

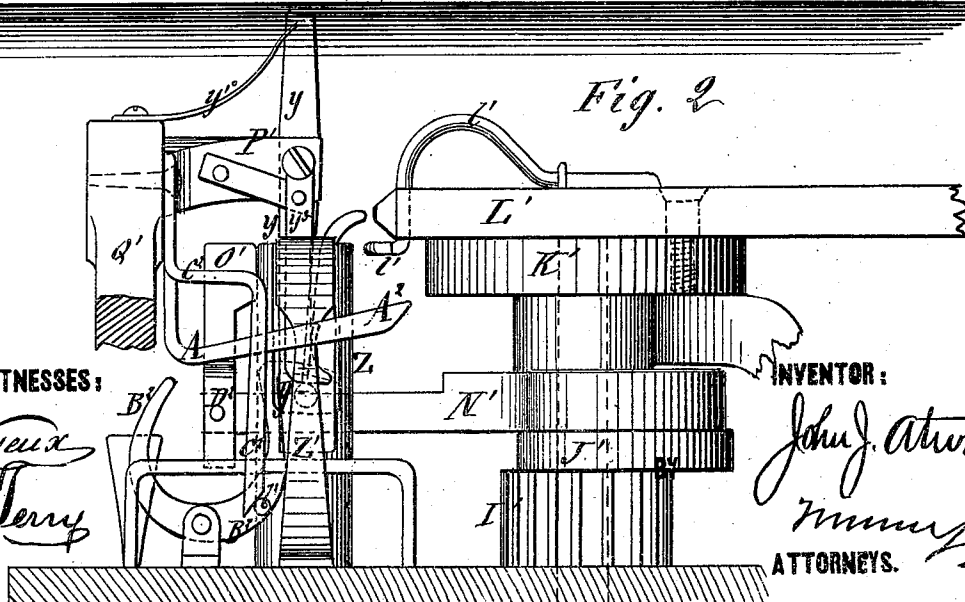
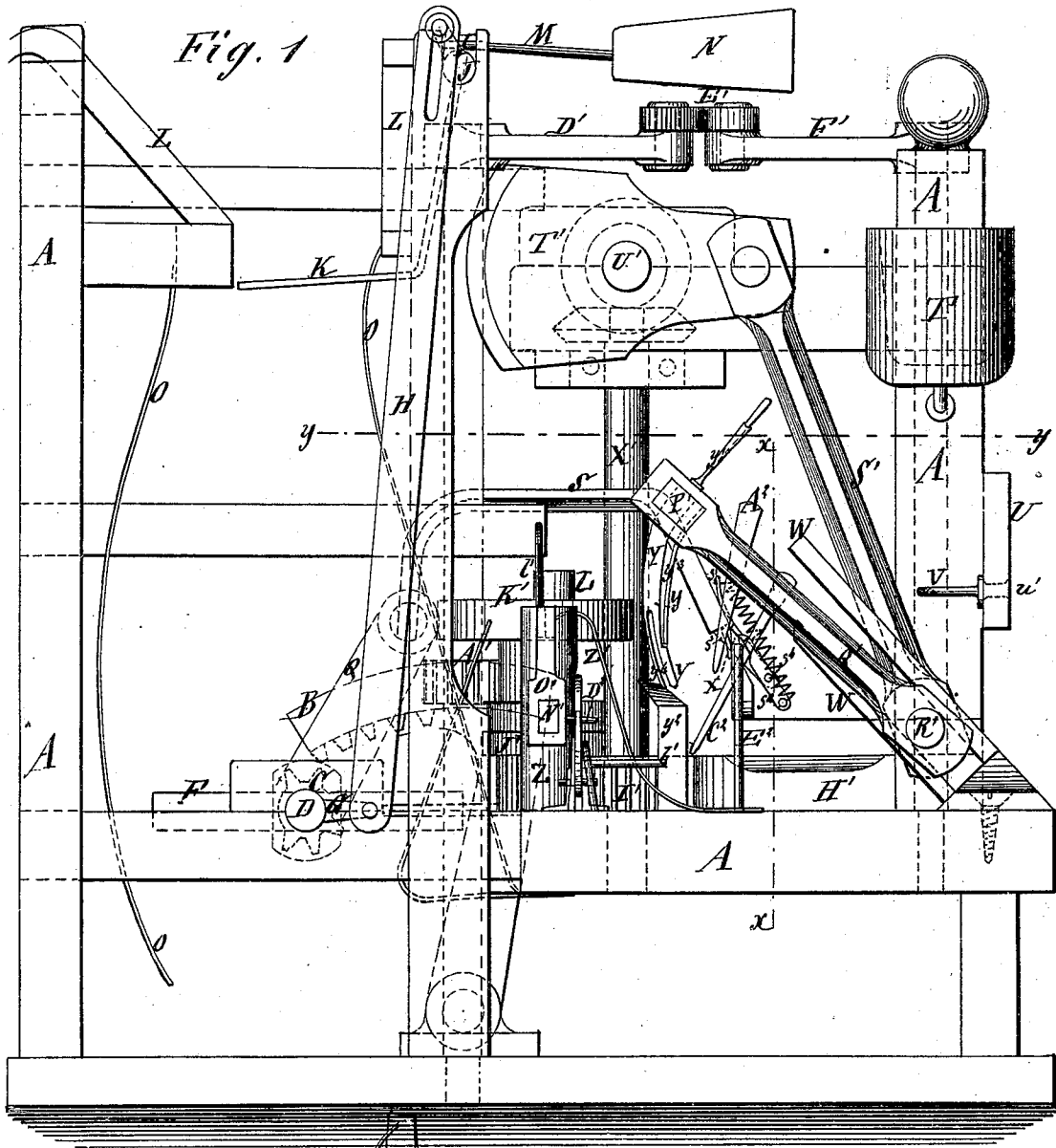
J. J. ATWATER.

4 Sheets—Sheet 1.

GRAIN-BINDER.

No. 170,617.

Patented Nov. 30, 1875.



WITNESSES:

E. Novell
A. F. Terry

INVENTOR:

John J. Atwater
Attorneys

J. J. ATWATER.
GRAIN-BINDER.

No. 170,617.

Patented Nov. 30, 1875.

Fig. 3

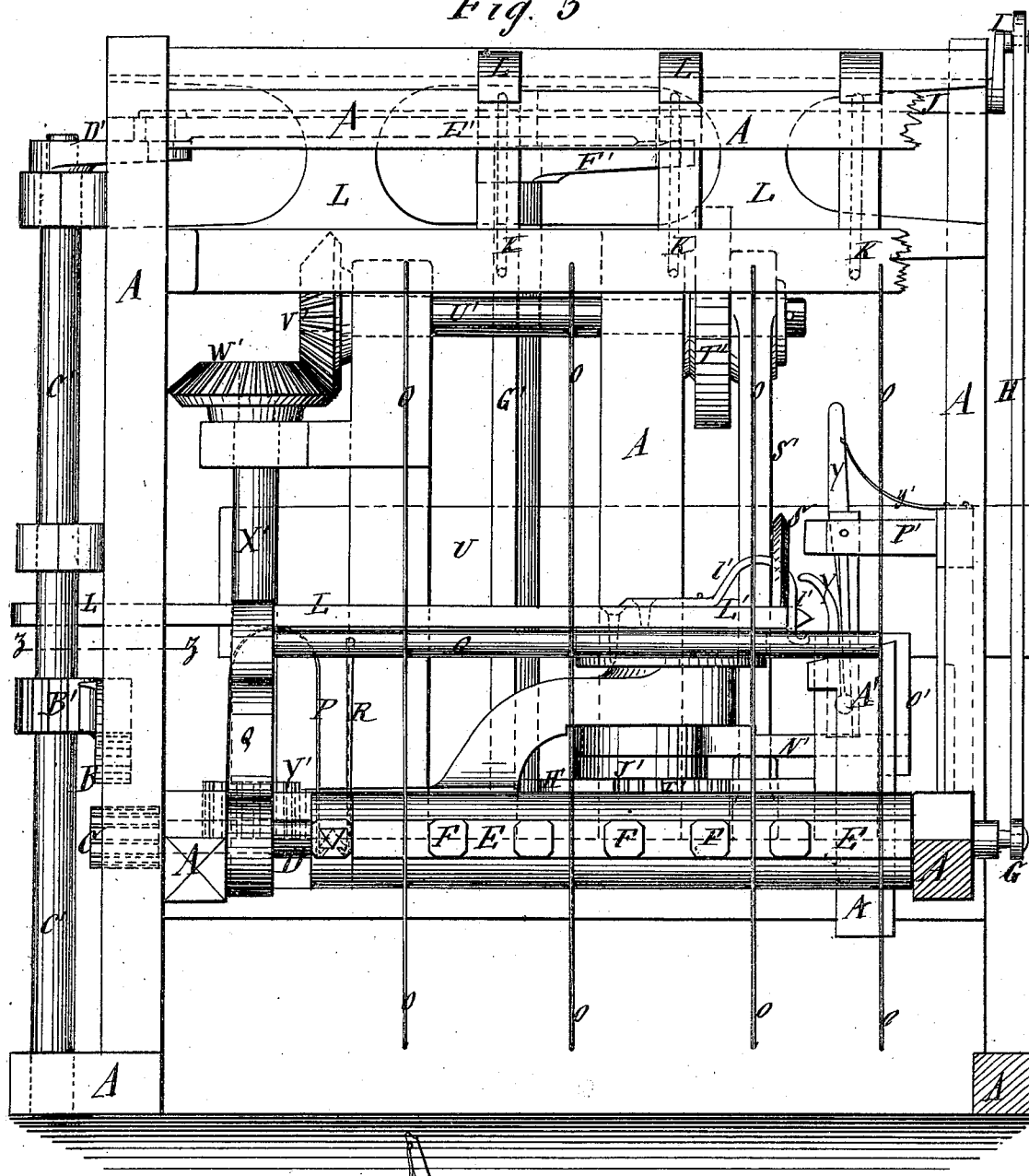
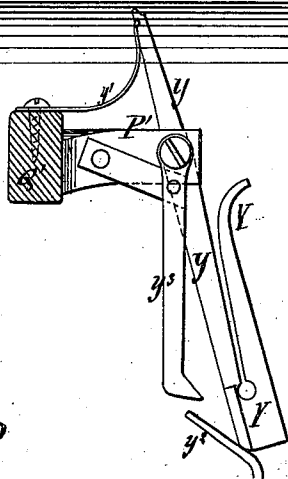


Fig. 4



WITNESSES:

C. Newell
A. F. Terry

INVENTOR:

INVENTOR: *John J. Atwater*
BY *Munn*
ATTORNEYS. *Co*

J. J. ATWATER.
GRAIN-BINDER.

No. 170,617.

Patented Nov. 30, 1875.

Fig. 5

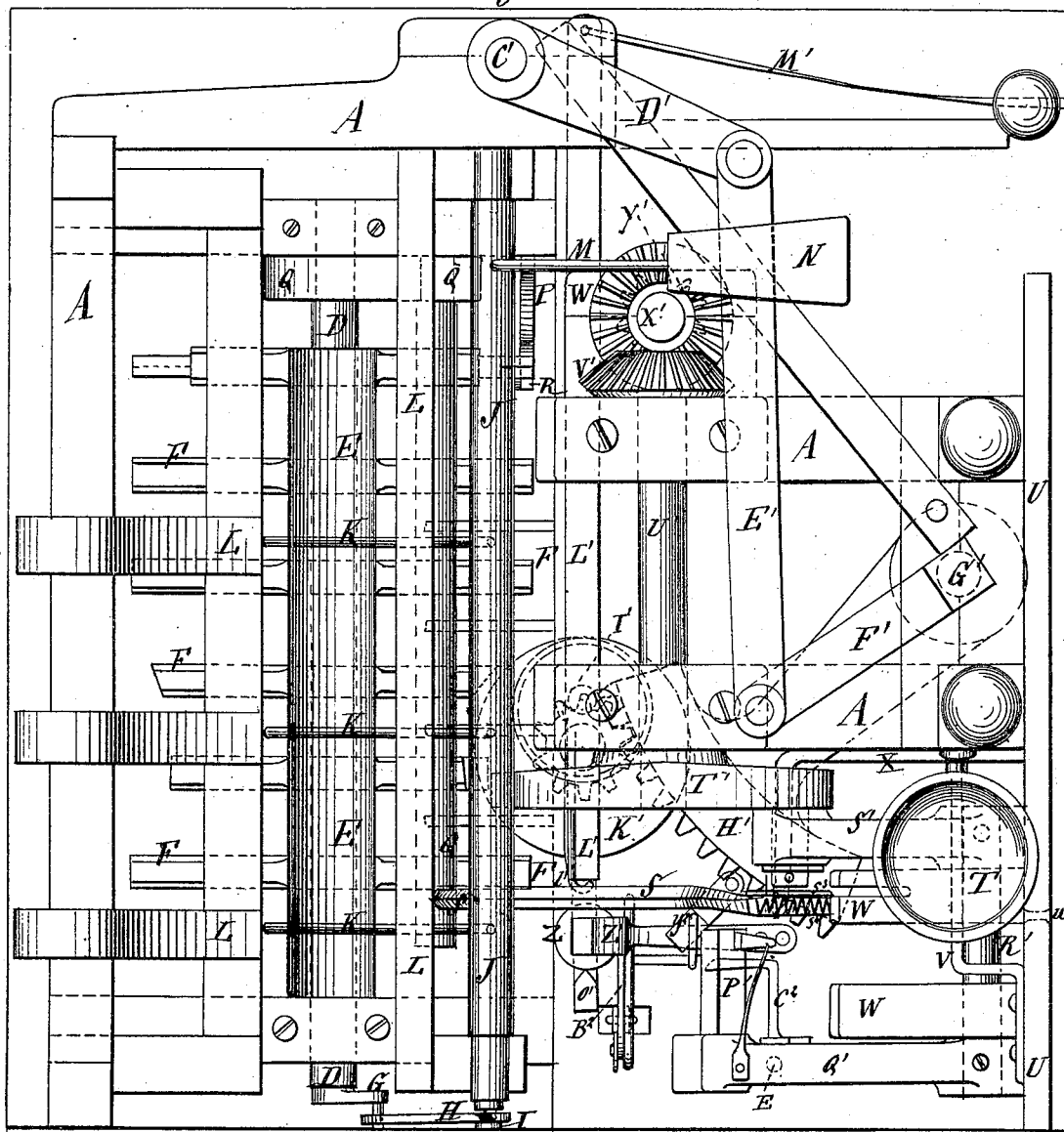
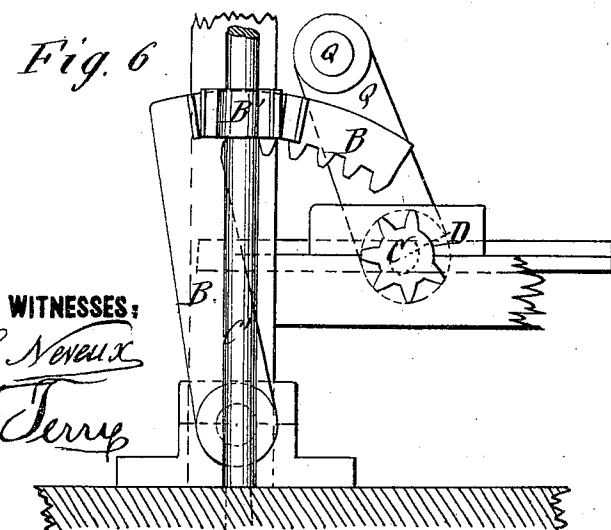


Fig. 6

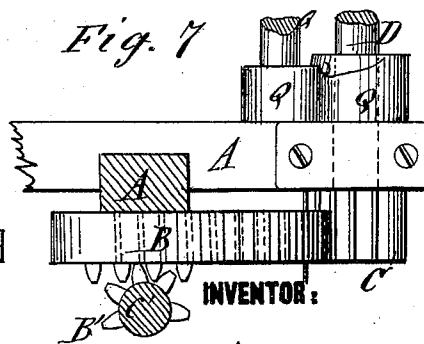


WITNESSES:

С. Мещеряков

A. F. Terry

Fig. 7

**INVENTOR:**

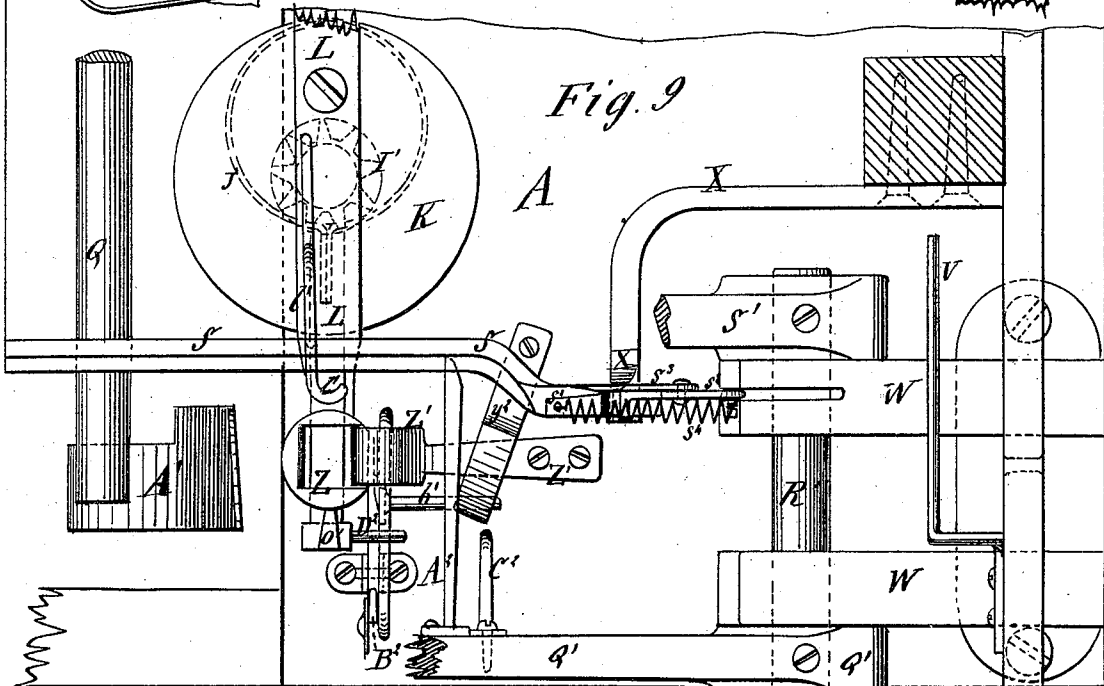
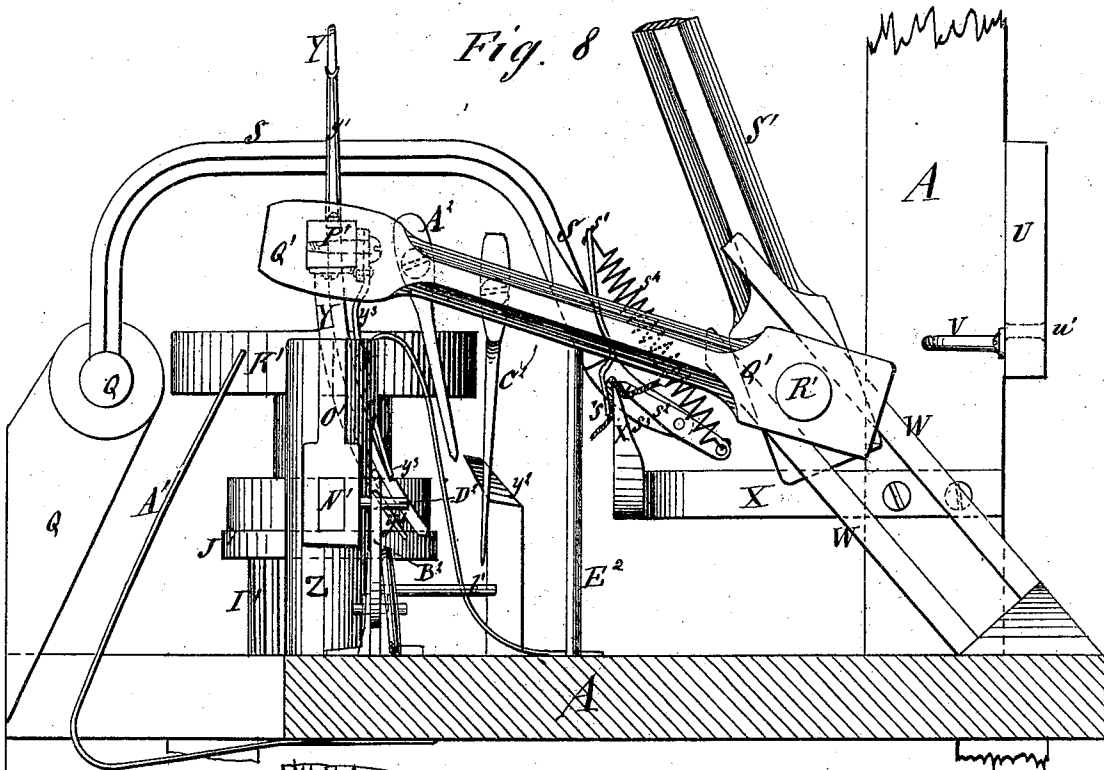
BY

John J. Atwater
Munn & Co.
ATTORNEYS.

J. J. ATWATER.
GRAIN-BINDER.

No. 170,617.

Patented Nov. 30, 1875.



WITNESSES:

C. Neraux
A. F. Terry

INVENTOR:

John J. Atwater
BY *Wm. H. ...*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN J. ATWATER, OF MEDFORD, MINNESOTA.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **170,617**, dated November 30, 1875; application filed February 20, 1875.

To all whom it may concern:

Be it known that I, JOHN J. ATWATER, of Medford, in the county of Steele and State of Minnesota, have invented a new and useful Improvement in Twine Grain-Binding Attachments for Reapers, of which the following is a specification:

Figure 1, Sheet 1, is a side view of my improved binder. Fig. 2, Sheet 1, is a detail section of the same, taken through the line *x x*, Fig. 1. Fig. 3, Sheet 2, is a front view of the same, part being broken away. Fig. 4, Sheet 2, is a detail view of the needle and its spring, stationary stop, and inclined guide-stop. Fig. 5, Sheet 3, is a top view of the binder. Fig. 6, Sheet 3, is a detail view of the toothed rack and segmental gear-wheels, by which motion is given to the various parts of the binder. Fig. 7, Sheet 3, is a detail section taken through the line *z z*, Fig. 3. Fig. 8, Sheet 4, is a side view of the binder, part of the frame-work being broken away. Fig. 9, Sheet 4, is a detail horizontal section of the same, taken through the line *y y*, Fig. 1.

Similar letters of reference indicate corresponding parts.

The invention will first be described in connection with drawing, and then pointed out in the claims.

A is the frame-work of the machine. B is a curved rack, to which motion is given from the driving mechanism of the harvester by means of a crank, pitman, or other convenient means. Upon the concave lower side of the rack B are formed teeth, which, as the rack moves forward and downward, engage with the teeth of the segmental gear-wheel C, attached to the end of the shaft D, which works in bearings attached to the frame A. Upon the shaft D is placed a hollow shaft, E, to the opposite sides of which are attached two rows of projecting arms, F. The hollow shaft E and arms F form a revolving table to receive the gavel and hold it while being bound. To the other end of the shaft D is attached a short crank, G, to which is pivoted the lower end of a long connecting-bar, H. The upper part of the connecting bar or rod H is slotted to receive a short crank, I, attached to the end of the shaft J, which works

in bearings attached to the upper part of the frame A. To the shaft J are attached a number of arms, K, which pass down upon the outer side of the vertical side of the bottomless trough or box L, that receives the cut grain from the harvester-elevator, are bent at, or nearly at, right angles, and project across the lower part of said receiving-trough, to receive and support the cut grain until enough has been collected to form a gavel. To the rock-shaft J is attached a rigid arm, M, to the outer end of which is attached a weight, N, of sufficient size to support the cut grain while being collected upon the bent arms K. The other side of the bottomless receiver is made inclined, to cause the cut grain as it is received from the elevator to slide down to the arms K. When the arms K are withdrawn the gavel falls upon the table E F, being guided into place upon said table by the guide-rods O. The upper ends of the guide-rods O of both sets are attached to the lower part of the bottomless receiving-trough L. The lower ends of the guide-rods O of the forward set are attached to the lower part of the frame A. The lower ends of the guide-rods O of the rear set are left loose, so that the bound sheaf may be dropped to the ground by the half-revolution of the table E F. The table E F is held in a horizontal position while receiving and supporting the gavel by the curved spring P, one end of which is attached to the frame A, and its other end is bent to receive the end of one of the bars F, and thus support the said table.

To the shaft D, at one end of the hollow shaft E, is rigidly attached a crank, Q, the shank of which is made a little longer than the bars F, so that the arm of the crank Q that projects parallel with the shafts D E may be out of the way of the sweep of said bars F. To the arm of the crank Q, near its shank, is rigidly attached a curved spring-arm, R, having a hook or catch formed upon its free end, which, as the crank Q swings forward, catches upon one of the cross-bars F of the table E F, and, as the said crank Q swings rearwardly, turns the said table E F through a half-revolution, dropping the sheaf to the

ground. To the arm of the crank Q is attached a curved arm, S, to the free end of which is attached a spring-jaw, s^1 , upon the outer side of which rests the jaw s^2 , which is pivoted to a short arm, s^3 , formed upon the end of the curved arm S. The outer ends of the jaws s^1 s^2 are connected by a coiled spring, s^4 , the elasticity of which holds the said jaws pressed together to hold the twine. The ball of twine is placed in a cup, T, attached to the upper part of the frame A. The twine is passed through a guide-hole, u , in the plate or bar U, attached to the front of the frame A, is coiled one or more times around the tension-rod V, attached to the plate U, to give it the proper tension, is passed through a guide-slot in a bar of the inclined rack W, and its end is secured in the clamp s^1 s^2 of the arm S. As the crank Q is turned back by the rearward movement of the rack B, the arm S draws the twine across the table E F, and at the same time the crank G operates the rock-shaft J, to withdraw the arms K, and allow the gavel to drop upon the table E F, and upon the twine drawn across said table E F. The twine, as it is drawn across the table E F, is drawn across the edge of the wedge-shaped end of an arm, X, attached to the frame A, into the slot of the needle Y, across the upper part of the side of the standard Z, and across the edge of the plate A^1 , which keeps it from slipping down upon the standard Z. As the gavel falls upon the table E F the rack B begins its forward movement, which turns the shaft D, and swings the crank Q and curved arm S forward, carrying the twine over the gavel, across the edge of the plate A^1 , across the upper part of the side of the standard Z, through the slot of the needle Y. As the curved arm S completes its forward movement, the clamp s^1 s^2 drops upon the edge of the arm X, and upon the twine drawn across said edge, so that both ends of the bands are now brought together within the clamp s^1 s^2 . As the curved arm S completes its forward movement, the rack B leaves the segmental gear-wheel C, and the teeth upon its outer side mesh into the teeth of the segmental gear-wheel B¹, attached to the upright shaft C¹, which revolves in bearings attached to the frame A. To the upper end of the shaft C¹ is rigidly attached a crank-arm, D¹, to the outer end of which is pivoted the end of a connecting-bar, E¹. The other end of the connecting-bar E¹ is pivoted to the outer end of a crank-arm, F¹, rigidly attached to the upper end of the upright shaft G¹, which revolves in bearings in the frame A, and to the lower part of which is rigidly attached a segment, H¹, of a large gear-wheel. As the rack B moves forward it rotates the shaft C¹, which brings the teeth of the segment H¹ into gear with the teeth of the small gear-wheel I¹, and turns the said gear-wheel I¹ forward.

The gear-wheel I¹ is pivoted to the frame A, and with it is rigidly connected a small

eccentric wheel, J¹, and a crank-wheel, K¹. To the crank-pin of the crank-wheel K¹ is pivoted a bar, L¹, the movement of the forward end of which is guided and controlled, as the said crank-wheel K¹ revolves, by a spring-rod, M¹, one end of which is pivoted to the rear end of the said bar L¹, and its other end is secured to the frame A. N¹ is a bar, one end of which is connected with the eccentric wheel J¹ by a strap which passes around said wheel J¹. The bar N¹ passes through a transverse hole in the lower part of the standard Z, and to its other end is attached a clamp, O¹, which rests against the outer side of the said standard Z. To the forward end of the bar L¹ is attached a hook, V¹, which, as the gear-wheel I¹ is turned by the segmental gear-wheel H¹, takes hold of the twine and carries it around the upper end of the standard Z, the clamp O¹ being moved outward by the eccentric J¹ as the hook V¹ approaches it, and being carried inward by said eccentric as soon as the hook V¹ has passed, to clamp the twine against the side of the standard Z, and prevent it from slipping off said standard. The needle Y is pivoted in a slot in the inner end of the arm P¹, rigidly attached to the upper end of the inclined arm Q¹, the said slot being so formed that the lower end of the needle Y can move inward, but cannot move outward. The needle Y is held against the shoulder or bottom of the slot in the end of the arm P¹ by a spring, y^1 , attached to said arm, and which rests against the outer side of the projecting upper end of the said needle. The needle is slotted from its eye near its lower end nearly to its pivoting-point, where the said slot passes out at the inner edge of the needle. The upper end of the free arm of the needle is bent outward, so that the twine, when being carried across the machine by the twine-clamp s^1 s^2 , may readily pass into said slot and pass down to the eye of the needle. As the needle passes down to its ordinary position, its lower end strikes against an inclined stop, y^2 , attached to the frame A, and is pushed inward, moving the slot of the needle away from the stationary stop y^2 , attached to the arm P¹, and which is designed to prevent the twine from slipping up in the said slot when the needle descends into the standard Z, to form the knot. The lower end of the bar Q¹ is rigidly attached to the outer end of a cross-bar, R¹, that moves up and down in the inclined guide-rack W, and to the inner end of which is rigidly attached the lower end of the inclined bar S¹. The inclined bar S¹ is placed at a greater inclination than the inclined bar Q¹, with which it is rigidly connected, and its upper end is pivoted to the crank-pin of the weighted crank T¹. The crank T¹ is rigidly attached to the end of the shaft U¹, which revolves in bearings in the upper part of the frame A, and to its other end is attached the bevel-gear wheel V¹. The teeth of the bevel-gear wheel V¹ mesh

into the teeth of the bevel-gear wheel W' , attached to the upper end of the vertical shaft X' , which revolves in bearings attached to the frame A , and to the lower part of which is attached a segmental gear-wheel, Y' .

With this construction, as the segmental gear-wheel H' leaves the gear-wheel I' , after carrying the hook V' of the bar L' around the standard Z , it comes into gear with the segmental gear-wheel Y' , and gives motion to it and the mechanism connected with it. This movement raises the needle Y , carries it to the rearward, and presses it down into the longitudinal groove formed in the forward side of the standard Z , carrying the ends of the twine through the loop of said twine formed around the upper part of the said standard Z . The groove of the standard Z is covered by a spring, Z' , the upper part of which is inclined inward, and around which the twine passes that passes around the upper part of the standard Z . As the needle Y descends into the groove of the standard Z it presses the upper end of the spring Z' outward, bringing its inclined part against the coil of the twine, and slipping said coil off the upper end of the said standard Z . As the needle Y descends into the standard Z , a curved knife, A^2 , attached to the inclined bar Q' of the needle-frame, cuts the twine between the needle Y and the twine-clamp $s^1 s^2$. To the frame A , at a little distance from the standard Z , is pivoted a bar, B^2 , which is bent into U form, and has a hook formed upon its inner arm. As the needle descends into the groove of the standard Z , a bar, C^2 , attached to the inclined bar Q' , strikes a pin, b' , attached to the inner arm of the U -bar B^2 , and forces the hook of said arm through a slot formed between the rear side of said needle Y and an arm, y^4 , attached to said needle. The hook of the U -bar B^2 passes through the needle Y above its eye, so as, when the needle Y is raised, to draw the ends of the twine out of the eye of the needle, to prevent said ends from being drawn out of the loop or coil of the twine by the ascent of the needle. As the needle Y is raised from the standard Z the spring Z' moves back and clamps the ends of the twine against the back of the slot in the standard Z , to prevent them from being drawn out of the loop or coil of the twine before the knot has been drawn tight. The hook of the U -bar B^2 is withdrawn from the standard Z by a pin, D^2 , attached to the clamp O' , and which strikes against the outer arm of the said U -bar B^2 . The downward movement of the needle Y is limited by a stop, E^2 , attached to the frame A , and against which the inclined bar Q' of the needle-frame strikes. As the rack B again begins its forward movement the first effect is to raise the needle Y and carry it to its usual position. The next effect is to move back the clamp O' and release the loop of the twine, allowing the elasticity of the sheaf to draw the knot tight. The crank Q and

arm S are then swung back to draw the twine again across the table $E F$, and at the same time the said table is revolved to throw the sheaf to the ground. As the crank Q and table $E F$ come into position another gavel is dropped upon the table $E F$, and is bound in the manner hereinbefore described.

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

1. The combination of the stationary wedge-shaped rest or arm X with the twine-clamp, constructed substantially as described, and the swinging arm S , for inserting the body of the twine into said clamp without releasing the end of the twine, substantially as set forth.

2. The combination of the spring-stop $P R$ with the revolving table or rack-shaft D and crank Q , carrying the twine-clamping devices, substantially as herein described.

3. The combination of the grooved standard Z , the plate A^1 , the hook-bar L' , spring M' , crank-wheel K' , and gear-wheel I' with each other, for forming the loop in the twine, substantially as herein shown and described.

4. The combination of the clamp O' , sliding bar N' , and the eccentric J' with the grooved standard Z and the gear-wheel I' , for holding the loop in place upon the standard Z , substantially as herein shown and described.

5. The slotted needle Y , and its stationary stop y^3 and spring y^1 , the needle-frame $P' Q' R' S'$, the crank T' , and the inclined guide-rack W , in combination with the grooved standard Z , for passing the ends of the twine through the loop, substantially as herein shown and described.

6. The combination of the spring Z' with the grooved standard Z and with the needle Y , for pushing the loop from the said standard and holding the ends of the twine, substantially as herein shown and described.

7. The combination of the inclined guide-stop y^2 with the needle Y , and its stationary guard-stop y^3 and spring y^1 , for uncovering the slot of said needle, substantially as herein shown and described.

8. The combination of the pivoted U -bar B^2 and the stops $b' C^2 D^2$ with the grooved standard Z , the clamp Q' , the needle Y , and the needle-frame $P' Q' R' S'$, for withdrawing the ends of the twine from the eye of the needle, substantially as herein shown and described.

9. The combination of the rack B , the segmental gear-wheels $B^1 H'$, the upright shafts $C^1 G'$, the cranks $D^1 F'$, and the connecting-rod E' with the gear-wheel I' , for operating the hook-bar L' and the clamp O' , substantially as herein shown and described.

10. The combination of the segmental gear-wheel Y' , the upright shaft X' , the bevel-gear wheels $W' V'$, and the horizontal shaft U' with the segmental gear-wheel H' and the crank T' , for operating the needle-frame and

needle, substantially as herein shown and described.

11. The combination of the cranks G I, the slotted connecting-rod H, the rock-shaft J, the weighted arm M N, and the bent arms K with the shaft D, that carries the crank Q and the swinging arm S, and with the open-bottomed

grain-receiver L, substantially as herein shown and described.

JOHN J. ATWATER.

Witnesses:

L. W. ATWATER,
JOHN H. ATWATER.