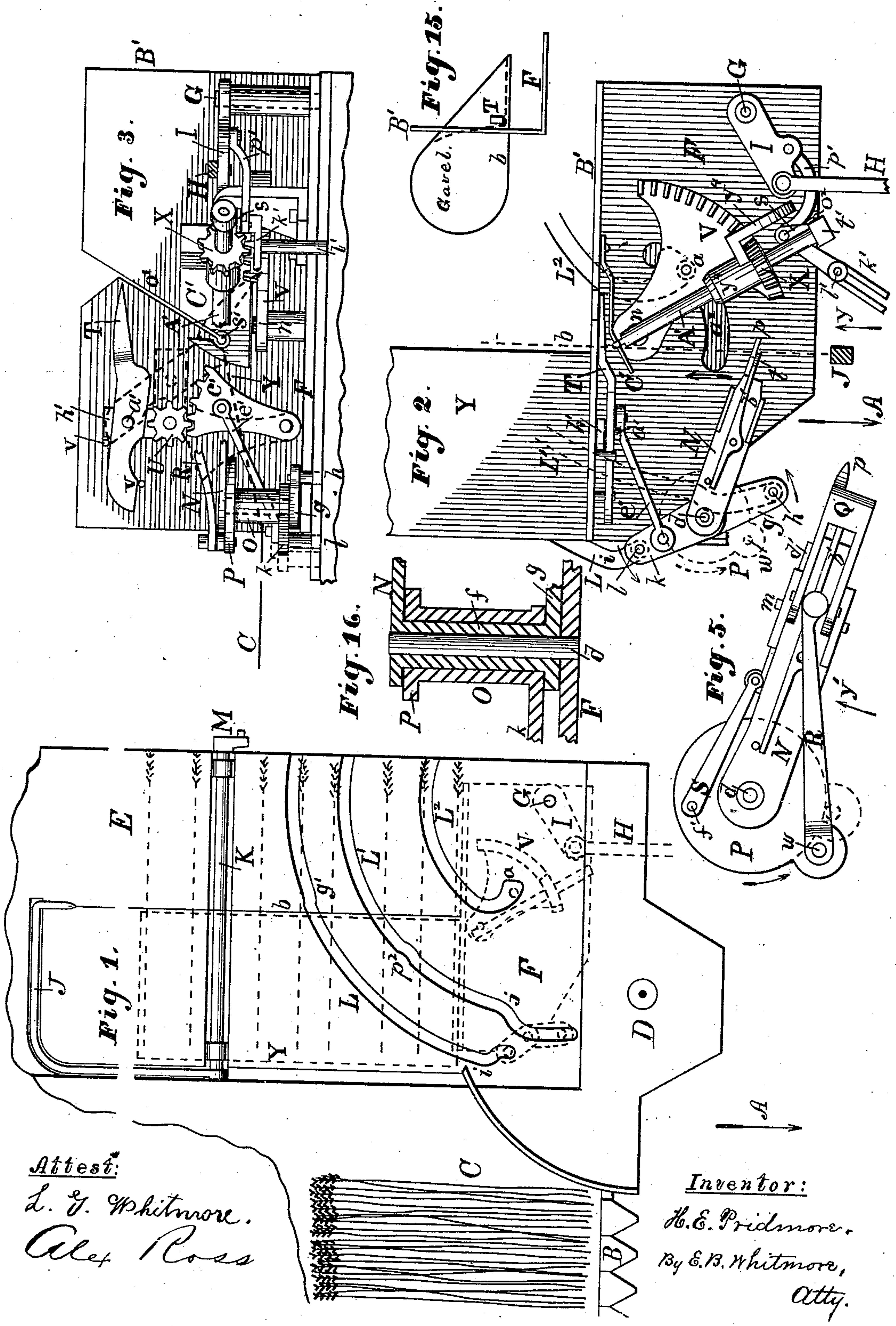


H. E. PRIDMORE.
Grain-Binder.

No. 226,785.

Patented April 20, 1880



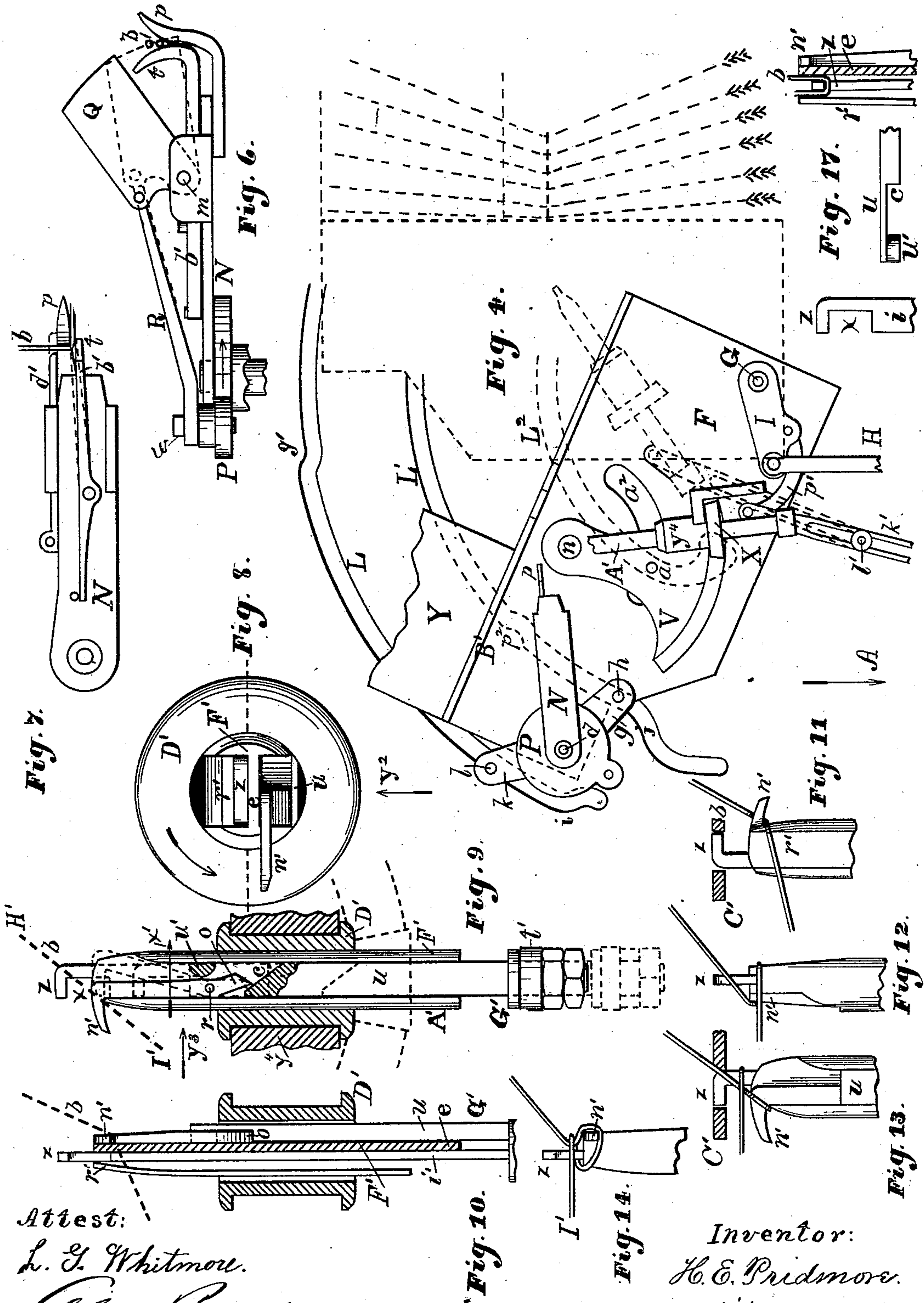
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By E. B. Whitmore,
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UNITED STATES PATENT OFFICE.

HENRY E. PRIDMORE, OF BROCKPORT, NEW YORK, ASSIGNOR TO BYRON E. HUNTLEY AND C. D. DEWEY, OF SAME PLACE, ONE-THIRD TO EACH.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 226,785, dated April 20, 1880.

Application filed December 26, 1879.

To all whom it may concern:

Be it known that I, HENRY E. PRIDMORE, of Brockport, in the county of Monroe and State of New York, have invented a new and useful Improvement in Grain-Binders, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a general plan of a portion of a reaper at the inner end of the sickle-bar, showing the relation between the binding mechanism and other parts of the reaper; Fig. 2, an enlarged plan of the binding mechanism, showing the same more fully than Fig. 1; Fig. 3, a side elevation of the same, looking in the direction indicated by the arrow y in Fig. 2; Fig. 4, Sheet 2, a plan of the same, showing another position and after certain operations of the parts have been performed; Fig. 5, Sheet 1, an enlarged plan of the twine-retaining device and twine-cutter; Fig. 6, Sheet 2, a side elevation of the same, viewed as indicated by arrow y' in Fig. 5; Fig. 7, a plan of the same, similar to Fig. 5, with some of the parts omitted; Fig. 8, a full-size view of the end or nose of the twine-knotter; Fig. 9, a side view of the same, viewed as indicated by arrow y^2 in Fig. 8; Fig. 10, a side sectional view of the same, looking in the direction indicated by the arrow y^3 in Fig. 9. Figs. 11 to 14, inclusive, show the positions of the knotter at every one-fourth rotation of the same made in developing the knot in the twine; and Figs. 15 and 16, Sheet 1, and Fig. 17, Sheet 2, details.

My invention relates to automatic twine-binding attachments to grain-harvesters; and it consists, mainly, in new and novel constructions of the twine-holding device and twine-cutter and of the twine-tying device or knotter, and of the manner of operating the said devices, all hereinafter fully described.

Referring to the drawings, the various arrows A indicate the direction of the advance of the reaper.

In Fig. 1, B is the sickle-bar, C the platform, and D the foot of the rake-standard, of an ordinary grain-harvester. E is a secondary

platform, upon which the binding is done, being an extension to the main platform C, but depressed below the level of the same.

F, in dotted lines, is a frame carrying the binding device; and J, the binder-arm, secured at the end of a horizontal shaft, K, resting in or upon the platform E.

Figs. 2, 3, and 4, Sheet 2, show the frame F, with its attachments, more fully drawn and to a larger scale.

L, L', and L² are three sinuous slots or grooves formed in the platform E, mainly concentric with the vertical stud G, constituting cam ways or tracks for three studs or vertical rollers extending into the same from beneath the frame F.

To operate the several parts of the binder and effect the binding of the sheaf the frame F is caused to swing horizontally around the fixed pivotal stud G through an arc of ninety degrees. (See Fig. 4.) The irregularities of the grooves L, L', and L², followed by the respective rollers, cause the parts to operate in manners hereinafter described.

I is a crank-arm, secured to the frame F by means of a sleeve journaled upon the stud G, rising from the platform E, and the said frame is caused to swing to and fro, as above described, by means of a connecting-rod, H, attached to said crank-arm, and at the other end to some suitable crank or rocker arm of the machine capable of giving the said rod reciprocal motion.

Figs. 1, 2, and 3 show the parts of the binder and the frame F in their normal positions and at rest, waiting the gathering of a gavel to be bound.

The cut grain upon the platform at C is carried by the ordinary harvester-rakes around upon the platform E, as shown in dotted lines, over the binding-twine b , after which the point of the binder-arm J, with the twine, is carried over the grain to the twine-clamping jaws by means of a connecting-rod attached to the crank-arm M or other suitable means, when the frame F, with the twine-encircled gavel, is swung around, as above described,

during which the sheaf is bound and delivered upon the ground, as indicated in dotted lines in Fig. 4.

Referring to the manner of holding and cutting the twine, *d*, Figs. 2 and 16, is a fixed vertical stud secured in the frame F, upon which is journaled a sleeve, *f*, carrying two horizontal arms, N and *g*. The lower arm, *g*, has a vertical stud, *h*, provided with a friction-roller, which extends down into the slot L' of the platform E, above described. The upper arm, N, carries the twine clamping and cutting devices. A second sleeve, O, is journaled upon the sleeve *f*, which is provided with a horizontal plate, P, and arm, *k*, which latter has a stud, *l*, reaching down into the slot L in the platform E.

It will be understood that were the frame F swung as above described, bringing the stud *h* to a crook in the slot L', carrying it nearer to the pivotal point G, the arms *h* and N, Fig. 2, would be swung as indicated by the arrows, and vice versa; and if the stud *l* be brought to a crook in the slot L, carrying it farther from said point G, the arm *k* and plate P would be carried in the direction indicated by their respective arrows, and vice versa.

Fig. 5, Sheet 1, and Figs. 6 and 7, Sheet 2, are views of the arm N, with its attachments, drawn to a larger scale. The arm N has a finger, *p*, extending upward from beyond its end, curving outward at the top, and a reversely-curved finger, *t*, being the upturned end of a spring, *b'*, lying upon and pivoted to the arm N, said fingers forming clamping-jaws, between which the band-twine is held. The spring finger or jaw *t* laps by the jaw *p*, as shown in Fig. 7, and when the twine *b* is forced between them it springs the jaw *t* back, and is held by virtue of the stiffness of the spring *b'*.

Q is a driving-head, pivoted at *m* between two upturned flanges of the arm N, and connected by a rod, R, to a stud, *w*, fixed in the plate P. When the head Q is caused to descend it drives the twine between the jaws, as shown. The descent of the head is caused by the plate P, Figs. 5 and 6, being turned in the direction indicated by the respective arrows by means of the roller *l*, Fig. 2, passing the crook *i* in the slot L, as above described.

When the parts are at rest, as shown in Fig. 2, waiting to receive a gavel, the head Q is raised, and the binder arm J, when a gavel is collected, brings the twine across between the retaining-jaws *t* and *p*, as indicated by the dotted line *b*. The movements of the parts are so timed that the frame F commences to swing the instant the twine is thus presented to the jaws, and the roller *l*, quickly reaching the crook *i*, brings the head down and drives the single twine (the other end of the same being already retained there from the last operation of binding a gavel) between the jaws, as above described; but soon after the roller *l* passes the said crook the roller *h* arrives at a reversed crook, *j*, in the slot L', Fig. 4, which swings

the arm N back toward the vertical web B', and this motion, as it increases the distance between the head Q and pin *w*, again raises the head.

d', Figs. 5 and 7, is a cutter for severing the twine at the right moment against the side of the jaw *p*, which forms a part of the shear. Said cutter is connected by a rod, S, with a stud, *f'*, of the plate P, and is caused to slide endwise within its guides longitudinally by the side of the arm N by means of the rollers *l* and *h* passing the crooks in their respective slots, above described. In its normal position the cutter is drawn considerably back from the jaw *p*; but as the arm N is swung to the position shown in Fig. 4 its cutting end is presented close to the twine, as shown in Fig. 7, and when the roller *l* arrives at the crook *g'* in the slot L' the twine, by a sudden movement of the cutter, is severed.

T, Figs. 2 and 3, is a twine-gathering device, the duty of which is to bring the upper strand of the band, after the same has been brought around the gavel, down close to and parallel with the lower strand, preparatory to being tied by the knoter. Fig. 15 shows in outline the twine before and after the upper inclined strand has been gathered to the lower one by the action of the gatherer T. The gatherer is hung upon a horizontal pin, *a'*, projecting from a crank-arm, *h'*, secured to a pinion, U, journaled upon a stud projecting from the vertical plate B' of the frame F. The pinion is given at intervals a quarter-rotation by means of a segment of gear, *c'*, which is oscillated by a connecting-rod, *e'*, joined to the arm *k*, said motion being given to the segment when the roller *l* passes the crook *i* of the slot L. The two positions of the parts are shown by the full and dotted line positions in Fig. 3.

The clamping-jaws *t* and *p*, Figs. 2 and 3, the orifice *s'* through the vertical plate B', and the point of the binder-arm in its normal position, as shown in Fig. 1, are in a straight line and on a level, so that the twine, held at the end in the said jaws, and also by the point of the arm, lies horizontally through the said orifice; but when brought around the gavel and again to the jaws the upper strand passes through the slit *o'* of the plate B' at a point about at *o'*, slightly below the extreme end of the gatherer, and is carried down to the orifice *s'* by the descent of the gatherer, as above described. There are pins *v v*, one above and one below the gatherer, which form guides for the same, the one above causing the gatherer to move forward nearly horizontally over the twine for a short distance before it descends.

Y, Figs. 2 and 3, is a gavel-receiver, (shown in dotted lines in Fig. 1,) which receives the gavels as they are brought to the binder, and which also shields the twine *b* from the grain as the same is brought over it by the rakes. Its left-hand edge, as appearing in said figures, is on a level with the platform C, while the opposite edge is raised to the orifice *s'* of

the plate B', or a little above the twine as it lies ready to receive the gavel. By means of this gavel-receiver or chute the gavel, when presented to the binder, is carried over the twine. The gavel-receiver is secured to the plate B' of the frame F, and swings with it.

V is a segment of gear pivoted upon a vertical stud, *n*, fastened to the frame F, and is provided with a stud and roller, *a*, extending down into the slot L² of the platform E. The slot L² is so shaped that when the frame F is swung around, the stud *a*, following said slot, causes the segment V to turn upon its pivot to the position shown in Fig. 4, there being a circular slot, *a*², cut through the frame to make way for the stud.

X is a pinion, whose teeth engage those of the segment V, which, with its sleeve, is journaled in a bracket or support, *y*⁴, rising from the frame F, within which sleeve and pinion rests a horizontal spindle, A', which constitutes the body of the twine-knotter. The spindle A', fitting within the sleeve, has an ordinary slot and feather or spline, which allows it to slide longitudinally through the sleeve; but both must rotate together.

A curved link, *p*', reaches from the crank-arm I to a point near to and beneath the knotter-spindle, to which it is connected by means of another short link, *s*, secured to a loosely-fitting collar, *t*', Fig. 9, Sheet 2, upon said spindle.

k' is a slotted bar connected with the bolt *o*², that joins the links *p*' and *s*, which receives in its slot the upper end of a vertical stud, *l*', secured to some suitable part of the reaper-frame.

When the frame F is swung well around the extreme end of the slot will arrive at the stud *l*' and check or stop the motion of the bar *k*', and if the motion of the frame be continued the spindle A' will, in consequence of the said stopping of the bar *k*', be drawn back endwise partially through the pinion, the positions of these several parts when the frame is swung fully around being shown in dotted lines in Fig. 4.

When the frame F is brought back to the position shown in Fig. 2 the opposite end of the slot will be brought against the stud *l*' and cause the spindle A' to slide through the pinion to its normal position. The use of these endwise motions of the knotter-spindle or parts of the same will presently be understood.

Figs. 8 to 14, inclusive, Sheet 2, show the knotter and the manner of tying the knot.

D', Figs. 8, 9, and 10, is a sleeve forming one piece with the pinion X, Fig. 2, journaled in the bracket *y*⁴, within which sleeve is secured a grooved stock-piece, F', which holds the twine-knotter proper. The said stock F' has two broad unequally-deep rectangular longitudinal grooves cut in its opposite sides, and approaching each other so that but a thin web, *e*, of the stock separates them.

Within the shallower groove, near the nose

of the stock, is pivoted at *r* a hook, *n*'. A bifurcated sliding piece, G', rests within the grooves of the stock F', the branches *v*' and *u* of which straddle the web *e*, as shown, the shorter and thicker branch *u* occupying the groove containing the hook *n*'. The hook *n*' has at its reverse end a short slightly-bent shank, *o*, and the inner side of the branch *u*, near its end, is cut away, leaving a knob, *w*', (see Fig. 17,) which, as the sliding piece G' of the knotter-spindle is moved backward or forward by means of the slotted bar *k*' and stud *l*', above described, acts upon said shank to operate the hook *n*'. As shown in Fig. 9, the knob *w*', in its forward movement, has passed the shank *o*, and, pressing upon the body of the hook beyond the pivot *r*, forces it to assume the position shown in full lines. The beveled part *c* of the branch *u*, pressing beneath the end of the shank, also assists to hold the hook in the position shown.

If the slide G' be partially withdrawn the knob *w*' will press upon the upturned portion of the shank and move the hook to the position shown in dotted lines.

The thinner branch *v*' of the slide G' extends through and beyond the nose of the stock, and has a rectangular notch, *x*, Figs. 9 and 17, cut in one edge near the end, forming a straight hook, *z*, which is drawn within the stock when the slide G' is drawn back, as above explained, these motions of the hooks *n*' and *z* being essential to the tying of the knot.

r', Fig. 10, is a spring secured within the sleeve D', and lying in a slot of the stock F' by the side of the branch *v*' of the slide G', which serves as a tension for the end of the twine as the knot is being drawn tight.

Fig. 9 shows the parts in position when ready to act upon the twine to form the knot. The heavy dotted line *b* represents the relative position of the band as it is presented to the knotter by the binder-arm and gatherer T, above described, the gavel being at H' and clamping-jaws at I'. It requires one and one-fourth rotation of the knotter to complete the knot, the direction of rotation being indicated by the arrow *x*'.

Fig. 10 shows the knotter after having rotated one-fourth around, the hook *n*' having caught the twines of the band. Figs. 11, 12, and 13 show the positions at the successive quarter-rotation of the knotter, and Fig. 14 when one and one-fourth rotation are made, the loop of the twine having been completed, (one strand of the band only being shown in these figures.)

At this stage of the operation the strands of the band are severed by the cutter *d*', Fig. 7, above described, and the slide G' is drawn back within the stock F' by means of the slotted bar *k*', above explained. By the drawing back of the slide the hook *z* draws the ends I' of the twine, which now lie across within the notch *x*, as shown in Fig. 14, through the loop, the hook *n*' being simultaneously withdrawn

from the loop by being thrown back, as shown in the dotted position in Fig. 9, effected by means of the knob u' , as above described. After the withdrawal of the hook n' the loop is permitted to slip off the nose of the stock, the knot being completed at the end thereof, said loop being assisted off the stock by means of a short quick crook, p^2 , Figs. 1 and 4, in the slot L' , which suddenly throws the twine-clamps p t in a direction toward the plate B' for the purpose.

C' , Figs. 2 and 3, is a bent offset plate attached to the plate B' , having a hole, s' , opposite the hole s' in said plate, within which the hook z of the knotter turns as the stock A' is being rotated to form the loop of the knot. The end or point of the hook z moves around close to the periphery of the hole, as shown in Figs. 11 and 13, which insures the twine b leading from the gavel being kept on the proper side of the hook, so as to be crossed by the twine leading from the clamping-jaws, thus completing the loop, as shown in Fig. 14. This guard-plate C' has a flaring opening, as shown, leading upward from the orifice s' to receive the twine brought down by the gatherer T , as above stated.

Fig. 17 shows the ends of the twine after having been severed by the cutter near the clamps as being drawn within the stock by the hook z . The spring r' pressing against the said twine gives the hook z a sufficient hold upon the twine by which to draw the knot tight.

The knotter operates close to the side of the bundle, and draws upon the band during the formation of the loop, so that the band may be made sufficiently tight upon the bundle. The motion of the arm N , carrying the twine-clamps toward the knotter, as above described, is designed to be so regulated as to yield twine to the latter no faster than it is required to form the loop, so that said knotter shall keep a steady and unbroken draft upon the band of the sheaf to insure sufficient tension of said band.

By observing Figs. 1 and 2 it will be seen that the segment V does not commence to turn upon its pivot at once when the frame F is started around by the rod H , for the slot L^2 is widened at a , so that the stud a of the segment, for some little time after the frame has started, moves through space without effecting anything; also, that the arm N remains at rest for some little time after the frame starts—that is, until the stud h arrives at the crook j in the slot L' , but that the arm k commences to swing upon its pivot d immediately upon the starting of the frame, for the crook i of the slot L being at hand, the roller l commences to traverse it at once.

Now, the swinging of the arm k , as above set forth, effects two things simultaneously: It throws the driving-head Q down and drives the twine in between the clamping-jaws to se-

cure it, and carries the gatherer T down, bringing the two strands of the band together across the knotter-hooks. During the time in which these things are being effected the stud a will cross the wide part of the slot L^2 and come in contact with the opposite side and start the knotter, and the stud h will reach the crook j at the same instant and commence to swing the arm N , with the clamps, toward the knotter to supply twine for the loop.

I claim as my invention—

1. A frame or part, F , of a grain-binding attachment to a harvester, pivoted upon and caused to swing around a stud, G , carrying with it the gavel and tying device, the latter being operated to tie the band while the frame is being swung.

2. In combination, a platform, E , provided with sinuous ways L , L' , and L^2 , and an overriding frame, F , provided with studs l h a , engaging with and following said ways, respectively, as the frame is caused by suitable driving mechanism to move over said platform, the said studs l h a causing the parts k , g , and V , respectively, to vibrate as the frame is moved, substantially as set forth.

3. A swinging frame, F , provided with a gavel-receiver, Y , arranged, as described, to direct the gavel over the twine as said gavel is presented to the binding mechanism by the rakes.

4. The vertical slotted plate B' , in combination with a twine-gathering bar, T , pivoted near its middle point upon a pin, a' , of a crank-arm, h' , projecting from a pinion, U , and suitable means to rotate said pinion.

5. In combination, the crank-arm k , connecting-rod e' , segment c' , pinion U , with its crank-arm h' , and gathering-finger T , substantially as described.

6. In combination with the radial arm N , provided with its jaws p and t , the independently-moving plate P , connecting-rod R , and twine-driving head Q , substantially as shown.

7. In combination with a slot or way, L^2 , and moving frame F , a pivoted segment, V , provided with a stud or roller, a , engaging with said slot or way, for the purpose set forth.

8. A twine-knotter body or stock, A' , in combination with links p' and s , slotted bar k' , stud l' , and crank-arm I , substantially as described.

9. In combination with a rotating twine-knotter, a guard, C' , for the twine, substantially as shown, and for the purpose set forth.

10. In combination with a rotating stock, A' , the hooks z and n' , longitudinally-sliding piece G' , and suitable means to operate the same.

11. In combination with a moving frame, F , and stud l' , the links p' and s , sliding stock or part A' , and slotted bar k' , for the purpose set forth.

12. In combination with a swinging arm, N , provided with a fixed jaw or piece, p , and spring-jaw t , a cutting device, d' , and suitable oper-

ating mechanism, in conjunction with said jaw or part *p*, to sever the twine, substantially as described.

13. A pivoted segment-gear, *V*, a sleeved
5 pinion, *X*, engaging with said segment and carrying a twine-knotter, and a bracket, *y*⁴, holding said sleeved pinion, in combination with a moving frame, *F*, stud *a*, and slot *L*²,
substantially as described.

10 14. In combination with the independently-

moving plate *P* and arm *N*, a connecting-bar, *S*, and cutter *d'*, substantially as shown.

15. In combination with ways *L* and *L'*, the swinging frame *F*, the stud *d*, arm *k*, with its stud *l*, arm *g*, with its stud *h*, and radial arm 15
N, substantially as described.

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Witnesses:

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