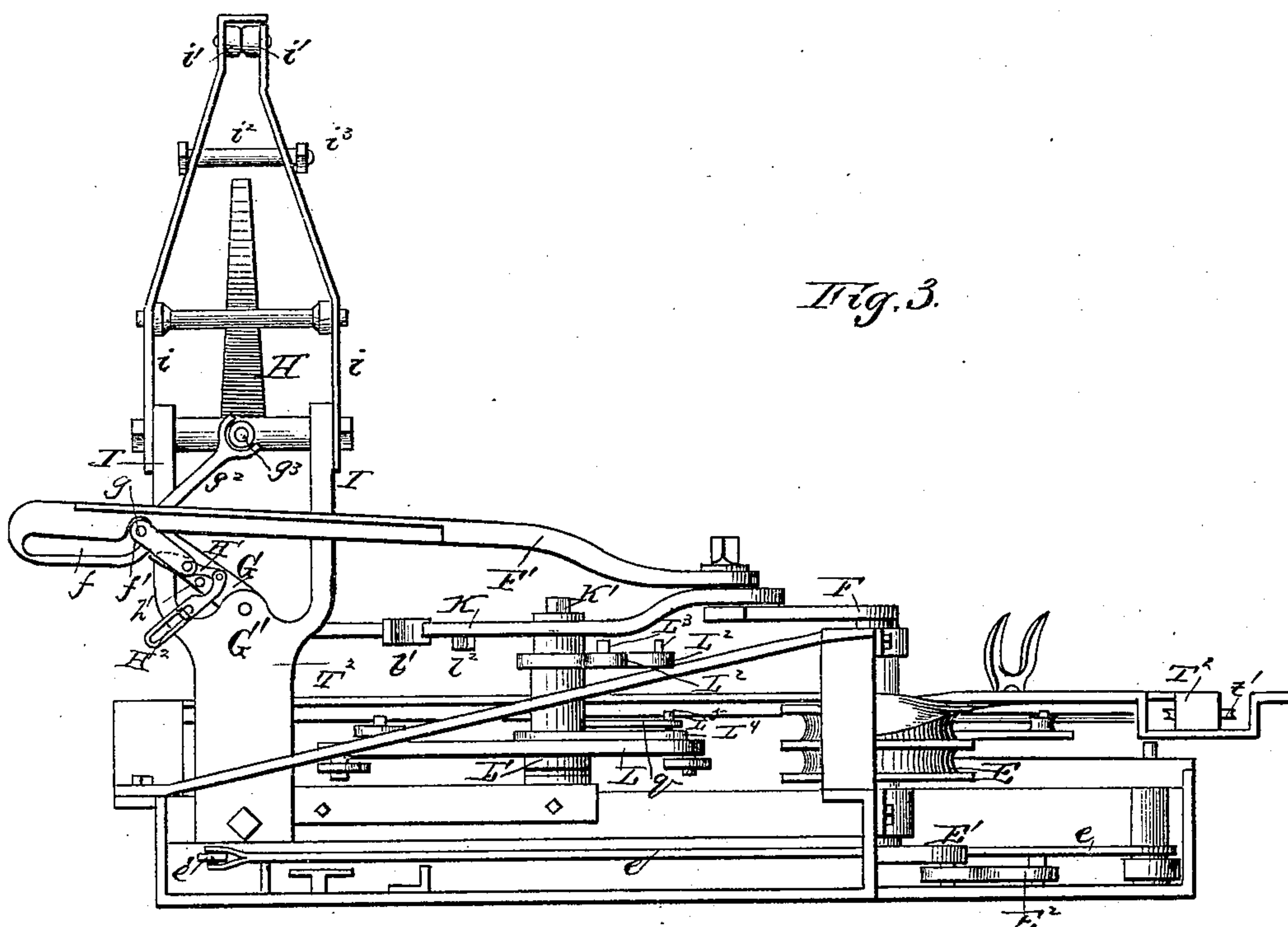
(Model.)

4 Sheets—Sheet 3

C. LIDREN.
GRAIN BINDER.

No. 253,167.

Patented Jan. 31, 1882.



Witnesses:
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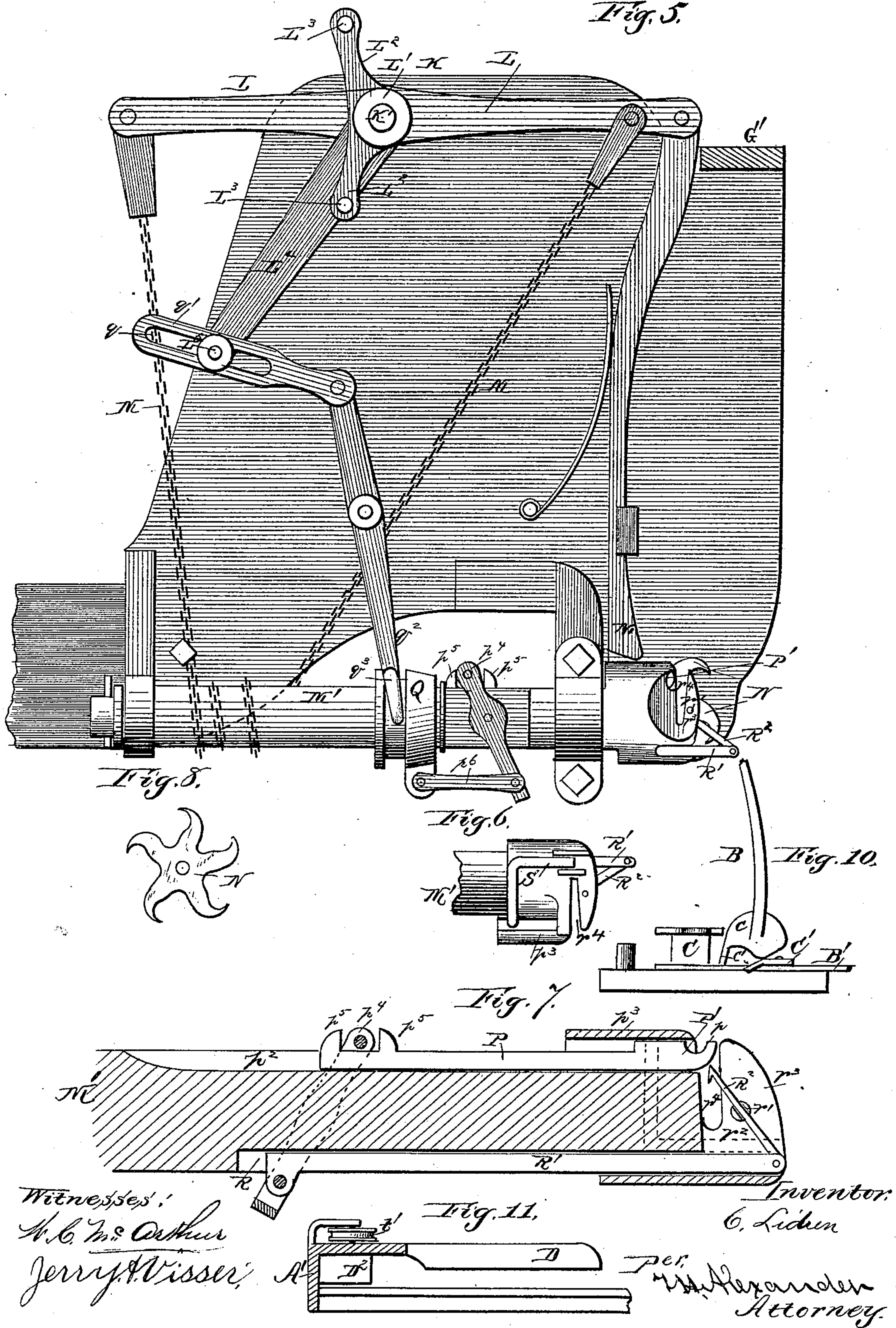
(Model.)

4 Sheets—Sheet 4.

C. LIDREN.
GRAIN BINDER.

No. 253,167.

Patented Jan. 31, 1882.



UNITED STATES PATENT OFFICE.

CHRISTOPHER LIDREN, OF LA FAYETTE, INDIANA, ASSIGNOR TO HIMSELF
AND R. JACKSON, OF SAME PLACE.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 253,167, dated January 31, 1882.

Application filed April 4, 1881. (Model.)

To all whom it may concern:

Be it known that I, CHRISTOPHER LIDREN, of La Fayette, 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, and in which—

Figure 1 is a plan view of my binder; Fig. 2, a similar view with the platform, binding-arm, and its operating-lever removed. Fig. 3 is an end view; Fig. 4, a front elevation, partly in section, of the binding end of the machine. Fig. 5 is an enlarged plan view of the binding or tying mechanism; Fig. 6, a reverse view of the tying-head; Fig. 7, a section through the same; Fig. 8, a view of the cord-holder; Fig. 9, a perspective of the gavel-carrier; Fig. 10, a side view of the rake, and Fig. 11 a detail of the stops for elevating it. Fig. 12 is a view of the knot.

This invention relates to that class of grain-binders in which the gavels are bound by a cord which is passed around the gavel, and then by means of tying devices tied into a knot.

The improvement will be fully set forth in the following specification and then particularly pointed out in the claims.

A indicates the platform upon which the grain falls and along which the gavels are carried forward by the rake to the binding mechanism. This platform will be slightly depressed at a point under the binder-arm, and it is secured upon the main frame A', various parts of which frame will be hereinafter particularly described in connection with the devices supported by the same.

B refers to the rake, which is hinged upon a base, B', so that its teeth can be either raised to a vertical position, in which case they will project above the platform through the slots *a a* in the latter, or lowered to a horizontal position, in which case the said teeth will be entirely below the platform. The base to which the rake is hinged is arranged to slide upon a way, *b*, that is secured to the main frame, the said way and the slots *a* in the platform being of a length sufficient to admit of the rake-

teeth, when raised, sweeping the platform and bringing the grain in gavels under the binder-arm.

Pivoted to the base which carries the rake, and at the sides of the latter, are latches C C', one at each side of the rake. The latch C is arranged to engage the rake, so as to hold the latter down in a prostrate position, while the remaining latch, C', is arranged to be brought under a cam-piece, *c*, upon the rake after the latter has been partially raised, so as to complete the raising of the rake and then hold the same in a vertical position. A stop, *c'*, is secured to or formed with said cam-piece in order that after the rake has been raised the same will be prevented from falling forward or toward the binder-arm. This stop, it is evident, could be arranged upon the base with like effect.

In order to disengage the latch C from the rake and to raise the latter when it reaches the grain side of the machine, I provide a dog, D, against which the said latch strikes just before the rake has reached the end of the platform, whereby the latch will be pushed away from the rake. I also provide a stop, D', against which one of the rake-teeth strikes, so that as the rake completes its travel it will be raised by the same; and I further provide a stop, D², as seen in Fig. 11, which at this juncture will push the latch C' under the cam-piece of the rake, so as to complete the raising of the rake, and lock the same in an upright position.

In order to push the latch C' away from the rake in order to allow the latter to fall after having traversed the platform, so as to bring the gavel under the binder-arm, I provide a dog or stop, *d*, against which said latch strikes while the rake is being carried toward the binder-arm; and I also provide a dog or stop, *d'*, against which the latch C strikes after the rake has been pushed down by coming in contact with a portion of the main frame or platform, whereby said latch will lock the rake in a prostrate position. These stops or dogs that cause the latches to operate in the manner described are all secured to the main frame in any suitable manner.

The mechanism for impelling the movable base that carries the rake toward and away

from the binder-arm consists of a driving-skein or sprocket-wheel, E, upon one end of the shaft of which is a crank-arm, E', that is connected by a connecting-rod, E², with a lever, e, which in turn is pivoted at one end to the main frame, and at its remaining end connected with a crank, e', that is pivoted to the base-plate of the rake.

The binding devices and mechanism for operating the same are constructed as follows:

A crank, F, is secured to the axle of the driving-skein E, and to this crank is connected a slotted bar, F', the slot *f* of which bar is at the end opposite to that connecting with the said crank. This slotted bar connects with a crank, G, that is pivoted to a standard, G', of the main frame by means of a wrist-pin, *g*, of the crank that passes through the slot *f* of the bar. The wrist-pin *g* extends out from both sides of this crank, and upon one end of the said pin is arranged a loose collar, *g'*, to which is swiveled a connecting-rod, *g*², the upper end of this connecting-bar being swiveled to a collar, *g*³, that is arranged loosely upon an arm, *h*, of the vibratory binder-arm H.

At the inner end of the slot of the bar F' is a notch, *f'*, adapted to engage the wrist-pin *g*, that passes through the said slot *f*. The walls of this slot act upon the wrist-pin of the crank G at certain intervals during the reciprocations of the slotted bar, and the said crank in turn actuates the swiveled connecting-rod that connects with the binder-arm, so as to cause the vibrations of the latter at the proper moments, as will be hereinafter more fully described.

The device which I employ for timing the movement of the crank G consists of a lever, H', pivoted to the said crank below the slotted end of the bar F', so that when the lever is vibrated in one direction one of its ends will strike against the said bar and raise the same, so that the notch in the slot will be raised to clear the wrist-pin on the crank. To the other or lower end of the lever H' is pivoted a connecting-rod, H², that is formed with a slot, through which a pin secured to the standard of the main frame extends. The crank G is provided with a pin, *h'*, which acts against the lever H', on the under side thereof, between the fulcrum-pin of the lever and the point of connection between the lever and the slotted connecting-rod H². When the slotted bar is thrown forward to its farthest extent the wrist-pin on the crank will be engaged by the notch *f'* at one end of the slot of said bar, and the lever H will assume a horizontal position; but after the slotted bar has been retracted to a certain extent the combined action of the pin *h'* upon the crank and the slotted rod H² will cause said lever to assume a vertical, or nearly vertical, position, whereby it will act against and raise the slotted end of the bar F', so as to free the wrist-pin of the crank from the notch at the rear end of the slot *f* in the bar. This elevation of the bar occurs when the binder-arm is depressed, and after the rake has been thrown down and is about to travel away from the

binding devices, all of which will be fully set forth in the description of the operation of the machine.

The binder-arm is mounted upon a shaft which has its bearings in the upper ends of two arms, I I, and from these arms rise two spring bars or arms, *i i*, which converge toward their upper ends, between which are arranged the tension-pulleys *i' i'*. These spring-arms are connected near their upper ends by a bolt, *i*², that is provided with a nut, *i*³, whereby said arms can be drawn together in order to vary the tension upon the cord that passes from the reel to and between the pulleys *i' i'*, and thence down through eyes or over rollers *i*⁴ upon the binder-arm. One of these pulleys *i'* is provided with a hub, *i*⁵, and is mounted upon a shaft passing through the spring-arms, while the remaining pulley is mounted upon the said hub. Hence by drawing the spring arms together the pulleys will be brought more closely to each other, thereby increasing the tension upon the binding-cord.

The mechanism for actuating the devices for holding, tying, and cutting the cord is constructed as follows:

K indicates a slotted lever, one end of which is connected with the crank of the driving-skein or sprocket-wheel. This lever is reciprocated by the revolutions of said crank, and is guided in its movement by a vertical rod, K', that is secured to the main frame and extended up through the slot K² of the said lever.

L refers to a vibratory lever, which is provided at a point near or at its center with a sleeve or hub, L', that is loosely arranged upon the vertical rod K', so as to turn freely thereon. This sleeve or hub is provided at its upper end with two horizontal arms, L² L², upon the end of each of which is a stop or pin, L³. At one side of the slotted end of the lever K is a stud or dog, *l*, arranged to act against one of the pins L³ upon one of the arms of the hub L'; and on the opposite side of the said slotted end of the lever K' are two studs or dogs, *l'* *l'*, arranged to act alternately upon the remaining one of the pins L³, the dog *l'* being extended farther out from the slotted lever than the dog *l*, so as to insure such action. The vibratory lever L connects at its ends with the ends of a chain, M, by means of suitable links, the said chain being wound several times around the oscillatory shaft M' of the tying mechanism. This chain is secured at a point between the ends of its coils to the shaft, around which it is wound, so that a vibration of the lever L in one direction will cause the shaft to rotate one way, and vibration of said lever in a reverse direction will cause a reversal of the movement of the shaft.

N indicates a many-armed rotary cord-holder that is pivoted to the main frame below the platform in position to hold the binding-cord which passes down from the binder-arm, and N' indicates a notched arm that is pivoted to one of the ends of the lever L, so that at certain periods in the operation of the machine

said pivoted arm will engage one of the arms of the holder and impart a partial revolution to the same, so as to cause the end of the cord to be gripped between the holder and the plate or frame upon which it is arranged. The shaft M' carries the devices for tying the knots in the binding-cord, the construction and arrangement of which will be as follows.

P indicates the sliding cutter and holder, which, after the cord has been passed around the gavel, severs the same above the armed holder N and holds the ends of the cord until the knot has been tied. This said device consists of a bar provided at its forward end with a hook, P', one inner edge, p, of which is sharpened to form the cutter, and the other inner edge, p', of which is rounded to constitute the cord-holder. This bar is arranged to slide in a longitudinal channel, p², in the shaft M', the said channel extending through a socket, p³, at one end of the shaft, so that the hook-shaped end of the bar can be extended out from said socket in order to catch the cord, and also retracted within said socket, so as to sever the cord by means of its cutting-edge, and to firmly hold the cord between the gavel and said socket by means of its holding-edge. The holder and cutter bar is caused to travel back and forth in the channel by means of a link, p⁴, that is pivoted to the sides of the oscillatory shaft, and arranged to act against studs p⁵ p⁵ upon the cutter and holder bar. This link is vibrated by means of a link, p⁶, connecting the same with a collar, Q, arranged to slide upon the oscillatory shaft, and the collar is caused to have such sliding movement at the proper moments by means of an arm, L⁴, of the lever L, said arm having a wrist-pin, L⁵, that passes through the slot q of a bar, q', which is pivoted to one end of a vibratory yoke-bar, q². The arms of the yoke q³ of this bar engage in the circumferential groove of the collar Q, whereby, while the vibrations of the yoke-bar will cause the collar to move along the shaft, the collar will also be permitted to partake of the oscillatory movements of the said shaft upon which it is arranged. This shaft is, in addition to the groove in which the cutter and holder bar works, provided upon its opposite side with a longitudinal channel, R, in which is arranged the slidable grabber-bar R', which carries at its outer end the pivoted hooked grabber R². The grabber-bar is connected with the link p⁴, preferably by the same pin that connects said link with the link p⁶, although any suitable connection may be made between the grabber-bar and either of the links, which, when the links are actuated, will cause the grabber-bar on one side of the oscillatory shaft to move in a direction reverse to that in which the holder and cutter bar on the opposite side of the shaft will be moved by the same action of the links. Hence when the hook-shaped end of the cutter and holder bar will be extended out from its sheath or socket the grabber-bar will be retracted within a channel, r². The hooked grabber or finger R² is pivoted to the end of the

grabber-bar, and when the said bar is projected out from its sheath the hooked end of the pivoted grabber-finger will be moved downward and backward by means of a stop or pin, r', that is arranged across a channel, r². This channel r² is parallel with the axis of the oscillatory shaft, and is formed between the walls of plates r³ r³, which are provided with slots r⁴ r⁴, arranged so that, in effect, a channel intersecting the channel r² is formed. When the grabber-bar is retracted the notched end of the grabber will be elevated, so as to come in position to catch or grab the cord near its ends, which are held by the holder, as more fully described farther on.

In order to push the loop from the end of the oscillatory shaft at the proper moment, I provide the arm S, which is arranged to slide alongside of the shaft and fastened to the cutter and holder bar, so as to move back and forth with the same.

T indicates the carrier for discharging the bound gavel. This carrier consists of a fork hinged upon a carriage, T', which is arranged to slide upon a way or track, T², curved at its rear end. The carrier is moved back and forth by means of a cord or chain, t, that passes around the several pulleys, t' t', and connects with the movable carriage or base-plate of the rake. This cord is connected with an arm, t², of the carrier, so that when the cord draws upon the carrier, so as to cause the same to carry the gavel to the discharge end of the platform, the carrier will be raised vertically; but when by a reverse movement of the rake-carriage the cord or chain draws upon the carrier, so as to move the same back to take a fresh gavel, the said carrier will be swung down upon its carriage, so as to readily pass under the bound gavel.

The chute upon which the bound gavels are carried can be extended to any distance and at any angle of elevation, whereby, after the direct action of the carrier upon the gavels has ceased, the same will be pushed along by the succeeding gavels, which will be directed against them by the carrier.

The operation of this machine is as follows: The rake being raised so as to project above the platform, and being locked in such vertical position by means of one of the pivoted latches upon the rake-carriage, it is impelled toward the binder-arm by means of the system of cranks and levers hereinbefore described, so as to sweep the platform and carry the gavel under the binder-arm and against the binding-cord that passes from the end of the binder-arm down through the platform to the armed rotary holder N, which holds the end of the cord. When the rake reaches the point at which it is stopped in its movement toward the binder-arm the latch which has held it up is released from the rake by coming in contact with one of the dogs or stops upon the main frame, and the rake thrown down upon its carriage by coming in contact with any suitable stop upon the main frame or the platform. At

this juncture a slight continuance of the forward movement of the rake-carriage will bring the latch, which holds the rake down, against a dog or stop, which causes said latch to lock the rake in a prostrate position below the platform. The binder-arm is brought down at the proper moment to carry the cord around the gavel by the backward movement of the slotted bar F, the notch f' in the slot of which engages the wrist-pin upon the crank G, which in turn actuates the binder-arm through the medium of the swiveled connecting-rod g^2 . As the shaft of the driving-skein or sprocket-wheel continues its rotation the rake will be carried from the gavel to the opposite end of the machine, where by reason of the stops or dogs the latch will be freed from the rake, the rake then raised in position to again traverse the platform, and the latch that locks the rake in an upright position be brought into engagement therewith.

After the binder-arm has been brought down in the manner just described the pivoted lever H will be turned upon the crank G by reason of the pin h' upon the crank and the slotted bar H, which connects with said lever, so that the upper end of the lever will strike against the slotted bar F and raise its slotted end, so as to free the wrist-pin of the crank from the notch in said bar. Hence as the bar F continues to move backward the crank will remain stationary, since its wrist-pin will be in that portion of the slot which has plane walls. At this juncture one of the dogs or studs upon the slotted bar K strikes against one of the pins L^3 upon one of the upper arms L^2 of the hub or sleeve L' , and gives a partial rotation to said hub, whereby a partial revolution will be given to the vibratory lever L, so as to cause the arm N' , that is pivoted to said lever, to act upon the rotary cord-holder N, in order that said holder will take hold of the cord brought down by the binder-arm. Hence after the gavel has been bound, the knot tied, and the cord severed below the knot, the end of the cord passing down from the binder-arm will be retained by the holder and the cord be ready for a fresh gavel. The above movement of the lever L also causes a backward rotation of the oscillatory shaft carrying the tying devices through the medium of the link and chain connections between said shaft and lever, whereby the cord between the gavel and the holder N will enter the slots r^4 at the end of the oscillatory shaft M' , and thus come between the hook-shaped end of the cutter and holder P and the sheath in which said hook-shaped end is retracted. The vibration of the lever L also causes the sliding holder and cutter to be retracted within the sheath after the cord has been thus caught by the hook of said cutter and holder, said movement on the part of the latter being effected by reason of the action of the pin upon the center arm, L^4 , of lever L against the slotted bar q' , at one end of the slot thereof, which said slotted bar actuates the pivoted yoke-bar q^2 , that in turn causes the

collar Q to slide upon the oscillatory shaft and thereby operate the links p^4 p^6 between the collar and the sliding holding and cutting bar. As this bar is being drawn into the sheath the cord between the same and the armed rotary holder will be severed by the cutting-edge of the hook-shaped end of the bar, while the ends of the cord between said bar and the gavel will be held between the sheath and the holding-edge of the cutter and holder.

By reason of the pivoted link p^4 , which acts against the studs p^5 of the cutter and holder bar, and which is pivoted to the grabber-bar R' , said grabber-bar will be extended out from the oscillatory shaft on which it slides when the cutter and holder bar is retracted, as above described. Hence as the grabber-bar is being thus extended the notched finger or grabber R^2 , which assumes an upright position while the bar to which it is pivoted is retracted, will be depressed by contact with the pin or stop r' , so as to catch and hold the cord near the ends which are held by the cutter and holder. The oscillatory shaft which carries the said grabber and cutter and holder will now be rotated forward by the action of one of the studs or dogs of the lever K upon one of the pins L^3 on one of the arms of the sleeve or hub L' , and at the proper moment after the loop has been formed the cutter and holder will be moved forward and the grabber-bar retracted, whereby the cord will be released from the cutter and holder and also from the grabber or notched finger. It will be seen that as the arm S moves with the cutter and holder bar it will push the loop off from the end of the oscillatory shaft.

The movement of the carrier T for carrying the bound gavels from under the binder-arm is effected by means of its cord or chain connection with the rake-carriage, the said carrier being held upright while discharging the sheaves by means of the tension of the cord upon its arm in one direction, while said carrier will be depressed when it returns to the front of the platform by reason of the tension of the cord upon its arm in an opposite direction.

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

1. In a grain-binder, the combination, with the reciprocating rake-carriage arranged below the platform, the rake hinged to the rake-carriage, a pair of latches, the one adapted to hold the rake in an upright position and the other adapted to hold the rake prostrate below the platform, a stop-pin, c' , and stops or dogs for raising and depressing the rake and for engaging and disengaging the latches, so that the rake will be held upright while carrying the grain in gavels to the binder-arm, and then knocked down and held prostrate while moving away from the binder-arm, substantially as described.

2. The combination, with the vibratory binder-arm, of the slotted reciprocatory bar F' , the

crank-arm having a wrist-pin passing through the slot of said bar, the swiveled connecting-rod connecting the crank-arm with the binder-arm, and the lever H' , arranged to raise the slotted bar F' at certain periods to free the wrist-pin of the crank from a notch at one end of the slot in said bar, substantially as described.

3. The combination, with the vibratory binder-arm, of the slotted reciprocatory bar F' , having a notch formed at one end of its slot, the crank G , provided with a wrist-pin passing through the slot of the reciprocatory bar, the connecting-rod swiveled at each end to a collar, one of which collars is arranged loosely upon an arm, h , of the binder-arm and the other similarly arranged upon a wrist-pin of the crank, and the lever H' , having a slotted bar, H^2 , pivoted thereto, said lever being adapted to raise the bar F' at the proper moment, so as to free the wrist-pin of the crank from the notch at the end of the slot in the said bar, whereby the latter will travel to a certain extent without actuating the crank, substantially as described.

4. The combination, with the binder-arm, of the spring-bars i , the tension-pulleys arranged between the ends of said spring-bars, and a bolt passing through the spring-bars and provided with a nut for drawing them together, one of said tension-pulleys being mounted upon a hub of the other, substantially as described.

5. The combination, with the oscillatory shaft carrying the tying devices, of a vibratory lever having its ends connected with the oscillatory shaft by means of a chain wrapped several times around the shaft, a sleeve or hub upon the vibratory lever provided with radial arms and studs upon said arms, and a slotted bar guided by the axle that passes through the hub of the lever, said slotted bar being provided with dogs that act at certain moments upon the studs of the hub-arms, and being also connected with the crank of the driving-shaft, substantially as described.

6. The combination, with the binder-arm, of the armed rotary cord-holder N and the arm N' , pivoted to the lever L , and arranged to act upon the rotary cord-holder at certain moments, so as to cause the holder to engage the cord, substantially as described.

7. The combination, with the oscillatory shaft M' , of the cutter and holder P , arranged to slide along said shaft, the links connecting the cutter and holder with a collar loose upon the oscillatory shaft, and the vibratory lever arranged to move the collar, substantially as described.

8. The combination, with the oscillatory shaft, of the cutter and holder P , arranged to slide in a longitudinal channel in the shaft, a sheath into which the cutter and holder is retracted in order to sever the cord between the rotary armed holder and the said cutter and holder, and also to gripe the ends of the cord between the cutter and holder and the gavel, substantially as described.

9. The combination, with the oscillatory shaft, of the cutter and holder P , arranged to slide along said shaft, a link, p^4 , connecting with the cutter and holder bar and pivoted to the oscillatory shaft, the link p^6 , connecting said link with a grooved collar, Q , arranged to slide upon the oscillatory shaft, the vibratory yoke-bar q^2 , arranged to move the loose collar, the lever-arm L^4 , provided with a wrist-pin, and the slotted bar connecting with the vibratory yoke-bar, and having its slot arranged to receive the wrist-pin upon the lever-arm, substantially as described.

10. The combination, with the oscillatory bar carrying the cutter and holder, of a bar arranged to slide along said shaft and having pivoted to its outer end a notched grabber or finger, and guides arranged to raise said grabber when the bar is retracted and to depress the same when the bar is extended out from the oscillatory shaft, substantially as described.

11. The combination, with the oscillatory shaft carrying the movable cutter and holder, of the movable bar carrying the pivoted finger or grabber, the cutter and holder and the grabber-bar being connected by a link pivoted to the oscillatory shaft, so that the vibration of the link will cause the said two devices to slide along the shaft in opposite directions, substantially as described.

12. The combination, with the oscillatory shaft having the longitudinal channel R , of the pivoted grabber R^2 , arranged to work in said channel, the cutter and holder P , and devices for moving the bars of the cutter and holder and the grabber, said shaft also having the slots r^4 , in which the cord is received as it is being wound around the shaft, substantially as described.

13. The combination, with the oscillatory shaft, of the movable cutter and holder, the grabber pivoted upon a sliding bar, and mechanism timed to rotate the shaft in one direction, so as to cause the cutter and holder to engage the cord and then to cause the grabber to engage the same, said mechanism being also timed to cause the shaft to then rotate in a reverse direction and to actuate the cutter and holder, so as to release the cord after the knot has been tied, substantially as described.

14. The combination, with the oscillatory shaft, of the cutter and holder P , mechanism for actuating the same, the grabber-hook R^2 , the slots r^4 , the channel r^2 , the guide r' , and the arm S , connected with the cutter and holder bar and arranged to push the loop off from the end of the oscillatory shaft, substantially as specified.

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

CHRISTOPHER LIDREN.

Witnesses:

DAVID N. MITCHELL,
EDGAR H. ANDRESS.