

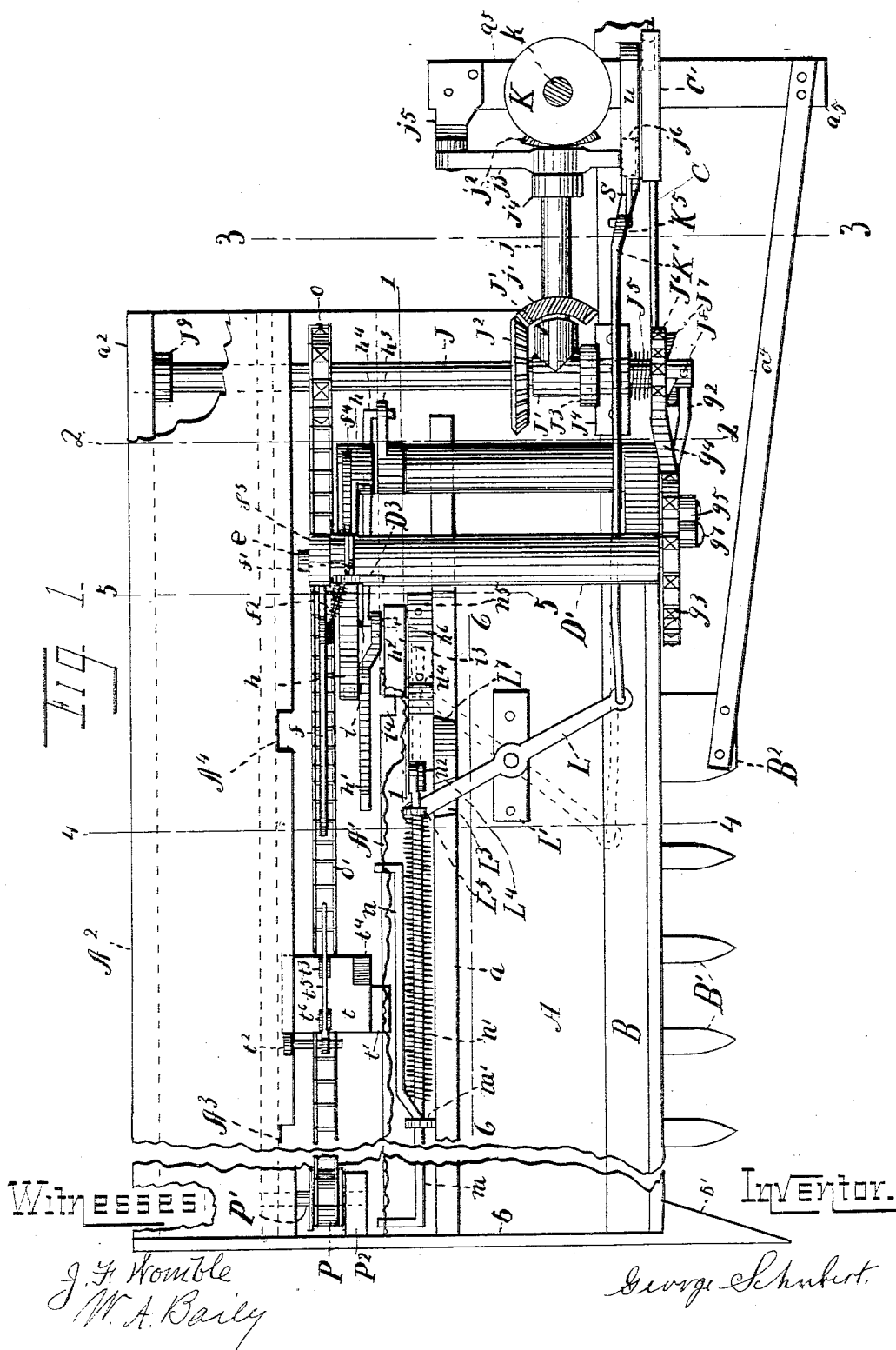
(No Model.)

3 Sheets—Sheet 1.

G. SCHUBERT.
GRAIN BINDER.

No. 482,758.

Patented Sept. 20, 1892.



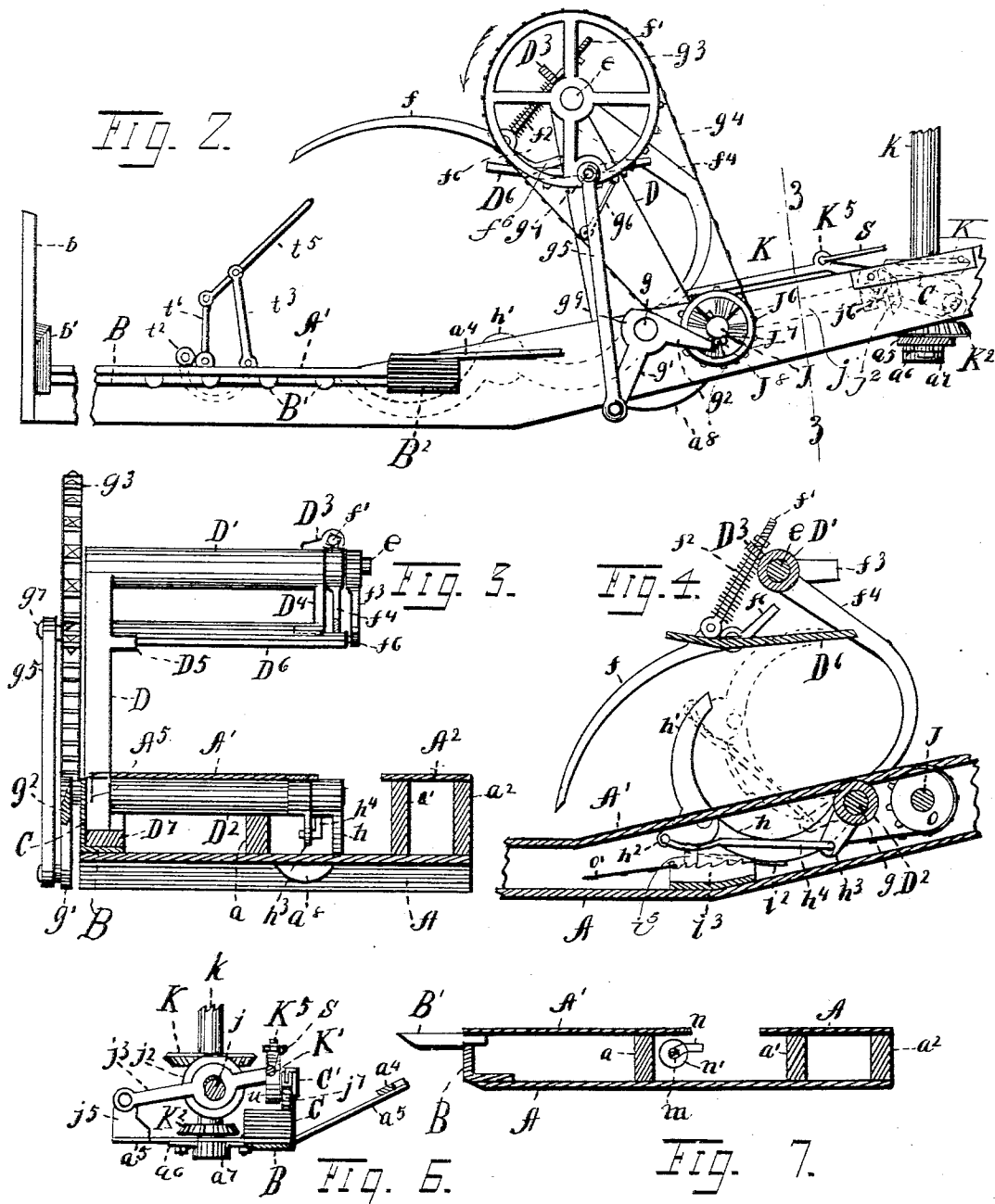
(No Model.)

3 Sheets—Sheet 2.

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GRAIN BINDER.

No. 482,758.

Patented Sept. 20, 1892.



Witnesses:

J. F. Noble
W. A. Bailey

Inventor.

George Schubert.

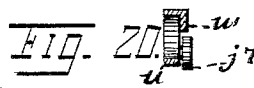
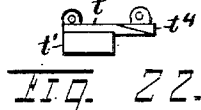
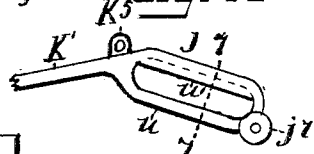
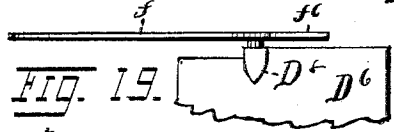
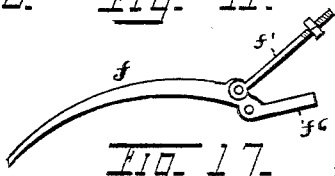
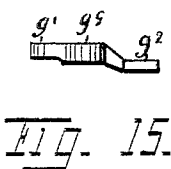
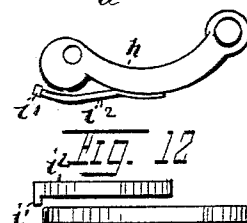
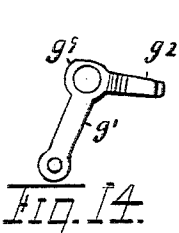
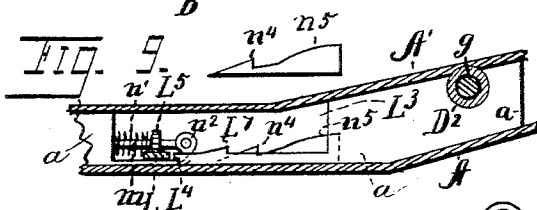
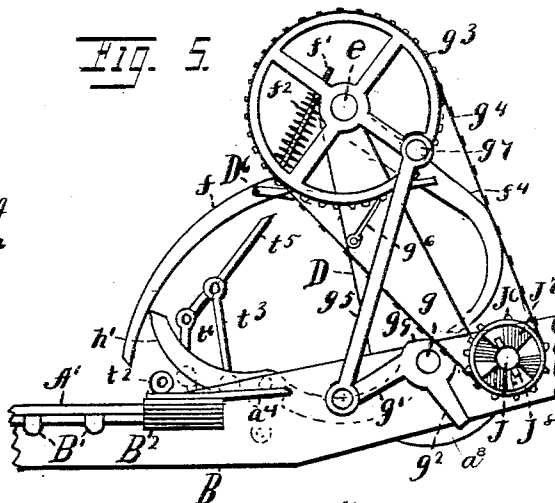
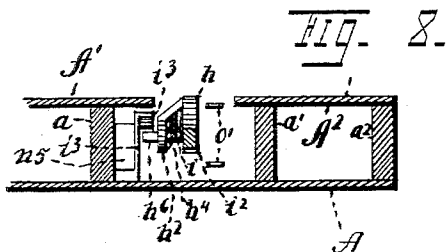
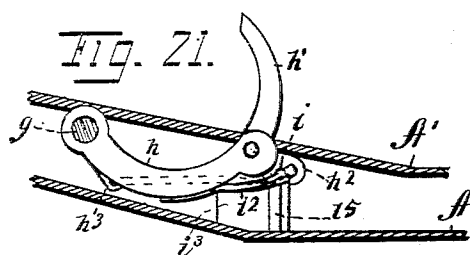
(No Model.)

3 Sheets—Sheet 3.

G. SCHUBERT.
GRAIN BINDER.

No. 482,758.

Patented Sept. 20, 1892.



Witnesses:

Fig. 23.

Inventor.

J. F. Kromble
M. A. Bailey



George Schubert

UNITED STATES PATENT OFFICE.

GEORGE SCHUBERT, OF WALNUT, TEXAS.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 482,758, dated September 20, 1892.

Application filed March 7, 1892. Serial No. 423,994. (No model.)

To all whom it may concern:

Be it known that I, GEORGE SCHUBERT, a citizen of the United States, residing at Walnut, in the county of Bosque and State of Texas, have invented a new and useful Grain-Binder, of which the following is a specification.

This invention relates to improvements in a grain-binder of a kind known as a "platform-binder," in which the cord-carrying arm or needle and needle-operating mechanism are placed below the upper deck of the platform, and the cord-tying mechanism is placed above the upper deck of the platform.

The objects of my improvements are, first, to construct a needle in sections, and to construct mechanism to curve said needle in position to a proper curvature to conform to the sheaf to be bound at the beginning of the binding operation, and to again straighten out said needle at the end of the binding operation, so as to pass beneath the upper deck of the platform, so that the grain can be shifted direct from the grain-receiving platform on the needle by a suitable conveyer invented by myself and patented February 17, 1891, No. 446,473, thus dispensing with all packing and elevating and receiving mechanism, thus promoting simplicity and cheapness of the construction of such grain-binders; second, to construct a simple, light, and durable clutching mechanism to connect and disconnect the binding mechanism with the harvester or conveyer gearing; third, to construct a simple gear-shifting mechanism to impart reciprocating movement to the conveyer, and, fourth, to construct a light and simple locking mechanism to lock the gear-shifting mechanism in position after being shifted to the desired position. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of a harvester-platform provided with my improvements. The upper front plate of the platform and the breast-board are removed to show parts below. Fig. 2 is a front elevation view of Fig. 1. Fig. 3 is a vertical cross-section view taken on line 2 2 of Fig. 1, looking grainward. Fig. 4 is a vertical longitudinal section view taken on line 1 1 of Fig. 1, showing the grainward sec-

tion of the needle locked in position to compress the grain and also showing the needle at its farthest upward movement in dotted lines. Fig. 5 is a portion of Fig. 2, with the binding mechanism started by the conveyer, and the conveyer shown at near the stubble end of its movement. Fig. 6 is a vertical cross-section view, taken on line 3 3 of Figs. 1 and 2, looking stubbleward. Fig. 7 is a vertical cross-section taken on line 4 4 of Fig. 1. Fig. 8 is a section view on line 5 5 of Fig. 1, looking grainward and showing the plates of the platform and the rear section of the needle in section. Fig. 9 is a vertical longitudinal section view taken on line 6 6 of Fig. 1, showing the shifting and locking mechanism in full lines. Figs. 10, 11, 12, 13, 14, 15, 16, 17, 18, and 19 are detail views of different parts of the machine. Fig. 20 is a cross-section view taken on line 7 7 of Fig. 18. Fig. 21 is a view of the needle when locked in position, as seen from the rear of the machine. Fig. 22 is a detail view of the conveyer-block, and Fig. 23 is a detail view of the bracket *v*.

Referring to the drawings, A designates the lower plate of the platform.

A¹ is the upper front plate, and A² is the upper rear plate, of the platform.

B is the usual finger-bar on the front edge of the platform provided with the guards B¹ and an inner shoe B². Said finger-bar is preferably extended with its stubbleward end to the harvester-frame. (Not shown in the drawings.)

C is a vertical flange formed on the stubbleward extension of the finger-bar.

Strips *a* and *a'* are secured to the plate A a proper distance apart and of proper width to provide room for the conveyer and mechanism hereinafter described. The strip *a*² forms the rear sill of the platform. The plate A is secured with its front edge to the lower flange of the finger-bar, and the plate A¹ is secured with its front edge to the upper flange of the finger-bar and projecting rearward over the strip *a*, as shown in dotted lines in Fig. 1, and secured to the strip *a*. The plate A² is secured to the strips *a'* and *a*² and projects inward over the strip *a'* and leaves a slot in the upper deck of the platform.

A³ and A⁴ are notches formed in the inward

projecting edge of the plate A² for the operation of the conveyer. The strip *a* extends from the grain end of the platform to near the shaft J, and the strips *a'* and *a''* extend from the grain end of the platform to the stubble end of the platform, as shown in dotted lines in Fig. 1.

*a*⁵ designates a cross-bar secured to the under side of the finger-bar B.

*a*⁴ is a brace extending from the shoe B² to the front end of the bar *a*⁵.

The platform in this machine is extended stubbleward a proper distance beyond the inner shoe B² or inner cutting-point of the machine to provide room for the binding mechanism hereinafter described. The front edge of the stubbleward extension of the plate A' is turned down to a right angle A⁵, by which it is secured to the vertical flange C. (Shown in Fig. 3.)

The main frame of the binding mechanism or binder-frame consists of the upright portion D, having the sleeves or arms D' and D², projecting rearward and perforated to receive the shafts *e* and *g*.

D⁷ is a horizontal flange on the lower end of the binder-frame, by which said frame is secured to the finger-bar, and with the rear end of the arm D² rigidly bedded in the stubble end of the strip *a*.

D⁴ is a downward projection on the rear end of the arm D', having a horizontal flange on its lower end, (shown in dotted lines in Fig. 3,) to which is secured the rear end of a suitable breast-board D⁶. The front end of the breast-board D⁶ is secured on the lug D⁵, formed on the body of the binder-frame D. (Shown in Fig. 3.)

k designates a vertical shaft journaled with its upper end in a bearing supported by the harvester-frame (not shown in the drawings) and with its lower end extending through the bar *a*⁵ and journaled in the bearing *a*⁷, secured by its ears *a*⁶ to the under side of the bar *a*⁵, as shown in Fig. 6.

K and K² are bevel-pinions near the lower end of the shaft *k*, a proper distance apart to provide room for the operation of the pinion *j*².

j is a shaft slightly inclined, as shown in Fig. 2 in dotted lines. Said shaft *j* extends from the inner or stubble end of the platform to near the vertical shaft *k*, and journaled in a pivoted bearing J' at its grain end and in a movable bearing *j*³ near its stubble end, and provided with a bevel-pinion *j*¹ in mesh with bevel-pinion J², and a bevel-pinion *j*², adjacent on the stubble side of the movable bearing *j*³ and in position to be engaged or disengaged with the bevel-pinions K and K².

*j*⁴ is a collar on the shaft *j* adjacent on the grain side of the movable bearing *j*³ to prevent said bearing *j*³ from having any longitudinal movement on the shaft *j*. Said movable bearing *j*³ is pivoted with its rear end on a bracket *j*⁵, secured on the rear end of the bar *a*⁵ and provided with an antifriction-roller *j*⁶ (shown in dotted lines in Figs. 1 and 2) on

its forward projecting end in position to engage with the guide or slot *u*, formed on the stubble end of the rod K'.

u is a flange projecting partly over the front side of the slot *u* and is to prevent any rearward movement of the stubble end of the rod K' by reason of the flange *u*' coming in contact with the front side of the antifriction-roller *j*⁶.

*j*⁷ is an antifriction-roller pivoted on the lower and stubble end of the guide or rod K' in position to operate on the incline portion of the finger-bar B, adjacent on the rear side of the vertical flange C.

C' is a guard secured on the vertical flange C opposite the shaft K in position to form a guide for the antifriction-roller *j*⁷ to prevent the said roller *j*⁷ from being raised, thus preventing the elevation of the stubble end of the shaft *j* when not so desired.

K⁵ is a lug secured near the of the slot of the rod K', as shown in Figs. 1 and 2, and provided with a draw-rod S, which extends to the operator's foot-board and connected to a suitable foot-latch, (not shown in the drawings,) by which it is operated when so desired. The rod K' extends grainward with its grain end extending beneath the plate A' and pinned to the front end of the lever L. Said lever L is pivoted on a block L', secured to the plate A and extending rearward a proper distance beyond the strip *a*.

L⁵ is a lug perforated and pivoted in the rear end of the lever L. (See Figs. 1 and 9.)

m designates a rod extending with its stubble end through the lug L⁵.

*n*² is a dog formed as shown in Fig. 10 and loosely pivoted to the stubble end of the rod *m* with its free end extending downward in position to engage with the shoulder *n*⁴ of the block *n*⁵, the rod *m*, extending with its other end to near the grain end of the platform with its end turned rearward in position to be operated by the forward projection *t*' of the conveyer-block *t*.

*m*¹ is a lug secured to the strip *a*, and forms a guide for the grain end of the rod *m*.

n is an arm preferably formed integral with the rod *m* at its grain end and projecting rearward and upward and then bent to extend a proper distance stubbleward parallel with the rod *m* with its stubble end turned rearward in the path of the projection *t*'.

*n*¹ is a spring coiled on the rod *m*, between the intersection of the rod *n* and the lug L⁵.

L³ is a depression or opening formed in the strip *a*, opposite the pivot of the lever L.

L⁴ and L⁷ are shoulders formed in the depression L³, the shoulder L⁴ being in position to lock the rear end of the lever L in its grainward position, and the shoulder L⁷ is slightly elevated and is to lock said lever L in its opposite direction.

*n*⁵ is a block secured to the plate A, adjacent the rear side of the strip *a*, extending with its grain end a short distance past the shoulder L⁷, with the shoulder or projection

n^4 projecting stubbleward and a short distance stubbleward from the shoulder L^1 , as seen in Figs. 1 and 9, and with its stubble end formed inclined and extending a short distance past the opening L^3 .

J designates a shaft extending through the strip a' near the stubble end of the platform and journaled with its rear end in the sill a^2 and with its front end in the bearing J^4 . The front end or periphery of the pivoted bearing J' is machined and journaled in the rearward-projecting flange J^3 of the bearing J^4 , as shown in the dotted lines in Fig. 1, and having its rear end supported on the shaft J .

J^9 is a collar secured on the shaft J , adjacent the front side of the strip a^2 .

J^2 is a bevel-pinion on the shaft J in position to mesh with the bevel-pinion j' , the said bevel-pinion j' is of concave form to provide room for the pivoted bearing J' .

o is a sprocket-wheel on the shaft J with its front edge slightly in rear of the plane of the rear face of the needle. o' is a chain extending over the sprocket-wheel o and over an idler P , (at the grain end of the platform,) which is secured to the shaft P' , which is journaled with its rear end in the strip a' , and with its front end in a block P^2 , secured to the plate A and the grain-board b .

t designates the conveyer-block secured in the chain in any suitable manner and provided with a projection t' on its front edge and having the front side of the stubble end beveled down from its upper side at t' to readily enter beneath the free end of the needle, as will be hereinafter described.

t^3 is an upright pivoted in the block t and curved with its lower end around beneath the block t and having an axle provided with an antifriiction-roller t^2 in position to operate on the plate A^2 .

t^5 is an arm or extension pivoted to the upper end of the upright t^3 and connected with its grain end to the grain end of the block t by the connecting-rod t^6 , as more fully described in the patent above noted.

J^6 designates a sprocket-wheel near the front end of the shaft J and provided with spiral projections or clutch J^7 (shown in Figs. 1 and 2) on its front side in position to be engaged and operated by the pin J^8 , secured in the front end of the shaft J .

J^5 is a spring coiled on the shaft J between the sprocket-wheel J^6 and the bearing J^4 , and tends to press said sprocket-wheel forward to cause the clutch J^7 to engage with the pin J^8 .

g^3 is a sprocket-wheel secured on the front end of the shaft e .

g^4 is a chain extending over the sprocket-wheels g^3 and J^6 to operate the sprocket-wheel g^3 . The shafts e and g are journaled in the arms D' and D^2 , respectively.

g^9 is a bell-crank secured to the front end of the shaft g , resting with its arm g^2 on the clutch J^7 (when in its normal position) to prevent said clutch from engaging with the pin

J^8 and with the arm g' extending grainward and connected to the wrist g^7 (secured in the periphery of the sprocket-wheel g^3) by the connecting-rod g^5 , as shown in Fig. 2.

f^4 designates a compressor-arm pivoted on the shaft e , adjacent the rear end of the arm D' , which can be of any ordinary construction and operated by any suitable mechanism or by the mechanism shown, described, and claimed in my application for a patent for a grain-binder filed July 1, 1891, Serial No. 399,436.

f designates a grain holding or receiving arm, pivoted on the stud D^8 , secured or formed on the rear edge of the breast-board D^6 , as shown in Fig. 19, having its grainward end curved downward or in any suitable form and provided with an extension f^6 , as shown.

f' is a rod pivoted to the arm f a short distance grainward from the pivot D^8 , extending with its free end through a bracket D^3 , formed on the rear end of the arm D' and threaded and provided with a nut on its free end to prevent its disengaging from the bracket D^3 .

f^2 is a spring coiled on the rod f' between the arm f and the projection or bracket D^3 , and tends to press the arm f downward.

f^3 is an arm secured to the shaft e , adjacent the rear side of the compressor and formed of proper length and in position to engage with the extension f^6 .

h^3 is an arm rigidly secured to the shaft g , adjacent the rear end of the arm D^2 .

h is the first or rear section of the needle, pivoted on the rear end of the shaft g , adjacent the rear side of the arm h^3 , extending with its free end grainward and curved to conform with the curvature of the sheaf. h' is the second section of the needle, also curved to the curvature of the sheaf and pivoted to the free end of the section h extending grainward when in its normal position, and with the heel h^2 , projecting stubbleward and connected to the arm h^3 by the connecting-rod h^4 . Said connecting-rod h^4 projects through the heel h^2 , forming the projecting hook i^6 , which projects forward far enough to engage with the bracket i^3 , as shown in Fig. 8. The connecting-rod h^4 is slightly curved near its grain end, as shown in dotted lines in Fig. 4. to come in proper contact of the joint of the section h' , so as to not move the section h' beyond the proper curvature. The heel h^2 of the section h' is curved forward from the section h far enough to provide room for the connecting-rod h^4 and the rearward projection i on said connecting-rod h^4 .

i^3 is a bracket formed as shown in Fig. 8 and secured to the plate A , with its rear and upper flanges adjacent to heel h^2 and far enough stubbleward to allow the forward projecting end i^6 of the connecting-rod h^4 to pass upward past said bracket i^3 , when the said connecting-rod h^4 is moved to its farthest grainward movement.

i^1 is a notch formed in the inward projecting edge of the plate A' , through which the hook h^6 ascends and descends.

i^2 is a spring secured to the section h , with its free end projecting grainward, with the grain end curved to clear the heel of the section h , as seen in Fig. 12, and provided with a short forward-projecting stud i' on its grain end in position to engage with the projection i , formed on the rear and grain end of the connecting-rod h^4 to lock the section h' and the connecting-rod h^4 in position.

i^3 is a post secured to the plate A in position to engage with the grain end of the spring i^2 and of proper length to disengage the spring i^2 from the projection i .

b is a grain-board of ordinary construction and secured to the plates A , A' , and A^2 in any well-known manner.

b' is a divider-board secured to the grain-board b and the finger-bar B .

a^8 is a depression in the plate A beneath the arm h^3 to provide room for the operation of said arm.

g^6 is a spring secured to the binder-frame in position to engage with its free end with the sprockets of the wheel g^3 , as shown in Figs. 2 and 5.

The operations may be summarized as follows, viz: The shaft k receives its rotation from mechanism of the harvester (not shown in the drawings) and is rotated in the direction as shown by arrow in Fig. 1. When the operator desires to start the conveyer, he draws the draw-rod S stubbleward, thus drawing the incline guide u in the same direction and engaging the bevel-pinion j^2 with the bevel-pinion K and starting the conveyer on its stubbleward movement, and as the conveyer moves stubbleward the projection t' moves against the rearward-projecting end of the rod n , moving it along stubbleward, thereby compressing the spring n' and shifting the rod m in the same direction, when the stubble end of said rod m will ascend on the inclined block n^5 , thereby elevating the stubble end of the rod m and causing it to elevate the rear end of the lever L , thus disengaging said lever L from the shoulder L^4 , when said lever is moved in the position, as seen in dotted lines in Fig. 1, by the spring n' , when said lever L will drop over the shoulder L^7 , and thus is locked in position. As the rear end of the lever L is moved stubbleward the rod K' is drawn in the opposite direction, thereby disengaging the bevel-pinion j^2 from bevel-pinion K and engaging it with the bevel-pinion K^2 , thus reversing the movement of the conveyer. As the conveyer nears the stubble end of its movement the beveled end t^4 of the block t engages beneath the free end of the needle and elevates the same to the extent as shown in Fig. 5, drawing the connecting-rod h^4 , and thereby imparting a slight rotation to the shafts g and e , and moving the bell-crank g^3 , connecting-rod g^5 , and sprocket-wheel g^3 in the position as seen in Fig. 5, and moving the

arm f^3 past the extension f^6 , allowing the arm f to descend and hold the grain until grasped by the needle. The slight forward movement of the shaft g moves the arm g^2 off the clutch J^7 , allowing the spring J^5 to move the sprocket-wheel J^6 outward or forward in line with the sprocket-wheel g^3 , causing the clutch J^7 to engage with the pin J^8 . The spring g^6 prevents the gearing from having any rearward movement, and as the rotation of the shaft J is reversed the clutch J^7 will be operated by the pin J^8 and cause the sprocket-wheel g^3 to complete one revolution, when the arm g^2 will again engage with the clutch J^7 and force the sprocket-wheel J^6 to the rear and disengage the clutch J^7 from the pin J^8 , when the binding mechanism will remain at rest in the position as seen in Fig. 2 with the arm f^3 in contact with the extension f^6 , holding the arm f at an elevation, as seen in Fig. 2, until again started, as heretofore described. As the binding mechanism is operated by the sprocket-wheel J^6 the section h' is first moved upward by the arm h^3 and connecting-rod h^4 to the curvature, as shown in Fig. 4, when the curved end of the connecting-rod h^4 will come in contact with the rear end of the section h' and prevent said section from having any further inward movement. At this time the forward end i^5 of the connecting-rod h^4 will pass from under the bracket i^3 and ascend through the notch i^4 in the plate A' by pressure of the arm h^3 on the connecting-rod h^4 the section h is caused to elevate, and as the free end of the section h begins to elevate the spring i^2 is released and engages with the stud i and locks the section h' and connecting-rod h^4 in position, when the needle is in position to be moved upward, as shown in dotted lines in Fig. 4, to compress the gavel and deliver the cord to the knot-tying mechanism. (Not shown in the drawings.) As the section h nears the end of its return movement the spring i^2 comes in contact with the post i^3 and is pressed against the section h , and thus disengages the projection i , when the end i^6 will be in position to again engage beneath the bracket i^3 and compel the section h' to unfold grainward to the position as seen in dotted lines in Fig. 2. As the conveyer nears the end of its grainward movement the projection t' comes in contact with the rearward projecting end of the rod m and draws said rod m grainward, the dog n^2 shifting along on the smooth surface of the block n^5 with its free end projecting grainward until it comes in contact with the shoulder at projection n^4 , when it will be drawn over and elevate the stubble end of the rod m and the rear end of the lever L , and disengaging said lever L from the shoulder L^7 , the rear end of said lever L will now be moved grainward by reason of the dog n^2 or eye of the rod m resting against the lug L^5 , and thus disengaging the bevel-pinion j^2 from the bevel-pinion K^2 , and allowing the conveyer to remain at rest until again started by the operator, as heretofore de-

n^4 projecting stubbleward and a short distance stubbleward from the shoulder L^7 , as seen in Figs. 1 and 9, and with its stubble end formed inclined and extending a short distance past the opening L^3 .

J designates a shaft extending through the strip a' near the stubble end of the platform and journaled with its rear end in the sill a^2 and with its front end in the bearing J^4 . The front end or periphery of the pivoted bearing J' is machined and journaled in the rearward-projecting flange J^3 of the bearing J^4 , as shown in the dotted lines in Fig. 1, and having its rear end supported on the shaft J . J^9 is a collar secured on the shaft J , adjacent the front side of the strip a^2 .

J^2 is a bevel-pinion on the shaft J in position to mesh with the bevel-pinion j' , the said bevel-pinion j' is of concave form to provide room for the pivoted bearing J' .

o is a sprocket-wheel on the shaft J with its front edge slightly in rear of the plane of the rear face of the needle. o' is a chain extending over the sprocket-wheel o and over an idler P , (at the grain end of the platform,) which is secured to the shaft P' , which is journaled with its rear end in the strip a' , and with its front end in a block P^2 , secured to the plate A and the grain-board b .

t designates the conveyer-block secured in the chain in any suitable manner and provided with a projection t' on its front edge and having the front side of the stubble end beveled down from its upper side at t^4 to readily enter beneath the free end of the needle, as will be hereinafter described.

t^3 is an upright pivoted in the block t and curved with its lower end around beneath the block t and having an axle provided with an antifriction-roller t^2 in position to operate on the plate A^2 .

t^5 is an arm or extension pivoted to the upper end of the upright t^3 and connected with its grain end to the grain end of the block t by the connecting-rod t^6 , as more fully described in the patent above noted.

J^6 designates a sprocket-wheel near the front end of the shaft J and provided with spiral projections or clutch J^7 (shown in Figs. 1 and 2) on its front side in position to be engaged and operated by the pin J^8 , secured in the front end of the shaft J .

J^5 is a spring coiled on the shaft J between the sprocket-wheel J^6 and the bearing J^4 , and tends to press said sprocket-wheel forward to cause the clutch J^7 to engage with the pin J^8 .

g^3 is a sprocket-wheel secured on the front end of the shaft e .

g^4 is a chain extending over the sprocket-wheels g^3 and J^6 to operate the sprocket-wheel g^3 . The shafts e and g are journaled in the arms D' and D^2 , respectively.

g^9 is a bell-crank secured to the front end of the shaft g , resting with its arm g^2 on the clutch J^7 (when in its normal position) to prevent said clutch from engaging with the pin

J^8 and with the arm g' extending grainward and connected to the wrist g^7 (secured in the periphery of the sprocket-wheel g^3) by the connecting-rod g^5 , as shown in Fig. 2.

f^4 designates a compressor-arm pivoted on the shaft e , adjacent the rear end of the arm D' , which can be of any ordinary construction and operated by any suitable mechanism or by the mechanism shown, described, and claimed in my application for a patent for a grain-binder filed July 1, 1891, Serial No. 399,436.

f designates a grain holding or receiving arm, pivoted on the stud D^8 , secured or formed on the rear edge of the breast-board D^6 , as shown in Fig. 19, having its grainward end curved downward or in any suitable form and provided with an extension f^6 , as shown.

f' is a rod pivoted to the arm f a short distance grainward from the pivot D^8 , extending with its free end through a bracket D^3 , formed on the rear end of the arm D' and threaded and provided with a nut on its free end to prevent its disengaging from the bracket D^3 .

f^2 is a spring coiled on the rod f' between the arm f and the projection or bracket D^3 , and tends to press the arm f downward.

f^3 is an arm secured to the shaft e , adjacent the rear side of the compressor and formed of proper length and in position to engage with the extension f^6 .

h^3 is an arm rigidly secured to the shaft g , adjacent the rear end of the arm D^2 .

h is the first or rear section of the needle, pivoted on the rear end of the shaft g , adjacent the rear side of the arm h^3 , extending with its free end grainward and curved to conform with the curvature of the sheaf. h' is the second section of the needle, also curved to the curvature of the sheaf and pivoted to the free end of the section h extending grainward when in its normal position, and with the heel h^2 , projecting stubbleward and connected to the arm h^3 by the connecting-rod h^4 . Said connecting-rod h^4 projects through the heel h^2 , forming the projecting hook h^5 , which projects forward far enough to engage with the bracket i^3 , as shown in Fig. 8. The connecting-rod h^4 is slightly curved near its grain end, as shown in dotted lines in Fig. 4, to come in proper contact of the joint of the section h' , so as to not move the section h' beyond the proper curvature. The heel h^2 of the section h' is curved forward from the section h far enough to provide room for the connecting-rod h^4 and the rearward projection i on said connecting-rod h^4 .

i^3 is a bracket formed as shown in Fig. 8 and secured to the plate A , with its rear and upper flanges adjacent to heel h^2 and far enough stubbleward to allow the forward projecting end i^5 of the connecting-rod h^4 to pass upward past said bracket i^3 , when the said connecting-rod h^4 is moved to its farthest grainward movement.

i^3 is a bracket formed as shown in Fig. 8 and secured to the plate A , with its rear and upper flanges adjacent to heel h^2 and far enough stubbleward to allow the forward projecting end i^5 of the connecting-rod h^4 to pass upward past said bracket i^3 , when the said connecting-rod h^4 is moved to its farthest grainward movement.

i^1 is a notch formed in the inward projecting edge of the plate A' , through which the hook h^6 ascends and descends.

i^2 is a spring secured to the section h , with its free end projecting grainward, with the grain end curved to clear the heel of the section h , as seen in Fig. 12, and provided with a short forward-projecting stud i' on its grain end in position to engage with the projection i , formed on the rear and grain end of the connecting-rod h^4 to lock the section h' and the connecting-rod h^4 in position.

i^3 is a post secured to the plate A in position to engage with the grain end of the spring i^2 and of proper length to disengage the spring i^2 from the projection i .

b is a grain-board of ordinary construction and secured to the plates A , A' , and A^2 in any well-known manner.

b' is a divider-board secured to the grain-board b and the finger-bar B .

a^8 is a depression in the plate A beneath the arm h^3 to provide room for the operation of said arm.

g^6 is a spring secured to the binder-frame in position to engage with its free end with the sprockets of the wheel g^3 , as shown in Figs. 2 and 5.

The operations may be summarized as follows, viz: The shaft k receives its rotation from mechanism of the harvester (not shown in the drawings) and is rotated in the direction as shown by arrow in Fig. 1. When the operator desires to start the conveyer, he draws the draw-rod S stubbleward, thus drawing the incline guide u in the same direction and engaging the bevel-pinion j^2 with the bevel-pinion K and starting the conveyer on its stubbleward movement, and as the conveyer moves stubbleward the projection t' moves against the rearward-projecting end of the rod n , moving it along stubbleward, thereby compressing the spring n' and shifting the rod m in the same direction, when the stubble end of said rod m will ascend on the inclined block n^5 , thereby elevating the stubble end of the rod m and causing it to elevate the rear end of the lever L , thus disengaging said lever L from the shoulder L^4 , when said lever is moved in the position, as seen in dotted lines in Fig. 1, by the spring n' , when said lever L will drop over the shoulder L^1 , and thus is locked in position. As the rear end of the lever L is moved stubbleward the rod K' is drawn in the opposite direction, thereby disengaging the bevel-pinion j^2 from bevel-pinion K and engaging it with the bevel-pinion K^2 , thus reversing the movement of the conveyer. As the conveyer nears the stubble end of its movement the beveled end t^4 of the block t engages beneath the free end of the needle and elevates the same to the extent as shown in Fig. 5, drawing the connecting-rod h^4 , and thereby imparting a slight rotation to the shafts g and e , and moving the bell-crank g^9 , connecting-rod g^5 , and sprocket-wheel g^3 in the position as seen in Fig. 5, and moving the

arm f^3 past the extension f^6 , allowing the arm f to descend and hold the grain until grasped by the needle. The slight forward movement of the shaft g moves the arm g^2 off the clutch J' , allowing the spring J^5 to move the sprocket-wheel J^6 outward or forward in line with the sprocket-wheel g^3 , causing the clutch J' to engage with the pin J^8 . The spring g^6 prevents the gearing from having any rearward movement, and as the rotation of the shaft J is reversed the clutch J' will be operated by the pin J^8 and cause the sprocket-wheel g^3 to complete one revolution, when the arm g^2 will again engage with the clutch J' and force the sprocket-wheel J^6 to the rear and disengage the clutch J' from the pin J^8 , when the binding mechanism will remain at rest in the position as seen in Fig. 2 with the arm f^3 in contact with the extension f^6 , holding the arm f at an elevation, as seen in Fig. 2, until again started, as heretofore described. As the binding mechanism is operated by the sprocket-wheel J^6 the section h' is first moved upward by the arm h^3 and connecting-rod h^4 to the curvature, as shown in Fig. 4, when the curved end of the connecting-rod h^4 will come in contact with the rear end of the section h' and prevent said section from having any further inward movement. At this time the forward end i^3 of the connecting-rod h^4 will pass from under the bracket i^3 and ascend through the notch i^1 in the plate A' by pressure of the arm h^3 on the connecting-rod h^4 the section h is caused to elevate, and as the free end of the section h begins to elevate the spring i^2 is released and engages with the stud i and locks the section h' and connecting-rod h^4 in position, when the needle is in position to be moved upward, as shown in dotted lines in Fig. 4, to compress the gavel and deliver the cord to the knot-tying mechanism. (Not shown in the drawings.) As the section h nears the end of its return movement the spring i^2 comes in contact with the post i^3 and is pressed against the section h , and thus disengages the projection i , when the end i^3 will be in position to again engage beneath the bracket i^3 and compel the section h' to unfold grainward to the position as seen in dotted lines in Fig. 2. As the conveyer nears the end of its grainward movement the projection t' comes in contact with the rearward projecting end of the rod m and draws said rod m grainward, the dog n^2 shifting along on the smooth surface of the block n^5 with its free end projecting grainward until it comes in contact with the shoulder at projection n^1 , when it will be drawn over and elevate the stubble end of the rod m and the rear end of the lever L , and disengaging said lever L from the shoulder L^1 , the rear end of said lever L will now be moved grainward by reason of the dog n^2 or eye of the rod m resting against the lug L^5 , and thus disengaging the bevel-pinion j^2 from the bevel-pinion K^2 , and allowing the conveyer to remain at rest until again started by the operator, as heretofore de-

scribed. The spring n is coiled close enough on the rod m so as to be entirely compressed at the time the lever L is disengaged from the shoulder L^4 to allow the conveyer to act direct on the lever L and the gear-shifting mechanism to disengage the gearing if the spring n' should fail to do so.

It will be understood that I do not wish to limit myself to the precise proportions and details of construction herein described, as I am aware that many modifications may be made therein without departing from the spirit of my invention.

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

1. In a grain-binder, a grain-receiving platform having a slot, a conveyer operated in said slot, a lever L , pivoted in the platform having a lug L^5 , pivoted in its rear end, a rod m , extending through the lugs L^5 and m' and having its grainward end bent to extend into the passage-way of the conveyer, a rod n , secured to the rod m and extending stubbleward with its free end bent to extend into the passage-way of the conveyer, an inclined block n^5 in the passage-way of the rod m , having a projection n^4 to be engaged by a dog n^2 , pivoted to the stubbleward end of the rod m , shoulders L^4 and L^7 in the platform in position to be engaged by the lever L , the shoulder L^7 , slightly above the level of the shoulder L^4 , and a spring n' , coiled on the rod m , in combination with gear-shifting mechanism connected with the forward end of the lever L , substantially as and for the purpose described.

2. In a grain-binder, a grain-receiving platform having a slot, a conveyer operated in said slot, a lever L , pivoted in the platform having a lug L^5 pivoted in its rear end, a rod m , extending through the lugs L^5 and m' and having its grain end bent to extend into the passage-way of the conveyer-block, and a dog n^2 , pivoted to the stubble end of said rod m in position to engage with the notch or shoulder n^4 , formed on the block n^5 , a shoulder L^7 in the platform, as shown, a rod n on the rod m and having a rearward-bent end projecting in the path of the conveyer, a coiled spring on the rod m , a rod K' , pivoted with its grainward end to the forward end of the lever L , a movable bearing j^3 to engage with the inclined slot in the rod K' , a shaft j , journaled in the movable bearing j^3 and in a pivoted bearing, a bevel-pinion j^2 on the shaft j to be engaged and disengaged with the bevel-pinion K^2 and K on the shaft k , a sprocket-wheel on the shaft J , a chain on said sprocket-wheel to operate the conveyer, and bevel-pinions J' and j' to operate the shaft J , as shown and described.

3. In a grain-binder, a needle formed in sections having the section h pivoted on the shaft g , projecting with its free end grainward, with the section h' pivoted to the free end of the section h and connected to the arm

h^3 rigid on the shaft g by the connecting-rod h^4 , a bracket i^3 in position to be engaged by the end h^6 of the connecting-rod h^4 , a spring i^2 , secured to the section h , projecting with its free end grainward in position to engage with the stud i on the connecting-rod h^4 , a post i^5 to engage with the spring i^2 , a grain-receiving platform having a slot, a conveyer operated in said slot to start the needle, operating mechanism, and clutch-tripping mechanism connected therewith and controlled by the shaft g , substantially as shown and described.

4. In a grain-binder, a needle formed in sections having the section h pivoted on the shaft g , projecting with its free end grainward, with the section h' pivoted to the free end of the section h and having a heel h^2 , projecting stubbleward and connected to the arm h^3 rigid on the shaft g by a connecting-rod h^4 , a bracket i^3 in position to be engaged by the end h^6 of the connecting-rod h^4 , a spring i^2 , secured to the section h , projecting with its free end grainward in position to engage with the stud i on the connecting-rod h^4 , a post i^5 to engage with the spring i^2 , a grain-receiving platform having a slot, a conveyer operated in said slot, operating mechanism, and clutch-tripping mechanism connected therewith and controlled by the shaft g , as shown and described.

5. In a grain-binder, a needle formed in sections having the section h pivoted on the shaft g and projecting with its free end grainward, with the section h' pivoted to the free end of the section h and having a heel h^2 , projecting stubbleward and connected to the arm h^3 rigid on the shaft g by a connecting-rod h^4 , a bracket i^3 in position to be engaged by the end h^6 of the connecting-rod h^4 , a spring i^2 , secured to the section h , projecting with its free end grainward in position to engage with the stud i on the connecting-rod h^4 , said connecting-rod h^4 curved, as shown, to come in proper contact with the needle or section h' , a post i^5 to engage with the spring i^2 , a grain-receiving platform having a slot, a conveyer operated in said slot, operating mechanism, and clutch-tripping mechanism connected therewith and controlled by the shaft g , as shown and described.

6. In a grain-binder, a needle formed in sections having the section h pivoted on the shaft g , projecting with its free end grainward, with the section h' pivoted to the free end of the section h and having a heel h^2 , projecting stubbleward and connected to the arm h^3 rigid on the shaft g by a connecting-rod h^4 , a bracket i^3 in position to be engaged by the end h^6 of the connecting-rod h^4 , a spring i^2 , secured to the section h , projecting with its free end grainward in position to engage with the stud i on the connecting-rod h^4 , a post i^5 in the platform, as shown, to engage with the spring i^2 , and means to operate the shaft g , as and for the purpose described.

7. In a grain-binder, in combination with operating mechanism, a grain-receiving plat-

form having a slot, a conveyer operated in said slot, a needle operated in said platform, a breast-plate, an arm f , pivoted on a stud D^3 on said breast-plate and having the extension f^6 , an arm f^3 rigid on the shaft e to engage with said extension f^6 , a rod f' , pivoted to the arm f and extending through a lug D^3 , a nut or its equivalent on its free end to prevent the rod f' from disengaging from the lug D^3 , a spring f^2 coiled on the rod f' , as shown, and for the purpose described, and means to operate the shaft e , substantially as shown and described.

GEORGE SCHUBERT.

Witnesses:

T. R. FEARS,
T. M. CROW.