

H. H. BRIDENTHALL, Jr.
GRAIN-BINDER

No. 174,615.

Patented March 14, 1876.

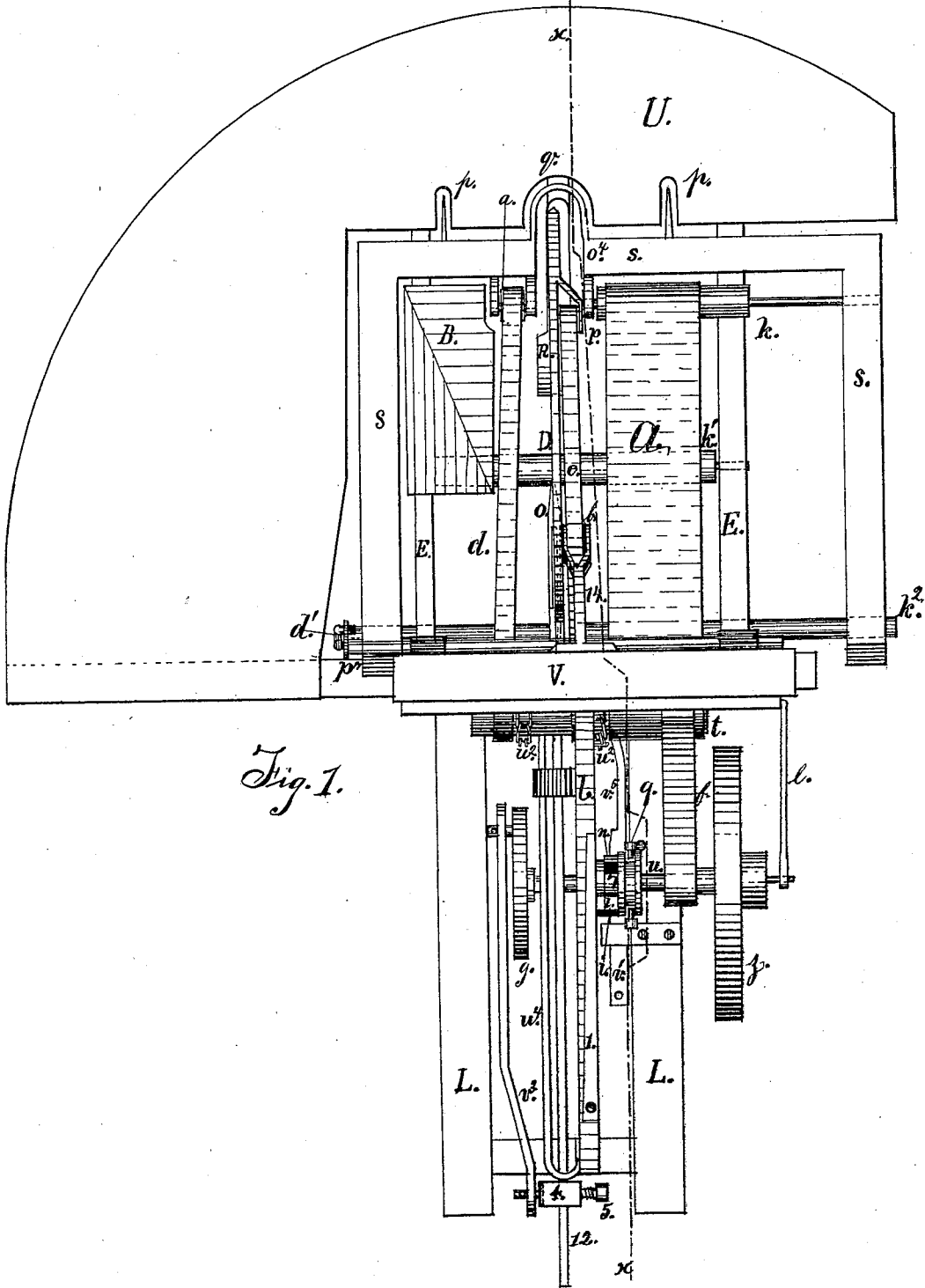


Fig. 1.

Witnesses.

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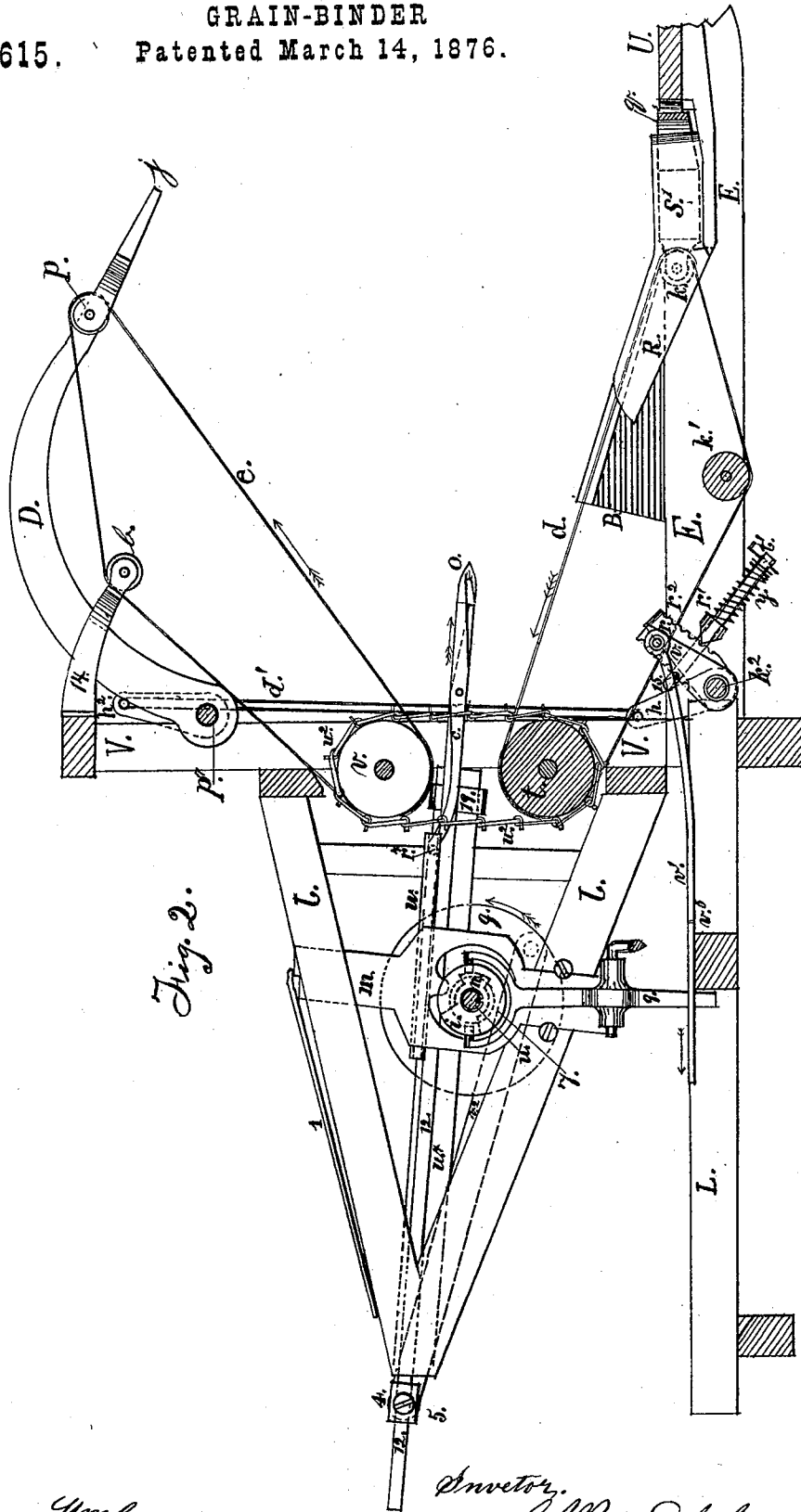


Fig. 2.

Witness:

Wm. C. Cover,
A. H. Hechmer,

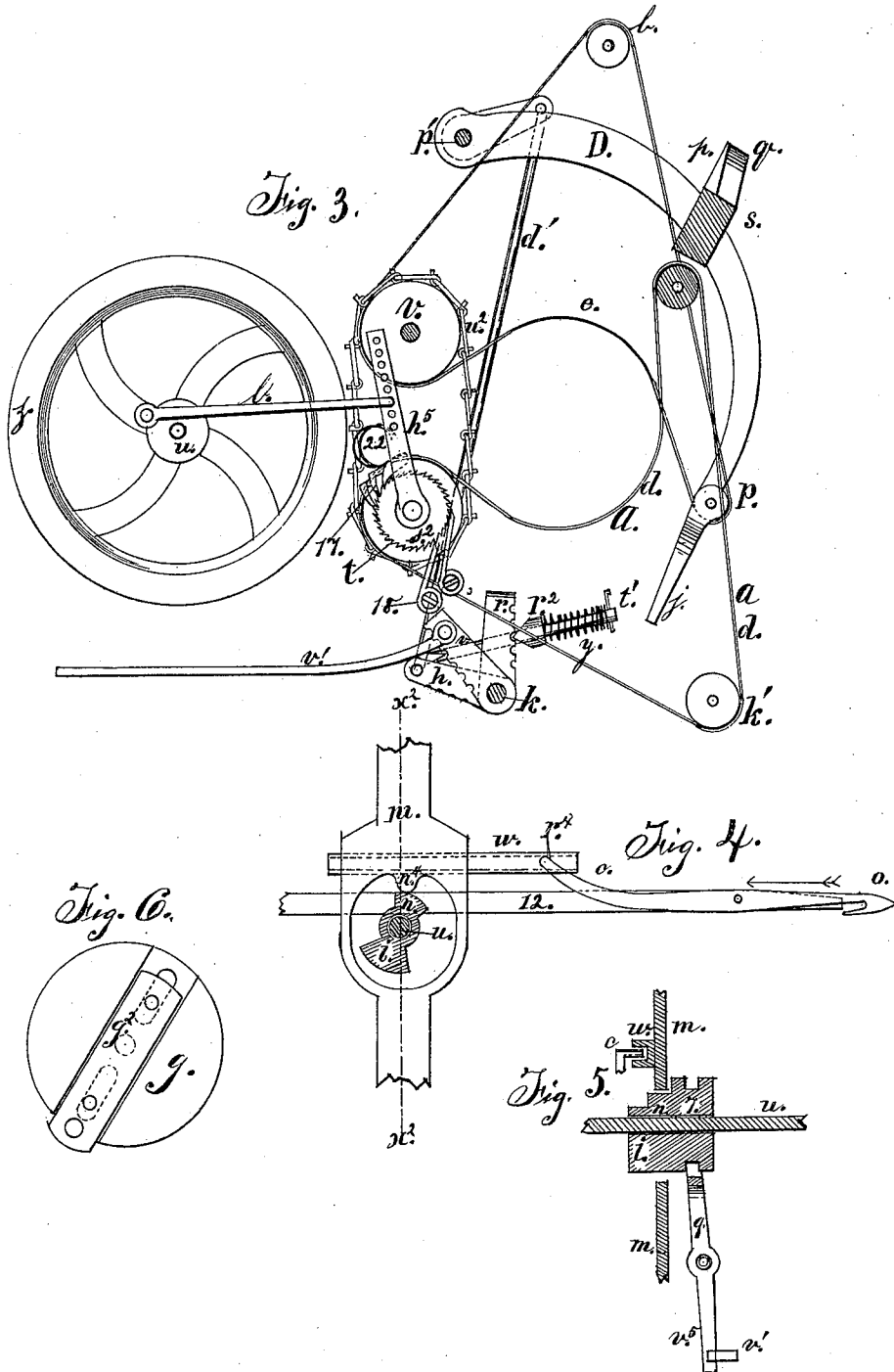
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UNITED STATES PATENT OFFICE.

HARRY H. BRIDENTHALL, JR., OF WESTMORELAND COUNTY, PA.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **174,615**, dated March 14, 1876; application filed May 25, 1875.

To all whom it may concern :

Be it known that I, HARRY H. BRIDENTHALL, Jr., of the county of Westmoreland, in the State of Pennsylvania, have invented certain new and useful Improvements in Grain-Binders; and I do hereby declare the following to be a clear and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a top view of my improved machine, and shows the general ground plan of the same. Fig. 2 is a sectional side elevation taken through the line *x x*, Fig. 1, and shows the arrangement of the various parts of the rotator and binder, the compressor being open. Fig. 3 is also a side elevation, partly in section, showing the mechanism operating the rotator, and the manner of compressing and rotating the gavel. Fig. 4 is a detail sectional view of the forming-hook and its operating-cam and slide. Fig. 5 is a detail sectional view of the aforesaid operating-cam, taken through the line *x² x²*, Fig. 4; and Fig. 6 is an elevation of the hook-operating crank-disk, showing the adjustable wrist.

Similar letters and numbers of reference indicate corresponding parts in all of the drawings.

The object of my invention is to improve the construction of grain-binding harvesters, especially that class of harvesters forming a binding of a series of interlocked loops drawn from the sheaf to be bound, making the said harvesters easily adjusted to operate in different conditions of grain, and more reliable and effective in operation, and thus to increase their general utility. It consists in the combination and arrangement of swinging frame, endless belts or wide bands, curved swinging arm, spiked rotating belts, with their supporting-frames and driving devices, for the purpose of holding and rotating the gavel; in an adjustable tension device, for the purpose of regulating the force by which the gavels are compressed, consisting of a rigid and a loose arm on the compressor-shaft, connected by means of a yielding connection; in devices in combination with the forming-hook, whereby different lateral motions are given to the band-forming hook when the compressor is open and closed; and in the arrangement of the

various elements, as will be hereinafter more fully described and specifically claimed.

To enable others skilled in the art to make and use my machine or invention, I will describe it in connection with the accompanying drawings.

L V E represent the supporting frame-works of my improved machine, and may constitute a portion of the frame of the ordinary harvester or mower, and the platform U a portion of the grain-platform of the same. To the base-rails E is pivoted the rock-shaft *k²*, and to the ends of which are connected the end rails or arms of the frame *s s¹*. The said frame *s* is arranged so that when the compressor is open to receive a gavel of grain it rests upon the base-rails E E, and the top thereof will be a little below the margin of the platform U. The outer rail or bar *s¹* of the frame *s s* is cut in the middle at *O⁴*, thereby leaving an opening. The ends of the rail formed by the said opening are connected by means of the U-shaped arm *q*, which, with the pins *p p*, rests within suitable openings in the edge of the platform U when the compressor-frame *s s* is down. The object of the said pins *p p* is to assist in gathering the gavel into the compressor. To the inner edge of the compressor-frame rail *s¹* are pivoted the pulleys *k a*, by means of suitable bearings thereon attached. The said pulleys or rollers *k a* carry the endless belts *d A*.

The band A is made quite broad, or there may be substituted therefor a series of narrow bands. The object of this broad or series of narrow bands is to confine the top end of the gavel while it is being revolved, and prevent the heads of grain from being thrashed by striking against other parts of the machine and be disarranged upon the sheaf, and to balance the said gavel, preventing it from swinging laterally and working endwise out of the compressor while being bound. Near the middle of the vertical frame are hung, within suitable bearings, the large driving-rollers *v* and *t*. The lower of the rollers, *t*, is made the longer, to accommodate the wide band A around both of the rollers *v t*, and between the bands *d A* are placed the short spiked chains *u²*, the spikes or projections upon which enter the gavel, and prevent their slipping upon the

same, thus insuring its revolution. Near the upper end of the frame V is pivoted the rock-shaft p'' , near the middle of which, and corresponding with the opening q in the frame rail s^1 , is firmly attached the curved arm D, which is provided, near its point j , with the pulley p , supporting the belt e . The belt e is further supported by the pulley b on the arm 14, corresponding with the roller k^1 , pivoted to the base rails E, and in connection with the bands A d . To corresponding ends of the rock-shafts $k^2 p''$ are connected the arms $h h^2$, which project in opposite directions, and are connected by means of the connecting-rod d' . The motion of the arm D is thus made to correspond with the motion of the frame S, forming the compressor, which, in closing the point of the arm D, passes through the opening q , carrying the belt e between the supporting-belts A d . In convenient position upon the rock-shaft k^2 is rigidly connected the slotted arm r . Both leaves of the said arm r are provided with a series of notches, r^2 . Alongside of the arm r is the loose arm v , which is suitably provided with a sleeve-bearing and collars upon the shaft k^2 . The said loose arm v is provided with a series of notches, corresponding with and on the opposite side from the notches upon the arm r . The said arms $r v$ are connected by means of the shaft t' , which plays loosely within the slot of the arm r , and the hook 15 engages one of the notches in the arm v , while a wedge-shaped loose collar, r^1 , engages a pair of notches in the arm r . A stout spiral spring, y , upon the said shaft t holds the collar r^1 against the arm r , and is secured at its opposite end by a suitable pin. The arms $r v$ are thus clamped together. A pin (not shown in the drawing) prevents the spring from drawing them too far past each other. Near the outer end of the arm v is fixed a stud, which enters a corresponding eye in the end of the rod v^1 . The said rod v^1 has for its purpose to operate or form the operating connection between the compressor and the gearing of the harvester, to which it may be connected in any suitable manner. A shoulder upon the said rod v^1 , at v^5 , is engaged by the lower end of the shipper-arm 9, which serves to hold the compressor closed when there is a gavel in the compressor. When a large-sized sheaf is being bound the spring y yields, thereby equalizing the tension upon large and small gavels; and it will be seen that by changing the hook and collar 15 and r^1 from the inner to the outer notches upon the arms $r v$ the effect of the spring y will be increased, and the tension may be thereby adjusted to suit the circumstances.

To the frame V are securely attached the frame J and the arm f , in which are the bearings of the hook-operating shaft u . The said shaft u receives motion from the gearing of the harvester or otherwise, as may be desired. The said motion may be quite rapid. The best speed is, perhaps, between one hundred and fifty and two hundred revolutions per

minute. Upon the end of the shaft u is attached a short crank or its equivalent, which is connected, by means of the connecting-rod l , to the arm h^5 , which is, by means of a short sleeve-bearing, pivoted to the end of the shaft of the feed-roller t , upon which is rigidly connected the ratchet-wheel s^2 . A series of pawls serves to connect the arm h^5 with ratchet-wheel s^2 . Another series of pawls is fixed to the frame V, and serves to prevent any backward motion of the feed-roller t .

The revolving of the shaft u , through the rod l , gives an oscillatory motion to the arm h^5 . The springs 22 cause the pawls 17 to act upon the ratchet-wheel s^2 , thereby giving the roller t an intermittent rotary motion, which is in turn communicated to the gavel, and corresponding with the reciprocating movement of the forming-hook O.

The arm h^5 is provided with a series of holes, as shown in Fig. 3; and, by placing the rod l in different holes, different motions are given to the arm h^5 , thereby increasing or diminishing the motion of the feed-roller t , as may be desired.

To the side of the frame J is rigidly connected the slide-bar u^4 , which serves as a slide, upon which reciprocates the forming-hook shaft 12 by means of the clamp or slide 19 and a suitable bearing at its opposite end. To the rear end of the hook-shaft 12 is adjustably connected the wrist-collar 4 by means of the set-screw 5, and receives motion through the connecting-rod v^2 from the driving crank-disk g , which is rigidly connected with the end of the drive-shaft u , and is provided with a groove across the face and two slots radiating from the center, and within the groove, to the crank-disk; and within the aforesaid groove is secured a sliding wrist, g^2 , by means of two screws passing through the said radial slots.

By this arrangement a longer or a shorter stroke may be given to the hook-shaft 12, as may be desired, for the purpose of binding long or short grain. The stud or wrist 4, being adjustable upon the shaft 12, enables the loops to be drawn any suitable distance from the gavel, so as to correspond with the distance which the gavel is moved or revolved at each stroke of the hook. The hook-shaft 12 is arranged so as to reciprocate angularly with the radius of the gavel or sheaf when it is held within the compressor, for the purpose of drawing the loops from the interior of the said gavel in the same plane $e' e$, angularly to the plane of the radius.

To the frame J, within suitable bearings, and at right angles to the hook-shaft 12, is secured the head or slide-stock m , to which, and parallel with the shaft 12, is secured the grooved slide or guide w , which has for its purpose to guide or control the hook O, by means of the arm C and the stud r^4 . The said forming-hook O is pivoted to near the end of the shaft 12, the end of which works between or in the forked stock of the hook O, and forms

a cast-off, for the purpose of throwing the loops over the hook, and regulating the filling of the hook O with straw, as will be hereinafter described. The shaft *n* passes through an opening in the guide-stock *m*, as shown in detail in Figs. 4 and 5, and carries thereon the double and sliding cam 7. A suitable groove is formed upon the cam 7, in which works the studs upon arms of the shipper-lever 9, for the purpose of governing the position of the cam relative to the guide-stock *m*. The stock is provided with projection *n*⁴, which rests upon the cam 7. The shaft and cam 7 are provided with a suitable tongue and groove, to prevent the turning of the shaft within the said cam 7, which is formed in two or more parts, one of which is provided with one projection, *i*, and the other with two, *i* *n*. When there is no gavel in the compressor the projection *n*⁴ rests on the cam at *i*, and when the said compressor is closed it rests on the cam at *n*. B, Fig. 1, is a piece fitted within the frame S in a manner so as to lie flush with the frame-rails when the said frame is down, and project a little above the belt *d*, and R is a similar piece fitted between the belts *d* A. Both pieces are securely connected with the frame U E, and have for their purpose to enable the gavel to be swept on the endless belts in good condition, and preventing the grain-stalks from getting beneath the said belts. The chains *w*² are placed as close to the hook O as practicable. The loops are thus confined between as they are drawn from the gavel, and prevented from spreading and tearing the previously-formed loops.

In consequence of the unsteady resistance produced by the action of the hook or needle O in drawing the tufts or loops, I have found it advantageous to use a moderately heavy fly-wheel, *z*, on the shaft *u*, for the purpose of equalizing the motion of the same. The said fly-wheel may be placed on any convenient part of the shaft *u*, or be used in lieu of the crank-disk *g*.

The operations of my machine are substantially as follows: Suppose a gavel of grain is swept upon the endless supporting-belts A *d*; the rod *v*¹ is, by the gearing of the machine or otherwise, as may be desired, drawn in the direction indicated by the arrow. The frame S is thereby raised, carrying up the gavel. The curved arm D comes down at the same time, the point *j* of which enters the opening at *q* in frame S, sweeping the grain upon the belts A *d*. Further movement brings the belt *e* around the gavel, crowding it against the short spiked bands *w*², the spring *y* holding it compressed in the position shown in Fig. 3. The rod *v*¹ having reached the extent of its movement, the lower end of the shipper-lever 9 is moved behind the shoulder at *v*⁵ by means of any suitable devices, thus holding the compressor closed around the gavel, and bringing the part *n* of the cam 7 beneath the projection *n*⁴. The shaft *n* being in motion, as before described, the hook O commences the operation

of forming the binding by forcing its way into the gavel, and when about to be withdrawn the projection *n* raises the guide-stock *m*, with the hook-arm slide *w*, thus opening the hook O a little way, as shown in Fig. 4. The projection *n*, not being so high as *i*, does not open the hook fully or entirely. By this construction the hook does not fill itself at one place within the gavel, but is filled gradually as it is withdrawn. By this arrangement there is less liability of the hook being filled by a short bunch of straw or rubbish, or of the loop being drawn entirely out of the gavel at one end, therefore spoiling the band. The tuft forming the loop being taken from different parts of the sheaf, the remaining ends of the straw will be spread, therefore giving them a better hold within the said sheaf and making a more substantial binding. The forming-hook having nearly reached the periphery of the gavel as it is being withdrawn, the projection *n* passes by the projection *n*⁴, and the spring 1 forces the guide-stock down, thus closing the hook, allowing it, with its loop, to be drawn through a previously-formed loop; which having been effected, the projection *i* raises the guide, thus throwing the hook entirely open. At the same instant the gavel is revolved a short distance, in the manner before described, therefore allowing the hook to pass through the last-formed loop and into the gavel, when the projection *i* passes the projection *n*⁴, and the guide is allowed to fall, closing the hook, and the operation of drawing another loop is commenced. The binding of the gavel having been completed in the usual manner as in harvesters of this class, the shipper-lever 9 is withdrawn from the shoulder at *v*⁵, and the compressor is allowed to open, permitting the bound sheaf to roll out of the machine. At the same instant, however, the upper end of the lever 9 moves the cam 7, so as to bring the projection *i* of the said cam beneath the projection *n*⁴. The hook is, therefore, prevented from taking up any more straw on being withdrawn; but the projection *i* operating as the hook passes in the gavel, the last loop is, therefore, disposed of, which would otherwise be drawn entirely out of or from the sheaf, and the finished band perhaps torn.

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

1. The combination of the frame V E, rock-shafts *k*² *p*², arms *h* *h*², rod *d*¹, frame S, arm D, belts *a* *d* *e* *w*², and the stationary pulleys *b* *k*¹, these members arranged as and for the purposes specified.

2. In combination with the hook-arm *c* and the driving-shaft *u*, the slide-stock *m* *w*, cams *i* *n*, and the shipper 9, substantially as and for the purposes herein specified.

3. The combination of the frame J, slide-bar *w*⁴, slide 19, and the hook-shaft 12, these members constructed and operating substantially as herein specified.

4. The combination of the adjustable crank

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g. pitman v^2 , movable wrist 4, and the hook-shaft 12, substantially as and for the purposes herein specified.

5. In combination with the rock-shaft k^2 and the operating-rod v^1 , the notched arms r , shaft t' , collar r^1 , and the spring y , substantially as and for the purposes set forth.

6. The combination of the rod l , arm k^5 , ratchets 17, wheel s^5 , and the feed-roller t , these members being constructed and operating substantially in the manner and for the purposes set forth.

7. In combination with the frame E and

the platform U, the inclined platforms B R, substantially as and for the purposes herein specified.

8. The combination of the cam shipper-arm 9, operating-rod v^1 , and the frame S, substantially as and for the purposes herein specified.

9. The compressor-frame S, provided with the opening O^4 and the curved U shaped arm q , substantially for the purposes set forth.

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Witnesses:

A. S. HAMILTON,
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