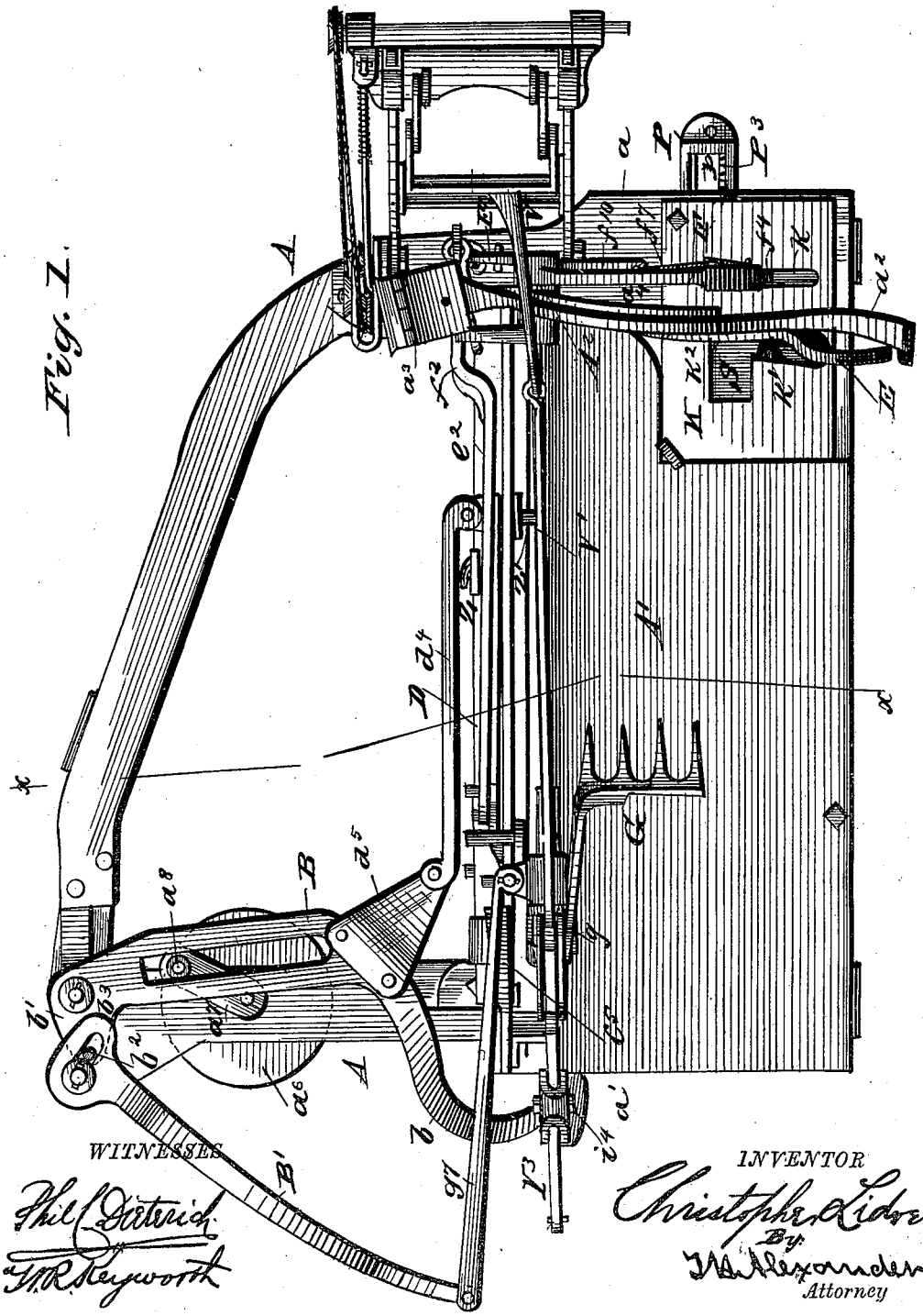
(Model.) 11 Sheets—Sheet 1.

C. LIDREN.

GRAIN BINDER.

No. 342,699. Patented May 25, 1886.

Fig. 1.



WITNESSES

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(Model.)

11 Sheets—Sheet 2.

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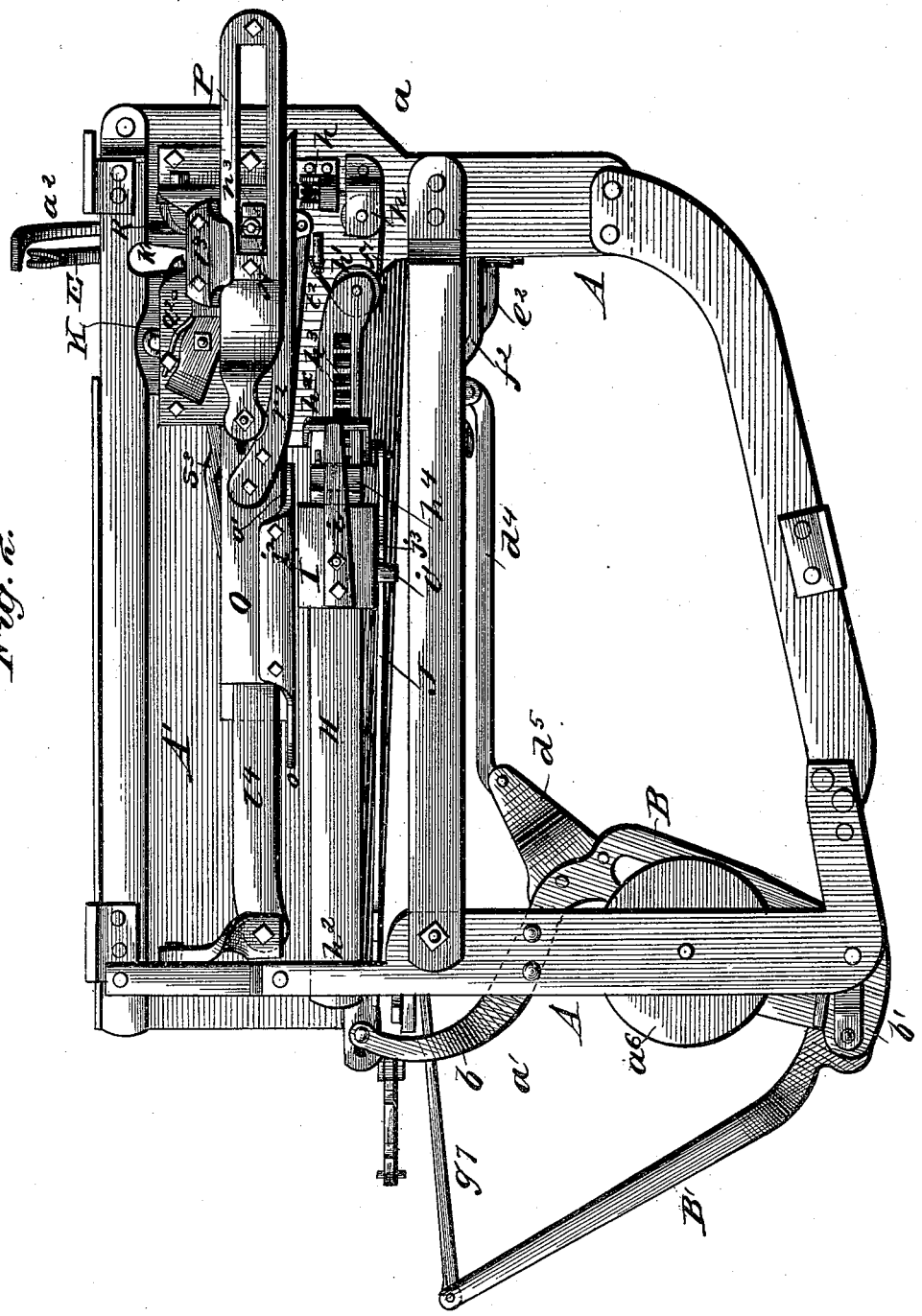
GRAIN BINDER.

No. 342,699. Patented May 25, 1886.

Fig. 2.



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(Model.)

11 Sheets—Sheet 3.

C. LIDREN.

GRAIN BINDER.

No. 342,699. Patented May 25, 1886.

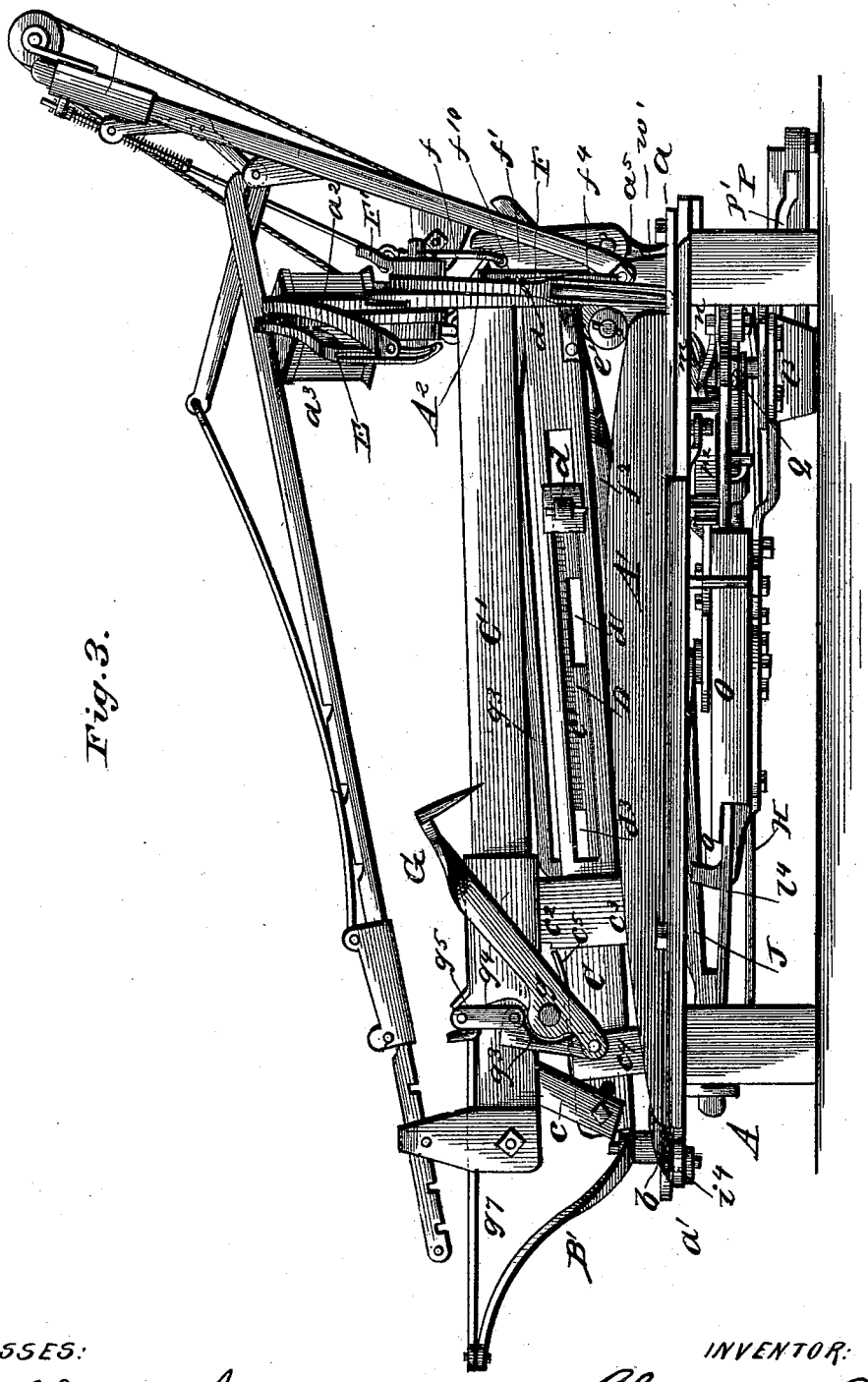

Fig. 3.

WITNESSES:

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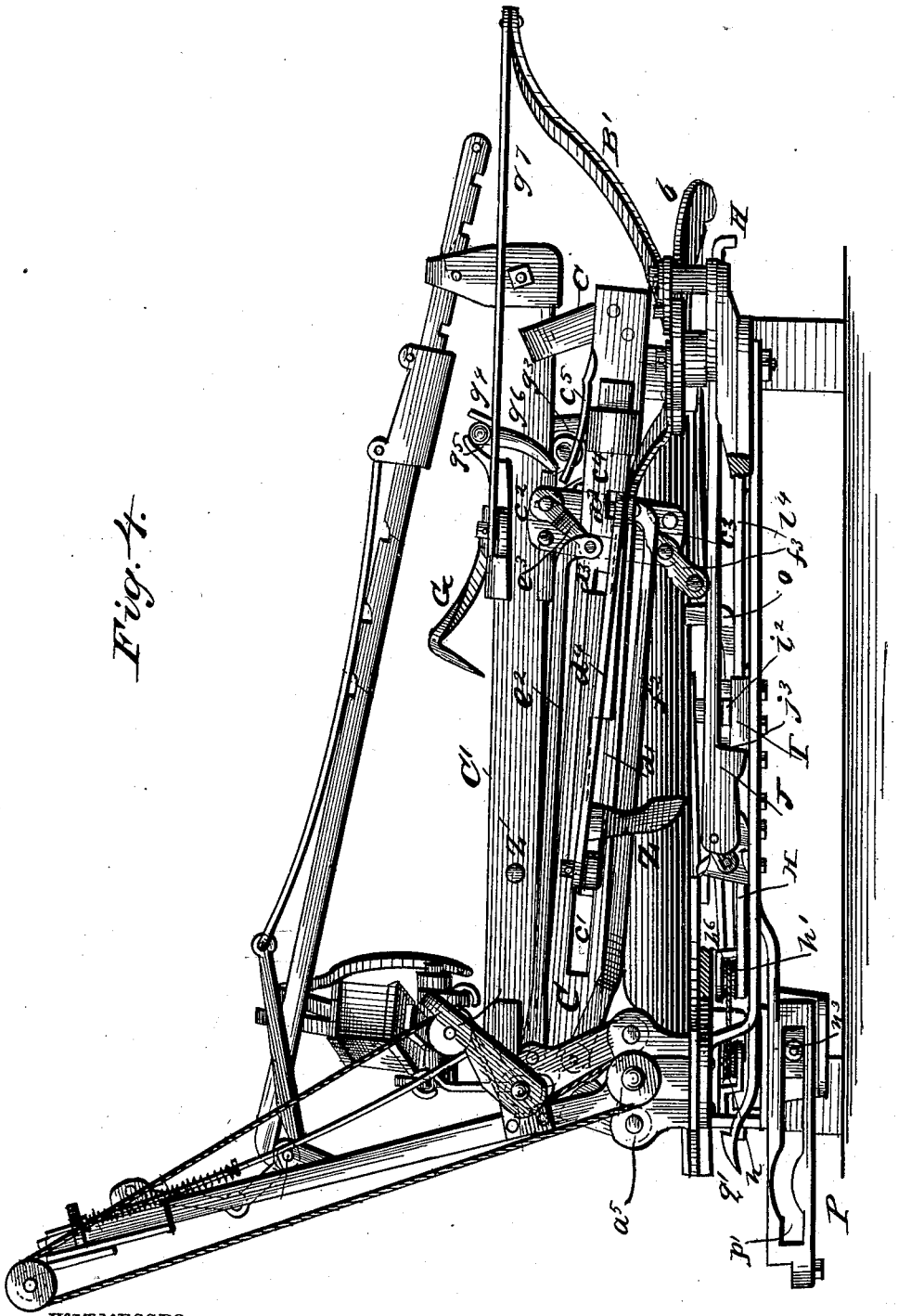
(Model.) 11 Sheets—Sheet 4.

C. LIDREN.

GRAIN BINDER.

No. 342,699. Patented May 25, 1886.

Fig. 4.



WITNESSES

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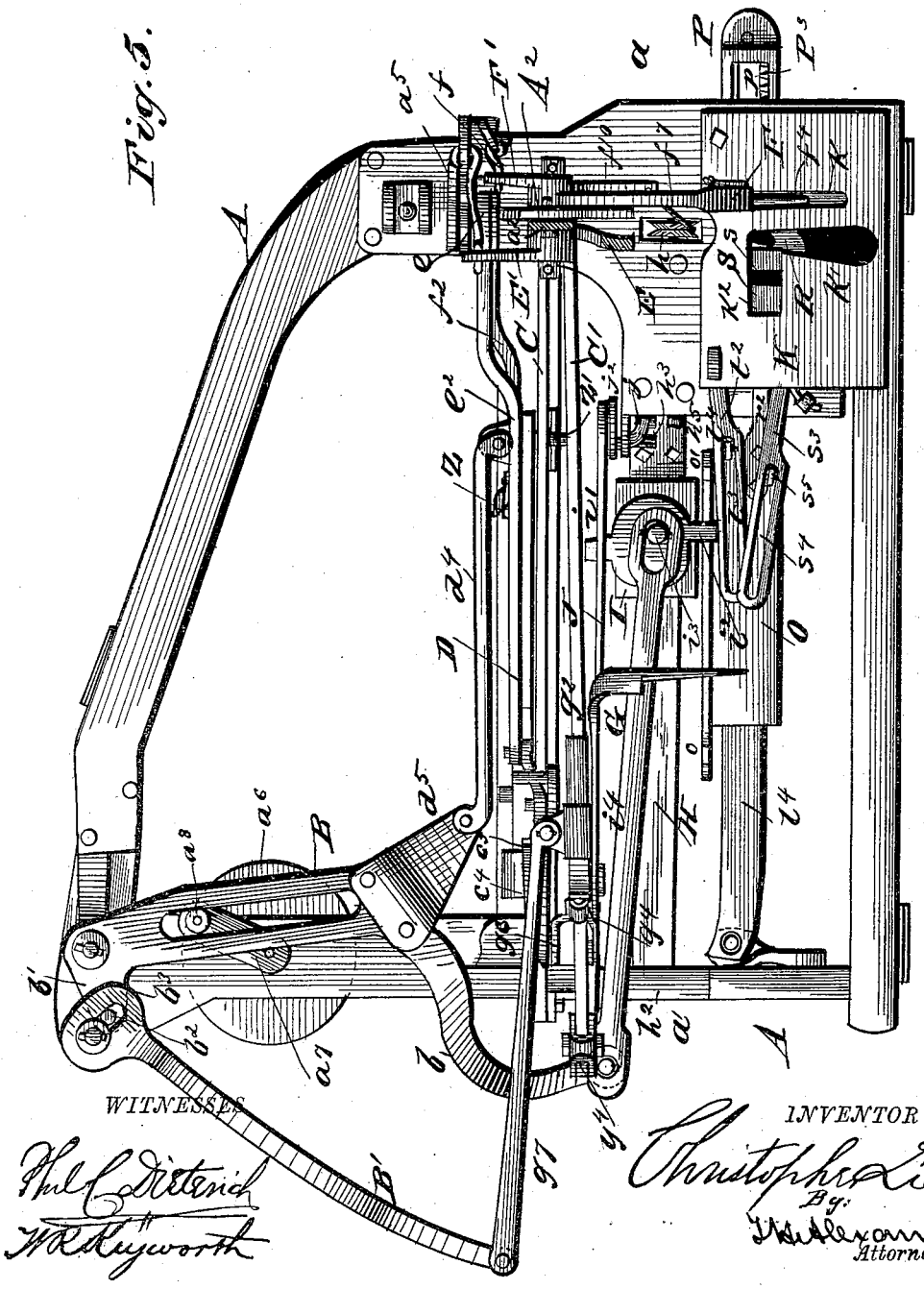
(Model.) 11 Sheets—Sheet 5.

C. LIDREN.

GRAIN BINDER.

No. 342,699. Patented May 25, 1886.

Fig. 5.



WITNESSES

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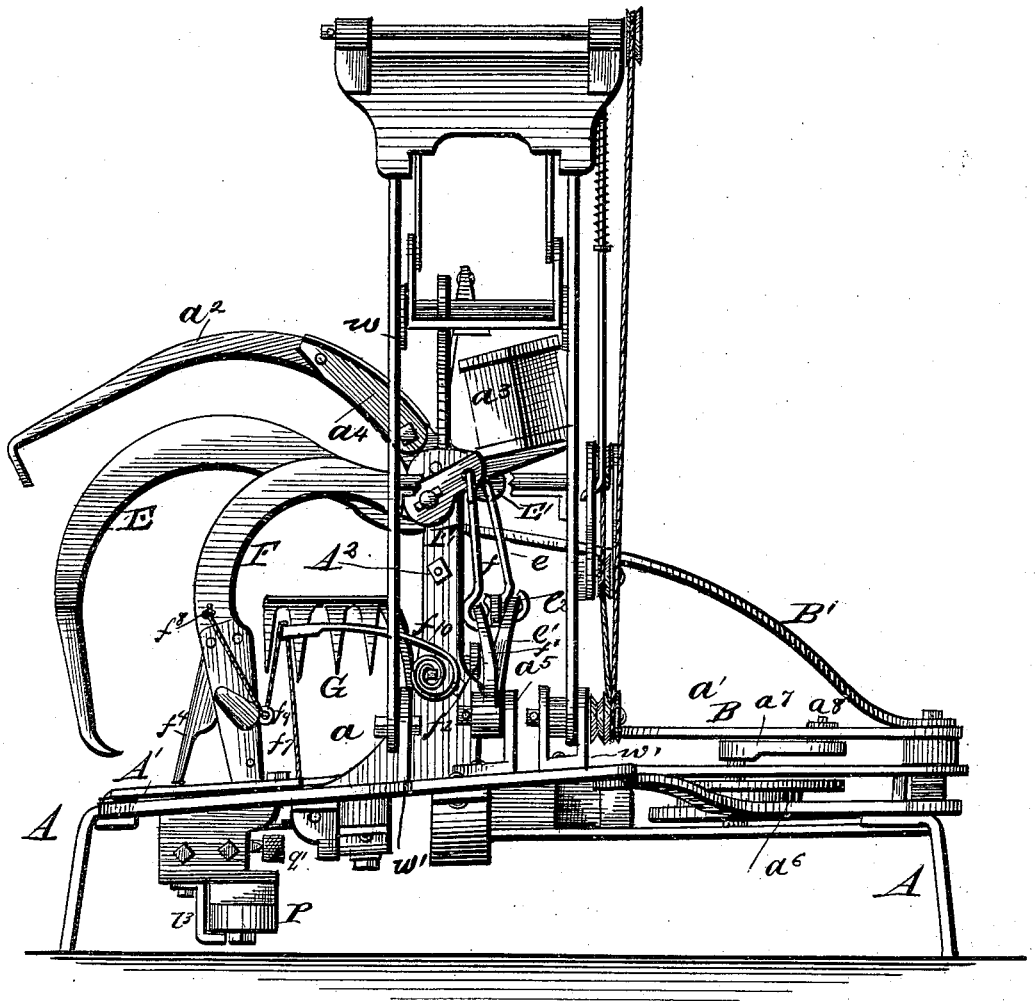
(Model.) 11 Sheets—Sheet 6.

C. LIDREN.

GRAIN BINDER.

No. 342,699. Patented May 25, 1886.

Fig. 6.



WITNESSES

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C. LIDREN.

GRAIN BINDER.

No. 342,699. Patented May 25, 1886.

Fig. 7.

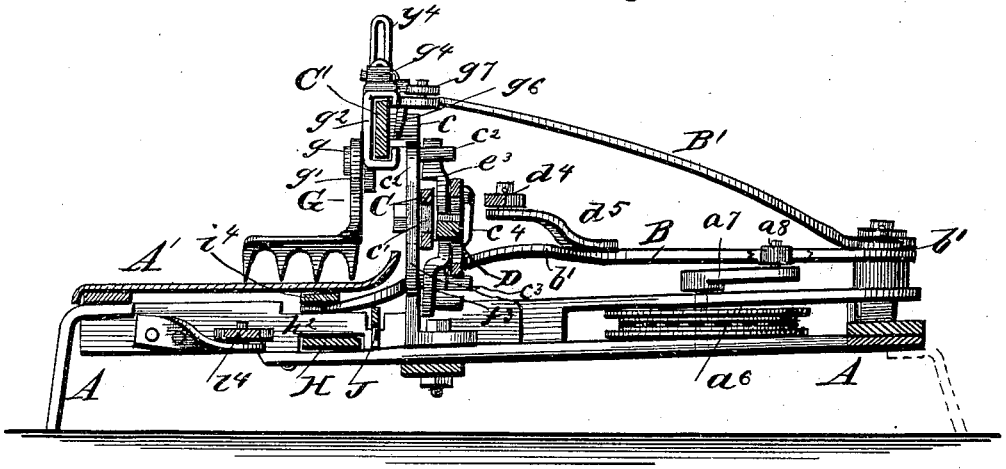
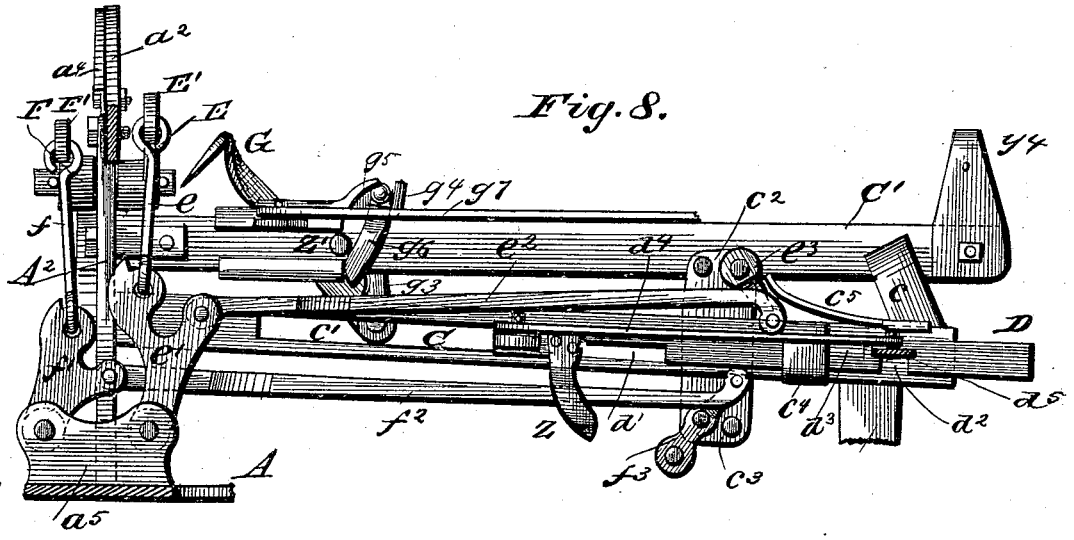


Fig. 8.



WITNESSES

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(Model.) 11 Sheets—Sheet 8.

C. LIDREN.

GRAIN BINDER.

No. 342,699. Patented May 25, 1886.

Fig. 9

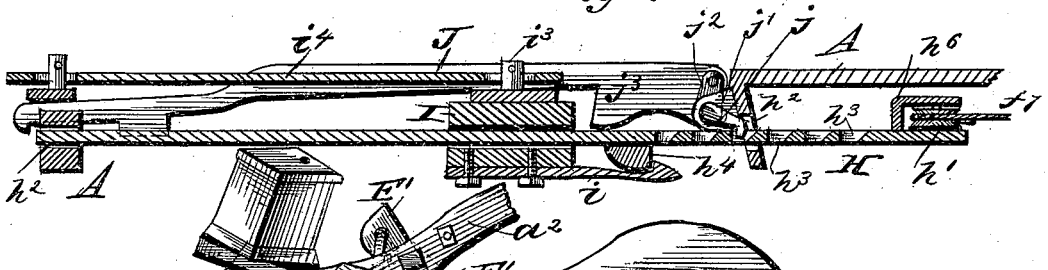


Fig. 10.

Fig. 11.

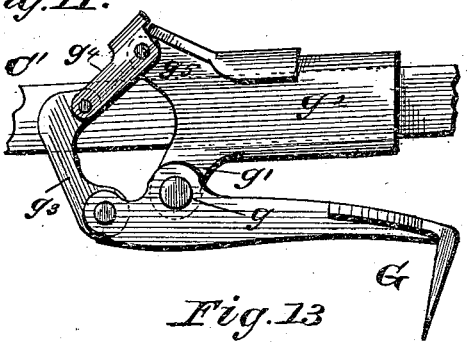


Fig. 12.

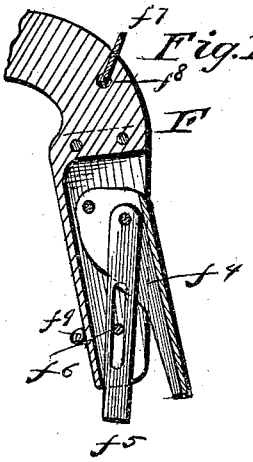
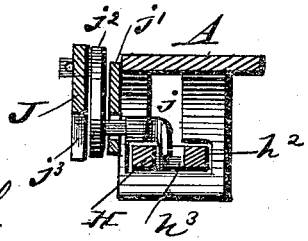


Fig. 13



WITNESSES

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(Model.) 11 Sheets—Sheet 9.

C. LIDREN.

GRAIN BINDER.

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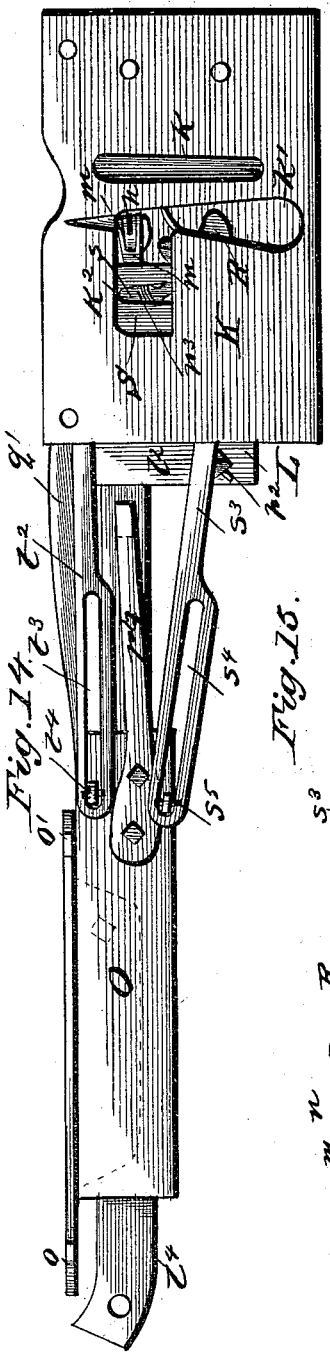

Fig. 14.

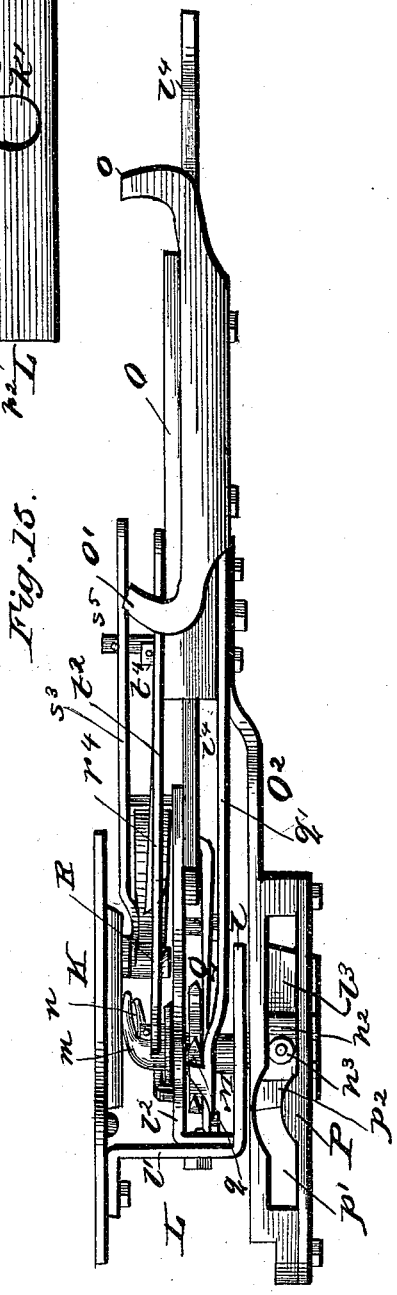

Fig. 15.

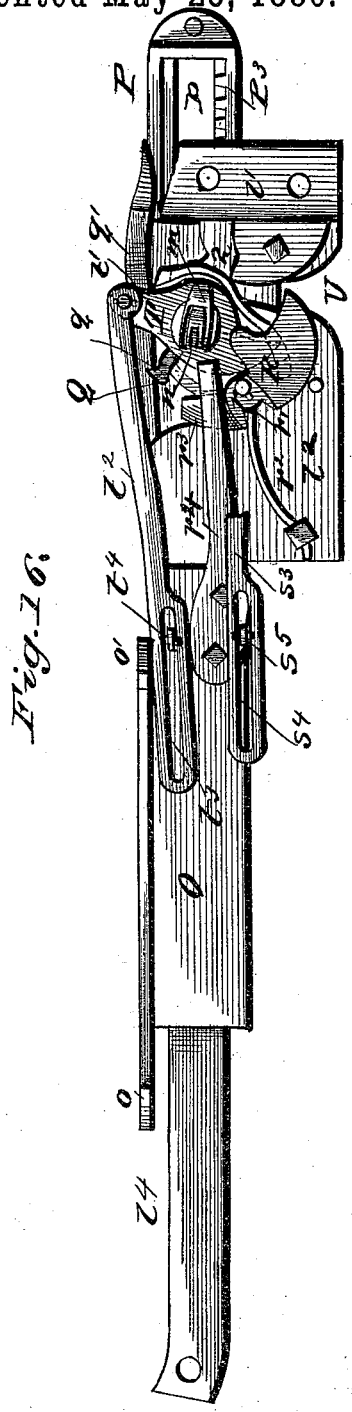

Fig. 16.

WITNESSES

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C. LIDREN.

GRAIN BINDER.

No. 342,699. Patented May 25, 1886.

Fig. 17.

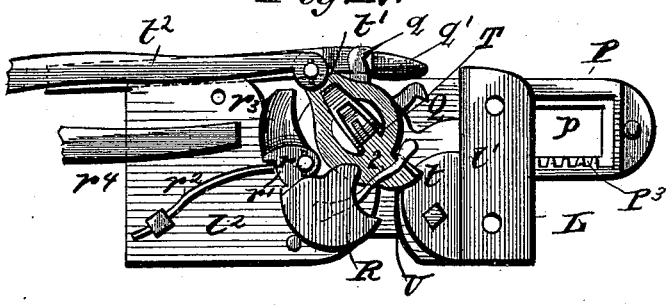


Fig. 18.

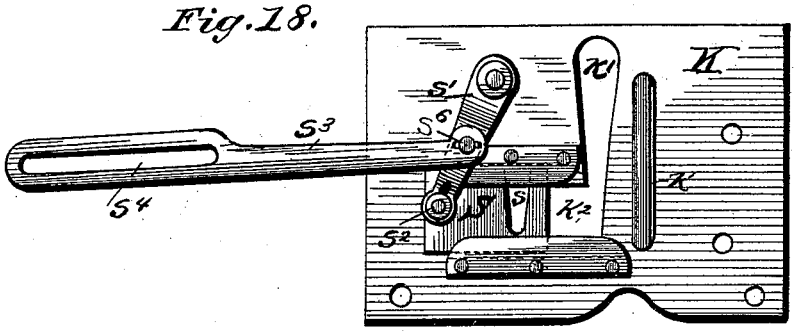


Fig. 19.

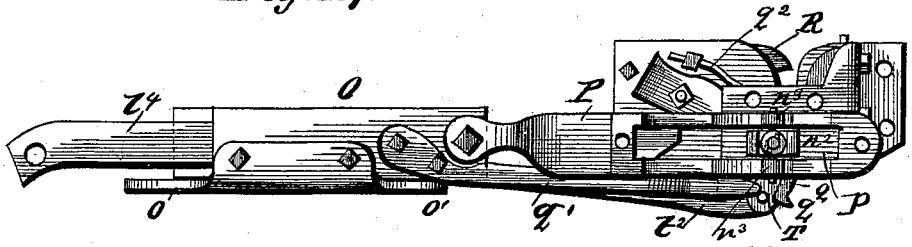


Fig. 21.

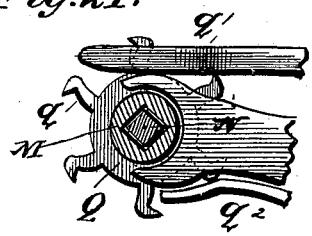


Fig. 20.

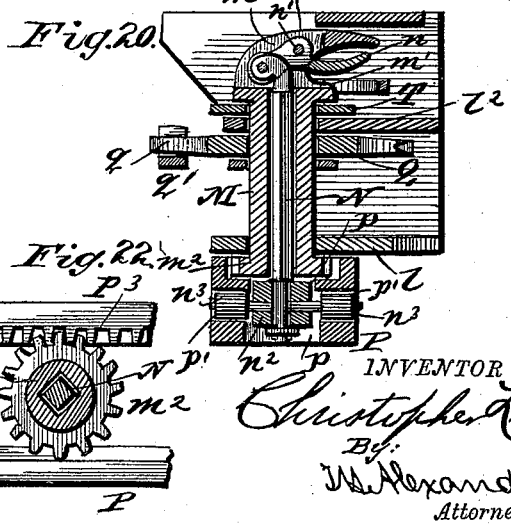
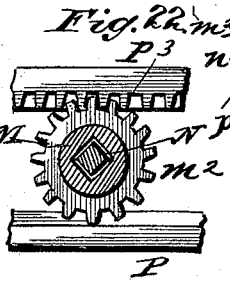


Fig. 22.



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Attorney

(Model.) 11 Sheets—Sheet 11.

C. LIDREN.

GRAIN BINDER.

No. 342,699. Patented May 25, 1886.

Fig. 23.

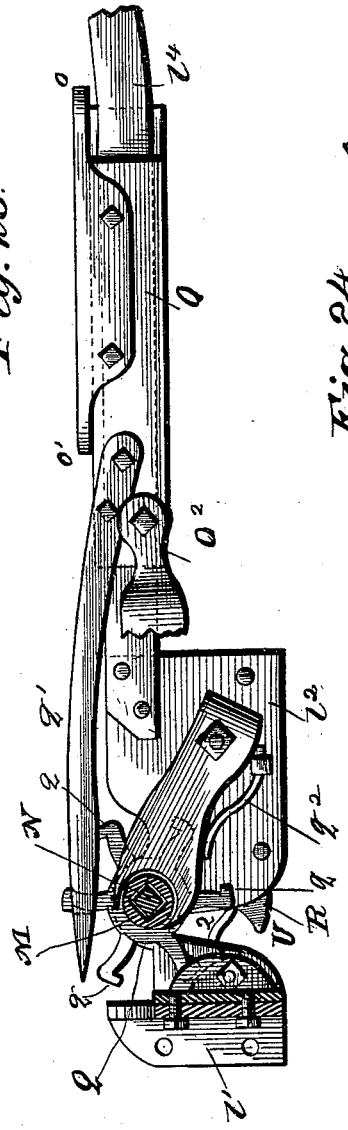
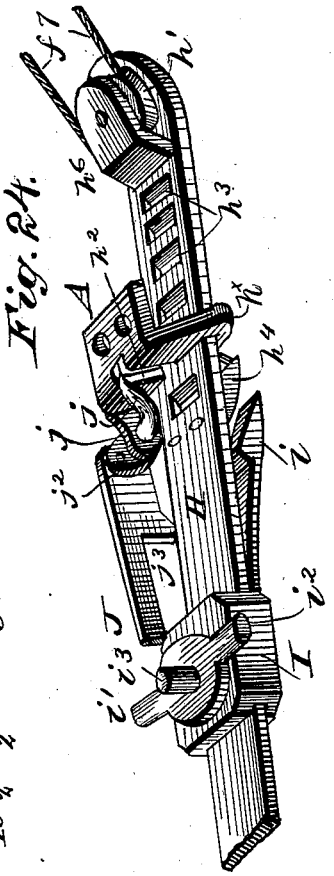


Fig. 24.



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A. E. Dowell

INVENTOR

Christopher Lidren

By his Attorney

W. Alexander

UNITED STATES PATENT OFFICE.

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

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 342,699, dated May 25, 1886.

Application filed March 6, 1885. Serial No. 157,903. (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 plan view of my improved grain-binder. Fig. 2 is a bottom plan view of the same. Fig. 3 is a front elevation of the same. Fig. 4 is a rear elevation. Fig. 5 is a plan view with the rake-platform removed. Fig. 6 is an end elevation. Fig. 7 is a transverse section taken on line *x x*, Fig. 1. Fig. 8 is an enlarged detail view showing the arrangement of the guide-bars. Fig. 9 is an enlarged sectional view of the bar H. Fig. 10 is an enlarged detail view showing the binder and compressor arm. Fig. 11 represents an enlarged detail of the ejector-rake and its mechanism. Fig. 12 is an enlarged sectional view of the lower part of the compressor-arm. Fig. 13 is an enlarged transverse sectional view of the bars H and J. Fig. 14 is a plan view of the plate K and mechanism attached thereto. Fig. 15 is a side elevation of the same. Fig. 16 is a plan view of the same with the plate K removed. Fig. 17 is a similar view showing the mechanism in a different position. Fig. 18 is a bottom plan view of the plate K. Fig. 19 is a bottom plan view of the plate O and bar P, with their mechanism. Figs. 20, 21, and 22 are enlarged sectional details of the knotting mechanism. Fig. 23 is an enlarged detail view, partly in section, of the cord-holder and connections. Fig. 24 is an enlarged detail of the bar H and its connections.

This invention, which is an improvement on a patent granted to me on the 30th day October, 1883, and numbered 287,695, appertains to the class of self-binding harvesters, the improvements relating particularly to the compressing, ejecting, and cord holding, knotting, and cutting devices, and the mechanism which actuates said devices.

The invention consists in the construction and arrangement of the various parts, hereinafter described, and pointed out in the appended claims.

For convenience and clearness, the main frame, the attached binder and compressor arms, ejector-rake, and mechanism actuating said arms and rake will be first described. The compressor mechanism and binding mechanism will then be described in their proper order.

In the accompanying drawings, A represents the bed-frame of the machine, of which *a* is the receiving and *a'* the delivering end.

A' is the platform, along which the bundles are discharged, extending from the end *a* to the end *a'*.

A^2 is a standard, rising from the rear part of the platform at the end *a*, and having the compressor and binder arms pivoted oppositely upon it on its outer and inner sides, respectively, as shown.

a^2 is a curved cord-directing arm secured to the top of the standard and carrying the spool-box a^3 on its rearward extension behind the standard. The front end of the arm is bent downward and inward, and is provided with an aperture, through which the cord runs to the binder-arm.

a^4 is a spring-plate secured to the side of the arm a^2, as shown.

a^5 is a bifurcated lug upon the main frame in rear of the standard A^2.

a^6 is a sprocket-wheel actuating all parts of the machine and driven by a chain from a like wheel secured to the axle or one of the main wheels. The sprocket-wheel a^6 is journaled on the main frame at the end *a'*, and its shaft carries the crank-arm a^7, provided with a vertical friction-roller, a^8.

B is a longitudinally-slotted lever pivoted upon the main frame at the end *a'*, and having at its front end an S-shaped extension, *b*. The friction-roller a^8 enters the slot of the lever, travels in the same, and vibrates the lever when the sprocket-wheel rotates.

b' is an extension from the rear end of the lever B, provided with a vertical pin, b^2, at its end.

B' is a lever pivoted at the end *a'* of the main frame outside the lever B, and provided at its rear end with the slotted enlargement b^3, into the slot of which the pin b^2 enters and vibrates the lever B' oppositely to the lever B. The lever B actuates the compressor and binder arms and binding mechanism, and the lever B' actuates the ejector-rake.

C is a guide-bar running from the standard A^2 slightly downward to a standard rising from the end a' of the main frame, and C′ is a horizontal guide-bar running from the standard A^2 in front and above the guide-bar C, and supported at the end a' of the main frame by a bar, c, which rises and inclines inward from the bar C. The guide-bar C is provided with the long longitudinal guide-slot c', and at the outer end of said slot with the vertical lugs c^2 and c^3, respectively, upon its upper and lower edges.

c^4 is a guide-loop on the rearward surface of the bar C outside said lugs, and c^5 is a flat spring secured to the edge of said bar above the loop c^4.

D is a reciprocating bar traveling on the rear surface of the bar C, and supported by the loop c^4 and slot c', its inner end being provided with a square lug, d, which enters said slot and is retained therein by a washer and pin, as shown. The bar D has on its lower edge the rectangular notches d' d^2, the former near its inner and the latter toward its outer end, and upon its upper edge is the rectangular notch d^3, situated between the former notches, but near the notch d^2.

d^4 is a laterally-swinging link-bar pivoted to the inner end of the bar D and to the end of an arm, d^5, which extends outward from the bend of the lever B, so that the vibration of said lever causes the bar D to reciprocate.

E is the curved binder-arm pivoted near the top of the standard A^2, and having its rearward extension, E′, connected by a link, e, to the inner arm of a bifurcated vibrating lever, e', pivoted upon the bracket a^5.

e^2 is a link-bar pivoted to the outer arm of the bifurcated lever and to the lower end of a vibratory arm, e^3, having its upper end pivoted on the lug c^2.

F is a compressor-arm pivoted on the standard A^2 oppositely to the binder-arm, and provided with the rearward extension, F′, which is connected by the link f to the inner arm of the vibratory bifurcated lever f'.

f^2 is a link-bar pivoted to the arm of said lever and to the upper arm of a vibratory bar, f^3, pivoted at its center upon the lug c^3. The lever f' is pivoted in the bracket a^5, inside the lever e'. When the bar D is at its limit of motion inwardly, the arm e^3 and the downwardly-bent end of the link-bar e^2 rests upon its upper edge outside the notch d^3, the lower end of the arm inclining inward. The link-bar e^2 then holds the lever e' inclined, so as to draw down the upper end of the link e and the extension E′ and hold up the point of the binder-arm. As the bar D moves outward the bent end of the bar e^2 and arm e^3 fall into the notch d^3, and in riding out of the same the arm e^3 is inclined outward, drawing back the link-bar, so as to cause the lever e' to assume an erect position. The end of the binder-arm then falls. As the inclination of the arm e^3 cannot reverse until its return to the outer side of the notch by the inward reciprocation of the bar D, the binder arm must remain down all the time that the arm e^3 is inside the notch and up all the time that it is outside the same; but as the said notch is only a slight distance inward from the said arm when the bar D is at its inward limit of motion, the binder-arm will fall when the said limit is nearly reached, and will rise again just after the beginning of the return of the bar D. The upper edge of the bar on either side of said notch consequently gives the proper pauses to the binder-arm, and their comparative duration is effected by the position of the notch. When the bar D is at its limit of inward motion, the upper end of the bar f^3 and the upwardly-bent end of the link-bar f^2 are in the notch d^2 with the bar f^3, inclining thence downward and outward, and its lower arm against a proper stop on the lug c^3. The link-bar f^2 then inclines the lever f', and by means of the link f keeps the compressor-arm raised. As the notch travels with the outward movement of the bar D the inclination of the bar f^3 is reversed, the link-bar f^2 drawn outward, and the compressor-arm F falls. It remains down until the ends of the bar f^3 and link f^2 have entered and are passing out of the notch d', when a depending lug, Z, attached to the bar D, inside said notch, strikes the lower arm of the bar f^3, causing its upper arm to engage against the outer wall of the notch and reverse its inclination and raise thereby the compressor-arm, which remains up till the bar f' is reversed in inclination by the notch d^2, as before. The compressor-arm is thus raised and lowered at each inward and outward motion of the bar D, being lowered slightly before the binding-arm to compress the gavel for the latter. The lower or outer part of the compressor-arm is recessed from its outer edge, and has pivoted within the recess F the bar f^4, recessed longitudinally from its inner edge.

f^5 is a bar lying in the recess of the arm, and having its upper end pivoted in the recess of the bar f^4. The bar f^5 is longitudinally slotted, a pin, f^6, passing through the slot and through the walls of the recess of the compressor-arm. When the compressor arm falls and strikes the bed plate, the bar f^5 is driven upward and throws outward the recessed bar f^4, driving all loose straw from the gavel that might interfere with the cord on the binder-arm.

f^7 is the compressor-cord, fastened to the compressor-arm at f^8, thence passing through the opening f^9 of the same, and thence through an opening in the outer end of the spring f^{10}, secured to the standard A^2, before descending to the compressor mechanism, hereinafter described.

G is the ejector-rake, having its handle or arm pivoted at g upon an arm, g', depending from the outer end of the front side of a slide, g^2, which moves upon the guide-bar C′, the upper and lower edges of the slide bending around the guide-bar.

g^3 is a link pivoted to the end of the rake-

arm extended outward beyond the pivot, and having its inner edge concave, so as to lie and bind on the convex edge of the arm g when the rake is lifted.

g^4 is a link pivoted to the upper end of the link g^3, and to an upward extension, g^5, of the slide.

g^6 is an arm of the link g^4, bending over the upper edge of the bar C′ and descending on the rear side of the same. The links g^3 and g^4 together form a toggle-joint.

g^7 is a laterally-moving link-bar pivoted to a rear extension of the slide and to the end of the lever B′. When the rake is moved outward, the arm g^6 strikes the bar c and the toggle-joint is extended, the meeting points of the links passing the perpendicular. This motion lifts the rake and causes the links g^7 to bind on the arm g, the link g^4 preventing the former link from falling backward. At the end of the inward motion of the rake a lug, Z′, on the bar C′ strikes the arm g^6, and, bending outward the toggle-joint, allows the rake to fall. The compressor-cord f^7 descends from the spring f^{10} through a slot in the main frame, runs around the pulleys h h, journaled on brackets secured to the under surface of the main frame, and the pulley h', and is secured to a staple on the lower surface of the main frame. The pulley h' is journaled upon the inner end of a longitudinal bar, H, sliding in a slot, h^2, in the outer bar of the frame, and also supported by a stirrup, $h^\times$, depending from the main frame. The said bar is provided outside the pulley h' with the rectangular openings h^3 h^3, the sides of which converge from above downward, and to the outer side of said slots, upon the under side, it has upon it the lug h^4, having its outer surface beveled, as shown.

I is a hollow block sliding freely on the bar H, and having secured to its lower surface the longitudinally-extending spring-hook i. The upper surface of the block has extending laterally from it the opposite arms or lugs, i' and i^2, and centrally upward from it the pin i^3, which enters a longitudinal slot in the inner end of a laterally-swinging link-bar, i^4, the outer end of which is pivoted upon the end of the S-shaped extension b of the lever B. As the block moves inward, the point of the spring-hook i passes over the lug h^4, the bar H being at rest, with a stop, h^5, on it, against a part of the main frame; but when the block begins its outer motion the hook catches against the lug and draws the bar out till a stop, h^6, on the bar strikes against the main frame. The beveled holding-edge of the hook then slides over the lug, and the tension of the compressor-cord and the spring f^{10} returns the bar H to its former position. When the bar H is drawn outward, the compressor-arm is down and the spring f^{10} is bent downward. The bar H is prevented from going too far inward by the hook j, pivoted upon a bracket, j', on the main frame, and having its arm j^2 pivoted upon the sliding bar J, the outer end of which is recessed on its edge and upheld by a bar of the main frame. When the block I moves inward, its lateral arm i' strikes against the shoulder j^3 on the lower edge of the bar J, thereby turning the hook j, and making its point enter one of the slots h^3. When the bar H is drawn outwardly, the point of the hook rides over the slots. A rectangular opening is cut at the front inner corner of the platform, and a rectangular plate, K, is bolted to the main frame thereover.

k is a transverse depression in the plate K, into which the compressor-arm descends, and which guides the bar f^4 in its outward motion.

k' is the transverse slot in the plate K, through which the binder-arm passes in its descent.

k^2 is a rectangular slot extending longitudinally of the platform from the rear end of the slot k', and serving a purpose hereinafter explained.

The plate K forms part of frame L, to which the holding, knotting, and cutting devices are attached.

To the plate K is bolted the upwardly-projecting flange of the vertical portion l' of a plate, l, which lies parallel with the plate K.

l^2 is a plate parallel to the plates K and l, about midway between the same, and secured to the vertical portion of the latter.

l^3 is a bracket depending from the plate l, and having its edge bent at right angles inward.

l^4 is a guide-bar, secured at its inner end to the plate l^2 and at its outer end to the main frame.

M is a hollow vertical shaft journaled in the plates l^2 and l. The upper end of the shaft M above the plate l^2 carries the horizontal jaw m, having on one side the curved and inclined shoulder m'. The lower end of the shaft M below the plate l carries the pinion m^2. The jaw m and upper end of the shaft M is provided with the slot m^3.

N is a shaft passing through the shaft M, and having pivoted to its upper end the heel of a jaw, n, which forms the lower jaw of the knotter, the jaw m being the upper jaw of the same. The jaw n is pivoted at n' in the slots m^3. The lower end of the shaft N carries the swiveled block n^2, provided with lateral arms carrying friction-rollers n^3 n^3.

O is a hollow block reciprocating on the bar l^4, and provided on its rear side with the upright lugs O O′, by engaging with which the lateral arm i^2 of the block I reciprocates the block O.

o^2 is a horizontal arm extending inward from the block O, and carrying at its end a slotted bar, P. The bar P has on its upper and lower sides the straight longitudinal slots p p, the lower one of which is a guide-slot for the swiveled block n^2. On the sides of the frame P are the similar longitudinal slots, p' p', having the curved portions p^2 p^2, into which enter the

friction-rollers n^3, so that when the said rollers pass over the curved portions p^2 the shaft N is raised and the jaw n opened from the jaw m.

P^3 is a straight rack-bar, made on the upper front edge of the bar P, within the same, and engaging with the pinion m^2, so that as the said bar is reciprocated the shaft M (and consequently the shaft N) are rotated first in one direction and then oppositely.

Q is a holder-wheel, journaled on the shaft M, immediately below the plate l^2, and provided with the teeth q.

q' is a spring-hook secured to the block O, extending inward therefrom, and having its point arranged to engage with the teeth q.

q^2 is a flat spring secured to the lower surface of the plate l^2, and acting against the teeth q on the side of the wheel Q, opposite the hook q', so as to prevent the said hook from rotating the wheel as it moves inward. As the hook moves outward its point catches against a tooth and moves it outward, causing a tooth diametrically opposite to bind the cord between itself and the plate l^2.

R is a tucking-plate having a curved contour, with its inner edge concave. The plate R is pivoted on a vertical post, r, between the plates K and l^2, and has on its hub, which surrounds the said post, the shoulder r', against which the spring r^2, secured to the plate l^2, acts when the plate R is rotated.

r^3 is an arm standing inward from the boss of the plate R, and r^4 is a spring-hook secured to the block O, which slips over said arm when moving inward, and draws the arm back when moving outward, till the inclination of the arm allows it to slip off and lets the spring r^2 return the plate R to its first position.

S is a rectangular plate or stripper, moving longitudinally in ways on the under surface of the plate K below the slot k^2.

s is a cut-away portion of the plate B, which continues and completes the slot k' when the plate S is at its farthest inward position.

s' is a lever-arm pivoted upon the under surface of the plate K, and slotted to receive a pin, s^2, depending from the plate S.

s^3 is a reciprocating bar pivoted at its inner end on the pin s^6, and provided with the longitudinal slot s^4 at its outer end.

s^5 is a pin rising from the block O, with its upper end in the slot s^4, and reciprocating the plate S from the said block. The function of the plate S is hereinafter explained.

T is the cutter-plate, lying upon the plate l^2, and having the cutting-edge t. The cutter-plate is journaled upon the shaft M, and has an arm, t', which is pivoted to a reciprocating bar, t^2, the outer end of which is provided with a longitudinal slot, t^3, into which passes the pin t^4 from the block O, the said pin reciprocating the bar t^2, and actuating thereby the cutter-plate. The plate l^2 is cut away at U vertically below the slot k' in the plate K, to allow the binder-arm to descend to the holder.

2 is a twine-guide bar having its ends bent downward and secured to plate l^2, the said bar standing in such position as to direct the twine into the open jaws of the knotter. The twine-guide 2 lies immediately above the cutter-plate, the cutting-edge of which moves under it and over the recess or slot U in the plate l^2. The cord guide 2 receives the cord as it is carried by the needle to the holder, and supports and guides it to the proper height to enter the jaws of the knotter. The gavel is pressed back against the compressor-cord by the grain-rake, and the compressor-arm descends in front of the gavel, carrying the cord down and compressing the gavel, the bar H being drawn outward to give the proper tension to the compressor-cord. The binder-arm then descends and passes the binding-cord around the gavel, and the wheel Q advances one tooth and secures the binding-cord between itself and the plate l^2. The shafts M and N have their jaws to the front of the machine, and the plate R or tucker turns the binding-cord to the side of the jaws, so that it engages therewith. When the jaws have rotated far enough to keep the cord from slipping off, the plate R springs back and the shaft M winds the cord upon itself. The shoulder m' on the said shaft then causes the cord to slip upon the jaws m and n, forming the loop of the knot. When the shaft M has made about one and one-half rotations, the jaws are opened by the action of the block n^2 in the slots p', lifting the shaft N. The jaws are then in position to catch the binding-cord, which is directed between them by the bar 2. The guide-bar 2 is of the same height above the plate l as the shoulder m' on the shaft M, and the cord consequently rises upon the guide-bar to that height and slides along the same into proper position to engage the shoulder, the bar having the proper inclination to permit this. After the jaws close on the cord the cutter-plate T cuts the cord, and the jaws m and n rotate backward, the plate S drawing the loop off the jaws, thus forming the knot, and the jaws opening during their reverse motion to allow the escape of the severed ends.

The reel-adjusting mechanism shown, while forming part of the described machine, pertains to another class, and will form the subject of a separate application for a Patent bearing Serial No. 157,904, and of even date with the present application.

The cutting and conveying mechanism is situated sufficiently in front of the binding table and mechanism not to prevent the action of the latter. The parts may be situated relative to each other similarly to the parts shown in a patent granted to me on the 30th day of October, 1883, No. 287,695.

Having described my invention, what I claim is—

1. In a self-binding harvester, the combination of the shaft M, provided with the jaw m, shoulder m', and pinion m^2, and the shaft N, provided with the jaw n, and having on its lower end the swiveled block n^2 and friction-

rollers n^3, with the reciprocating bar P, provided with the slots p p and p' p', and the rack-bar P^3, substantially as specified.

2. In a self-binding harvester, the combination, with a knotting device composed of the shafts M and N, and actuated by the pinion m^2 and rack P^3, and the bar P, carrying the said rack, of the cutter-plate T, the block O, the slotted arm or bar t^2, connecting said block with the cutter-plate, so as to actuate the latter from the block, and the arm or bar O^2, connecting the block O with the bar P.

3. The combination of the knotting device composed of the shafts M and N, constructed substantially as described, the plate K, secured to the main frame of the machine and provided with the slots k' and k^2, the reciprocating block O, the reciprocating plate S, provided with the slot or recess s, the lever-arm s', the reciprocating bar s^3, provided with the slot s^4, through which passes the pin s^5 on the block O, the vibrating plate R, pivoted on the post r, the spring r^2, attached to the plate l^2, and the spring-hook r^4, attached to the block O, substantially as specified.

4. In a self-binding harvester, the combination of the frame L, provided with the guide-bar l^4, the hollow shaft M, journaled in said frame and having the jaw m and shoulder m' on its upper end, the pinion m^2 on the lower end of said shaft, the shaft N, passing through the shaft M, the jaw n, pivoted to the shafts M and N, substantially as described, the block n^2, swiveled on the lower end of the shaft N and carrying the friction-rollers n^3, the slotted bar P, upon which the swiveled block travels, the rack-bar P^3, engaging with the pinion m^2, the block O, sliding on the guide-bar l^4, and having the bar P connected with it by the bar or arm O^2.

5. The combination, in a self-binding harvester, of the frame L, fixed to the frame of the machine, and holding the cord knotting and cutting devices, with the reciprocating block O and bar P, reciprocating bars s^3 and t^2, operating the tucker R and cutter-plate T, respectively, substantially as specified.

6. In a self-binding harvester, the combination of the reciprocating block O, having attached the spring-hook r^4, with the tucker-plate R, pivoted on the post r, and the spring r^2, substantially as specified.

7. In a self-binding harvester, the combination, with the reciprocating bar H, provided with the openings h^3, and the block I, sliding upon the bar H and provided with the arm i', of the bar J and hook j, substantially as specified.

8. The combination, in a self-binding harvester, of the reciprocating block I, provided with the arm i^2, with the sliding block O, provided with the lugs o o, substantially as specified.

9. In a self-binding harvester, the combination of the compressor-arm F, pivoted on the standard A^2, and the guide-bar C, provided with the slot c' and lug c^3, of the bar D, provided with the notches d' d^2, and tappet Z, and reciprocating on the guide-bar C, the bar f^3, link-bar f^2, vibratory lever f', and link f, substantially as and for the purpose set forth.

10. In a self-binding harvester, the combination of the binder-arm E, pivoted on the standard A^2, and the guide-bar C, provided with the slot c' and lug c^2, of the bar D, provided with the notch d^3, and reciprocating on the guide-bar C, the arm e^3, link-bar e^2, vibratory lever e', and link e, substantially as specified.

11. The combination, with the compressor-arm F, recessed on its outer edge, of the bars f^4 and f^5, substantially as specified.

12. In a self-binding harvester, the combination of the guide-bar C', and the lugs c' and Z', with the slide g^2, reciprocating on the guide-bar C', the rake G, pivoted on the slide, the links g^3 g^4, and arm g^6, substantially as specified.

13. In a self-binding harvester, the combination of the knotter rotating alternately in opposite directions and provided with the jaws m n and shoulder m', the slotted bar P, provided with a rack engaging a pinion on the lower end of said knotter, the vibrating tucker-plate R, pivoted upon the pin r, the spring r^2, attached to the plate l^2, the reciprocating block O, and the spring-hook r^4, secured thereto and adapted to engage with the arm r^3 of the tucker-plate, substantially as specified.

14. In a self-binding harvester, the combination of the knotter rotating alternately in opposite directions and composed of the shaft M, provided with the shoulder m' and jaw m, and the shaft N, provided with the jaw n, the slotted bar P, provided with the rack P^3, engaging the pinion m^2, the cord-holder wheel Q, journaled on the shaft M, the spring q^2, and the spring-hook q', attached to the block O, and adapted to engage the teeth of the wheel Q, substantially as specified.

15. In a self-binding harvester, the combination, with a knotter rotating alternately in opposite directions and provided with the shaft M, of the intermittently-rotating holding-wheel Q and vibrating cutter-plate T, both journaled upon the shaft M, substantially as specified.

16. In a self-binding harvester, the combination of a knotter rotating alternately in opposite directions, and composed of the shafts M and N, respectively, provided with the jaw m and shoulder m' and with the jaw n, the intermittently-rotating holder-wheel Q and vibrating cutter-plate, both journaled on the shaft M, the vibrating tucker-plate R, and the fixed cord-guiding bar 2, substantially as specified.

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

Witnesses: CHRISTOPHER LIDREN.

D. E. STUDEBAKER,

O. M. MITCHELL.