No. 631,456. Patented Aug. 22, 1899.

H. J. CASE.

GRAIN BINDER.

(Application filed Jan. 10, 1898.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

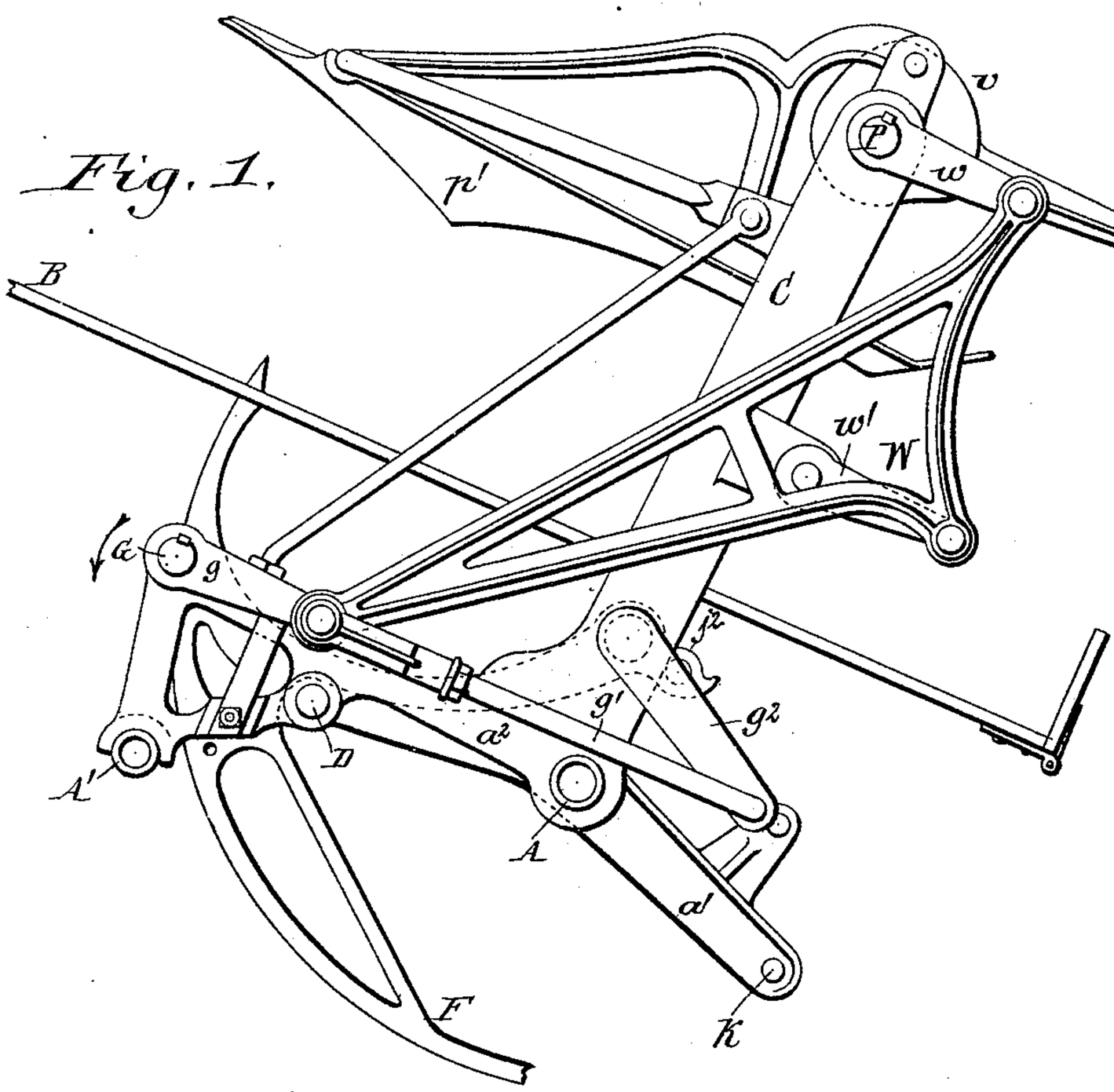


Fig. 2.

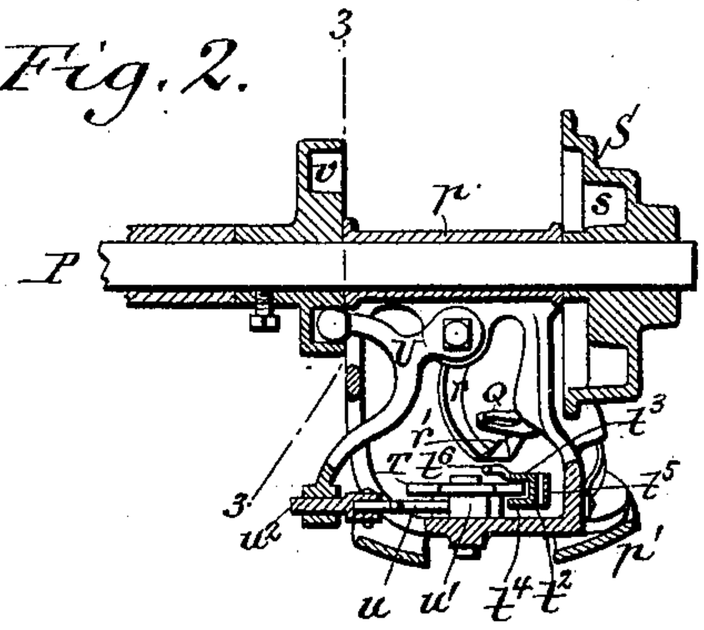
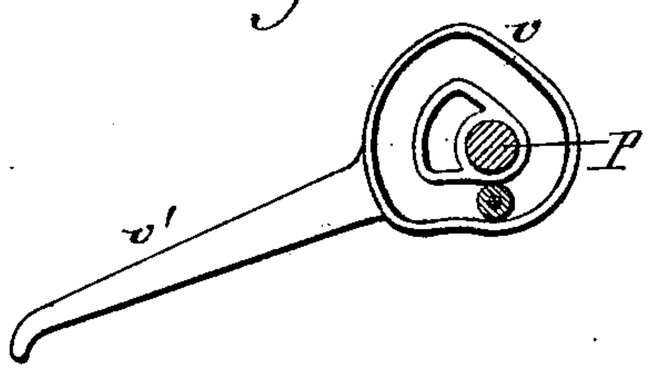


Fig. 3.



Witnesses:
Henry L. Deck.
Chas. F. Burkhart.

Henry J. Case Inventor.
By Wilhelm & Bonner.
Attorneys

No. 631,456. Patented Aug. 22, 1899.

H. J. CASE.

GRAIN BINDER.

(Application filed Jan. 10, 1898.)

(No Model.) 4 Sheets—Sheet 2.

Fig. 5.

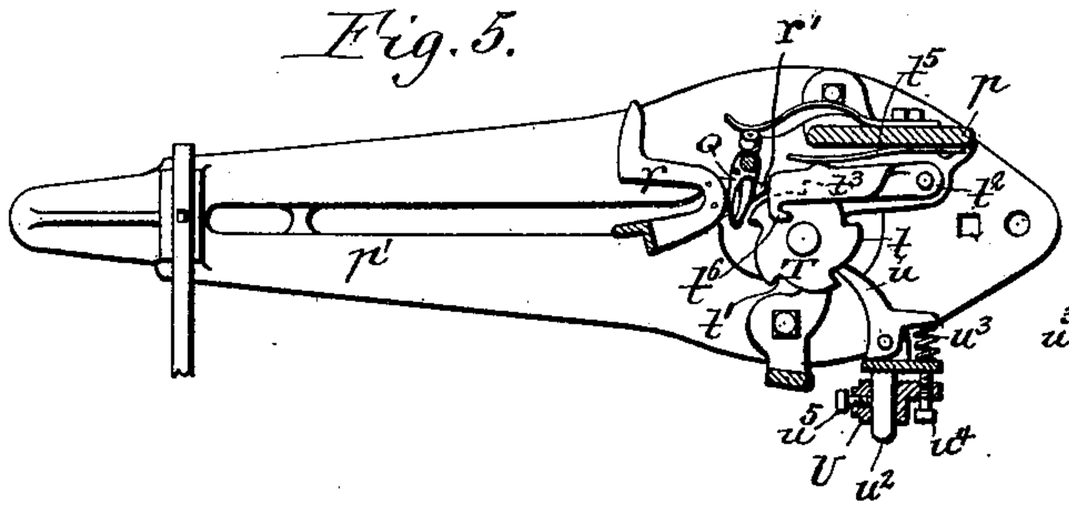


Fig. 6.

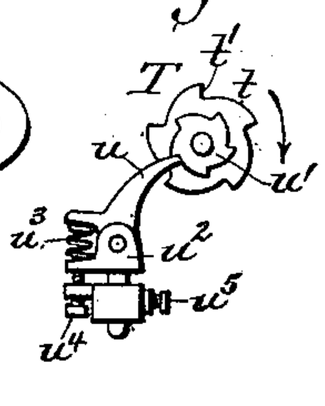
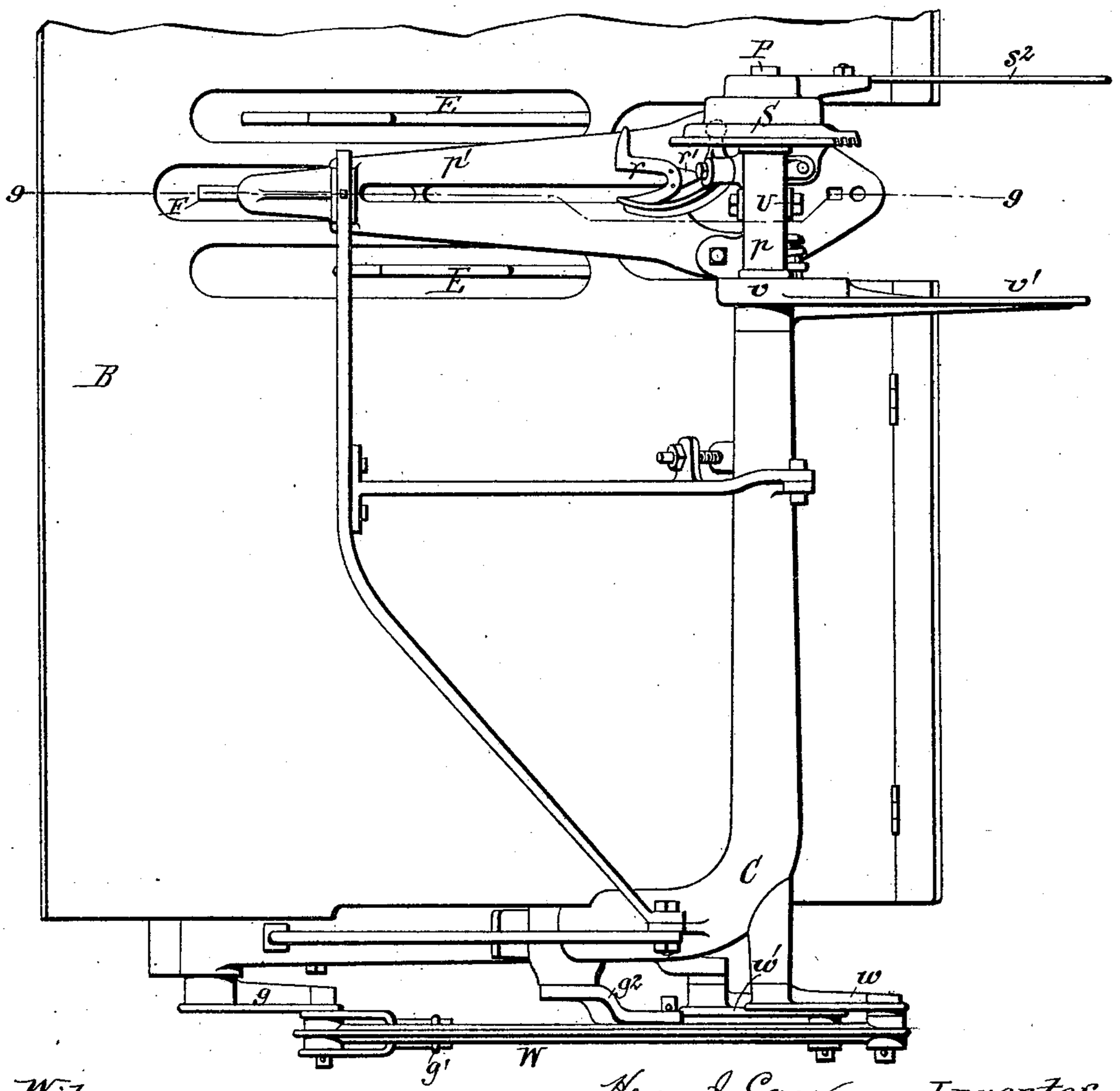


Fig. 4.



Witnesses:
Henry L. Dicke,
Chas. F. Burkhart.

Henry J. Case Inventor.
By Wilhelm & Bonnet.
Attorneys.

No. 631,456. Patented Aug. 22, 1899.

H. J. CASE.

GRAIN BINDER.

(Application filed Jan. 10, 1898.)

(No Model.) 4 Sheets—Sheet 3.

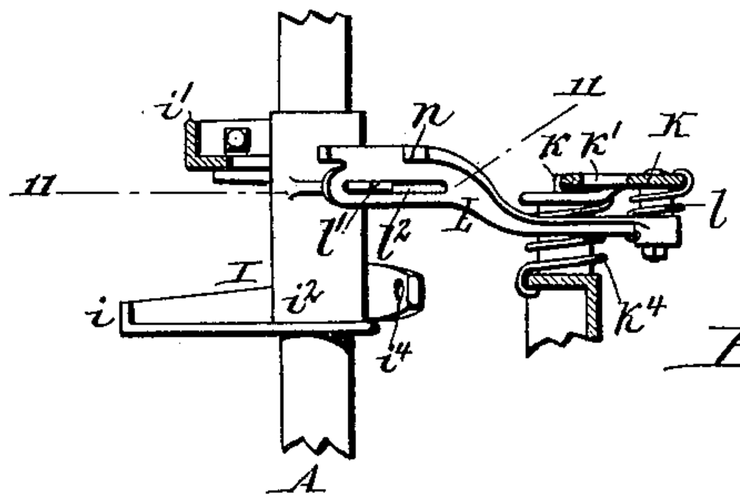


Fig. 8.

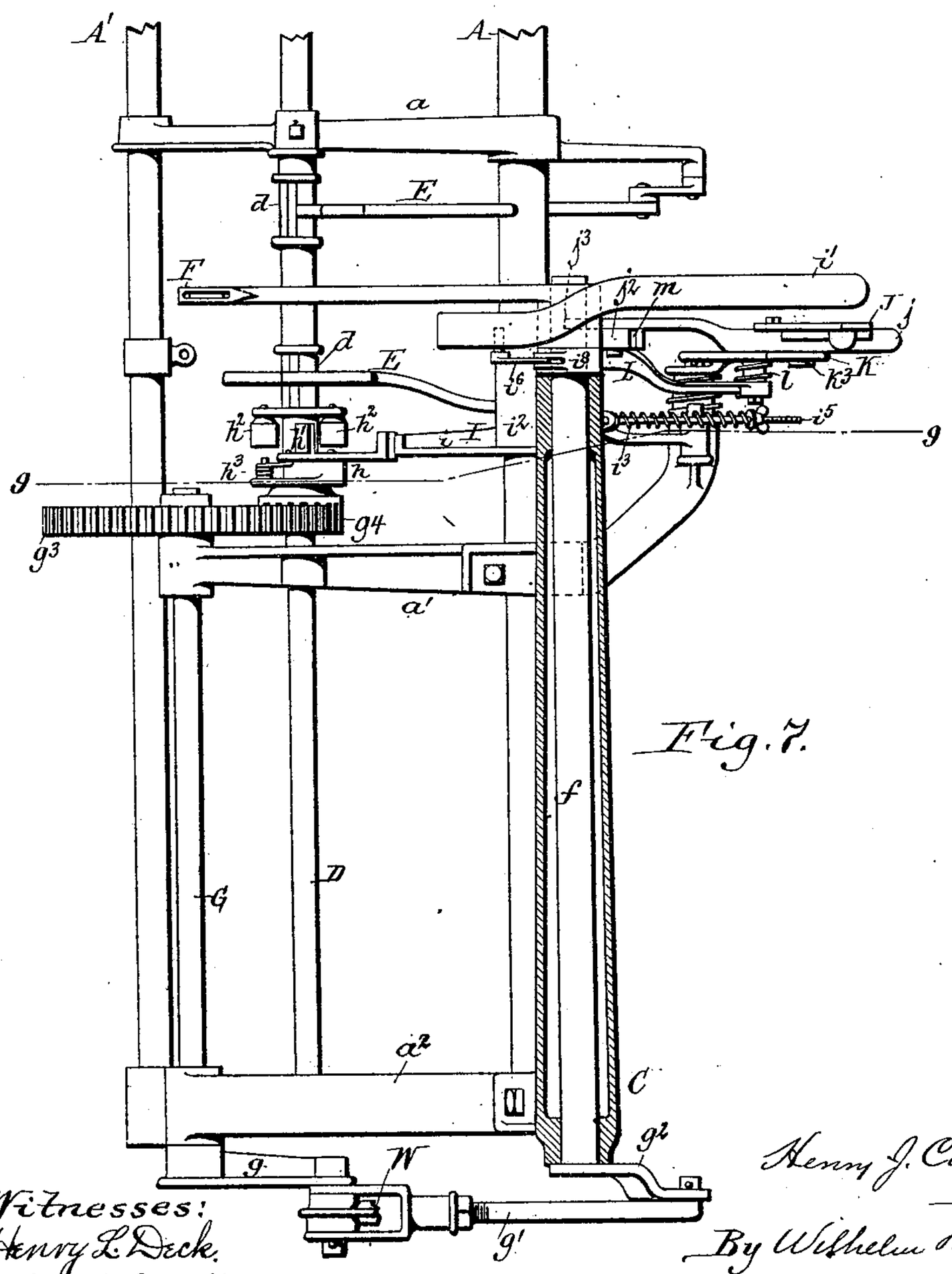


Fig. 7.

Witnesses:
Henry L. Deck.
Chas. F. Burkhart.

Henry J. Case
Inventor.
By Wilhelm & Bonner
Attorneys.

No. 631,456. Patented Aug. 22, 1899.

H. J. CASE.

GRAIN BINDER.

(Application filed Jan. 10, 1898.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 9.

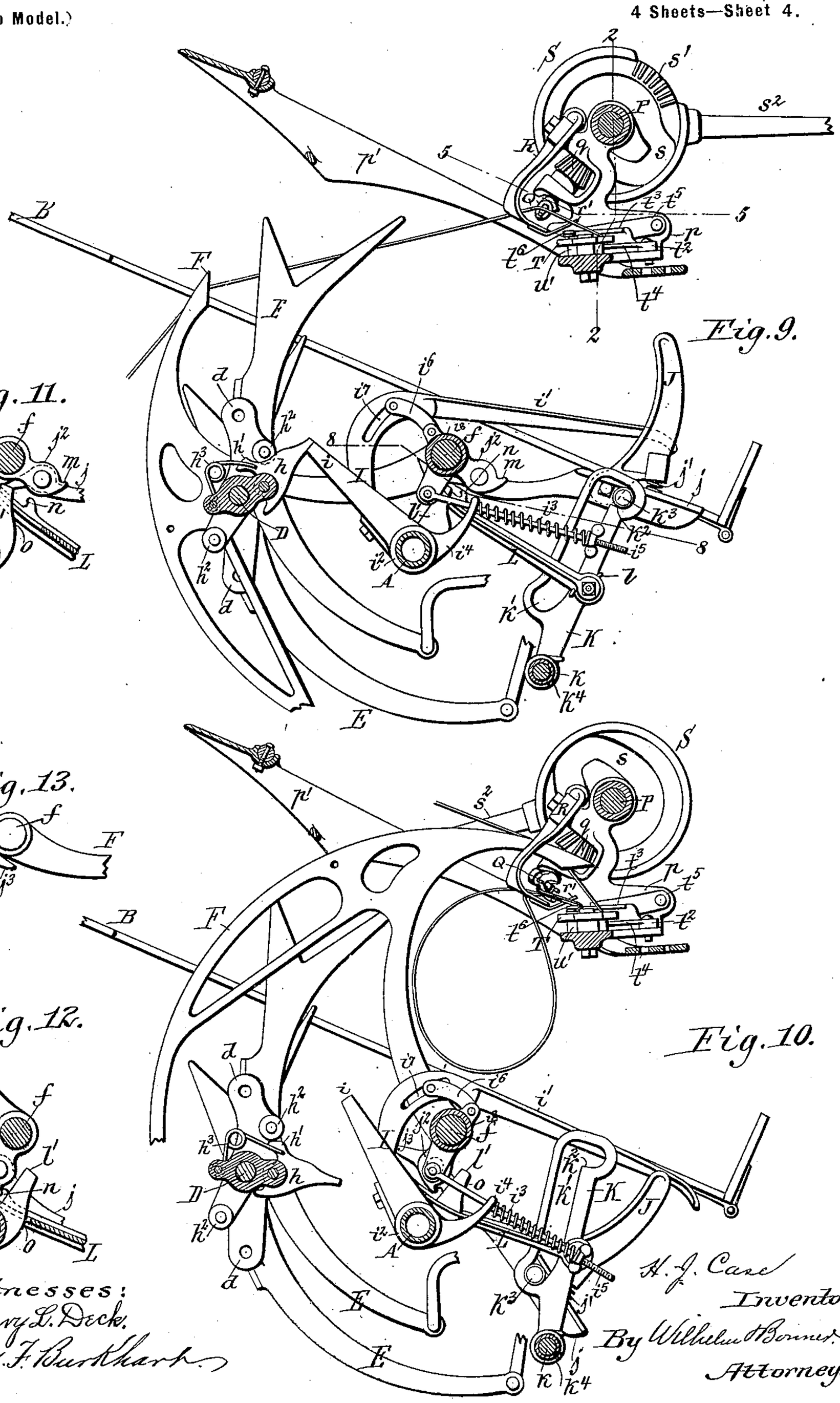


Fig. 11.

Fig. 13.

Fig. 12.

Fig. 10.

Witnesses:
Henry L. Deck.
Chas. F. Burkhardt.

H. J. Case
Inventor.
By Wilhelm & Bonner.
Attorneys.

UNITED STATES PATENT OFFICE.

HENRY J. CASE, OF AUBURN, NEW YORK, ASSIGNOR TO THE ADRIANCE, PLATT & COMPANY, OF POUGHKEEPSIE, NEW YORK.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 631,456, dated August 22, 1899.

Application filed January 10, 1898. Serial No. 666,139. (No model.)

To all whom it may concern:

Be it known that I, HENRY J. CASE, a citizen of the United States, residing at Auburn, in the county of Cayuga and State of New York, have invented a new and useful Improvement in Grain-Binders, of which the following is a specification.

This invention relates to grain-binders of well-known construction, which contain a compressor serving as an abutment against which the gavel of grain is pressed, a needle whereby the cord or twine is passed around the gavel, and a knotter mechanism.

The objects of my invention are to improve the mechanism by which the compressor is controlled and to improve the knotter mechanism.

In the accompanying drawings, consisting of four sheets, Figure 1 is an end elevation of the binder-deck of a grain-harvester provided with my improvements. Fig. 2 is a vertical transverse section of the knotter mechanism, taken in line 2 2, Fig. 9. Fig. 3 is a vertical section in line 3 3, Fig. 2. Fig. 4 is a fragmentary top plan view of the binder-deck and the binder mechanism. Fig. 5 is a horizontal section of the knotter mechanism, taken in line 5 5, Fig. 9. Fig. 6 is a bottom plan view of the twine or cord clamping disk and the ratchet mechanism which actuates the same. Fig. 7 is a horizontal section of the binder mechanism, taken through the bearing of the needle-shaft. Fig. 8 is a fragmentary horizontal section in line 8 8, Fig. 9. Fig. 9 is a vertical section taken in line 9 9, Figs. 4 and 7, and showing the position of the parts preparatory to binding a gavel. Fig. 10 is a similar view showing the position of parts while tying a band around the gavel. Fig. 11 is a fragmentary vertical section in line 11 11, Fig. 8, showing the parts in the same relative position as in Fig. 9. Fig. 12 is a similar view showing the parts in the same relative position as in Fig. 10. Fig. 13 is a fragmentary side elevation of the needle and connecting parts viewed from the side opposite to that shown in Fig. 11.

Like letters of reference refer to like parts in the several figures.

The frame of the binder mechanism consists, essentially, of two longitudinal bars A A', arranged underneath the binder-deck B, front, intermediate, and rear cross-pieces a a' a^2, connecting the longitudinal bars, and a standard C, secured to the intermediate and rear cross-pieces and overhanging the binder-deck.

D, Figs. 1, 7, 9, and 10, represents the constantly-rotating main or packer shaft, journaled in bearings on the cross-pieces, and E E are the packers, which are operated by the cranks d d on the main shaft. F represents the binder-needle, secured to the front end of the needle rock-shaft f, which is journaled in bearings in the standard below the binder-deck. G, Fig. 7, represents the intermittently-rotating counter-shaft, journaled in bearings in the intermediate and rear cross-pieces and provided at its rear end with a crank g. This latter is connected by a connecting-rod g' with a crank g^2, which is arranged on the rear end of the needle-shaft and which is of greater length than the crank g of the counter-shaft. The front end of the counter-shaft is provided with a gear-wheel g^3, which meshes with a gear-pinion g^4, mounted loosely on the main shaft. The gear-pinion is coupled with and uncoupled from the main shaft by a clutch-arm h, pivoted eccentrically on the gear-pinion and provided with a clutch finger or shoulder h', which can be shifted into or out of the path of the driving-dogs h^2, mounted on the main shaft. The clutch-arm is turned in a direction for bringing its clutch-shoulder into the path of the driving-dogs by a spring h^3, and the clutch-arm is turned in the opposite direction for moving its clutch-shoulder out of the path of the driving-dogs by the inner or rear arm i of a trip-lever I. The front arm i' of this lever projects normally above the binder-deck and is connected with the rear arm i by a hub i^2, which is journaled on the outer or front longitudinal bar A of the main frame. The trip-lever is yieldingly held with its inner arm in engagement with the clutch-arm and with its outer arm projecting above the deck by a spring i^3, bearing with one end against a perforated ear i^4 on the hub of the trip-lever and with its opposite end against a screw-nut on an adjust-

ing-rod i^5, the latter passing through said ear and pivotally connecting with the standard or other part of the stationary frame. The expansion of the spring i^3 is limited by means of a link i^6, which is provided at one end with a pin engaging with a slot i^7 in the outer arm of the trip-lever, and which is pivoted at its other end to a collar i^8, secured to the needle-shaft adjacent to the rear side of the hub of the needle, as shown in Figs. 7, 9, and 10. When a sufficient amount of grain has accumulated on the deck to form a bundle, the outer arm of the trip-lever is depressed by the grain and its inner arm is disengaged from the clutch-arm, as represented in Fig. 9, thereby coupling the counter-shaft with the main shaft and rocking the needle for passing the cord around the bundle in a well-known manner. The slotted connection between the link i^6 and the front arm of the trip-lever permits the latter to be turned independently of the needle for coupling the clutch. When the bundle has been removed from the deck, the spring i^3 shifts the trip-lever for lowering its inner arm into the path of the clutch-arm and uncoupling the clutch, as represented in Fig. 9. All of these parts are of well-known construction.

My improved mechanism for controlling the compressor is constructed as follows:

J represents the arm of the gavel-compressor, which projects normally above the binder-deck and which is pivoted at its lower end to the compressor-bar j near the outer end thereof. The arm J is provided on the outer side of its pivot with a heel or projection, which is arranged over the outer end portion of the bar j. A spring j' is interposed between the end portion of the bar j and the heel of the arm J. This spring holds the arm in its normal position, but allows it to yield outwardly to a limited extent. The inner or rear end of the compressor-bar is pivoted to a crank or lug j^2, which is arranged on the hub of the needle on the side opposite to that on which the point of the needle is arranged.

j^3 is a lifting lug or toe arranged on the compressor-bar on the inner side of its pivot and projecting underneath the hub of the binder-needle. During the downward or backward movement of the needle the lifting-toe engages with the hub of the needle, whereby the compressor is compelled to move upwardly with the compressor-lug j^2 and carry its arm above the binder-deck.

K represents an upright supporting-arm whereby the compressor is held in its elevated position during the operation of tying the cord around the gavel, and which is pivoted at its lower end to the intermediate cross-piece of the main frame by a transverse pin or bolt k, so that the arm can swing backwardly and forwardly in the same plane as the compressor. The supporting-arm is provided with a longitudinal slot k', the upper end of which extends forwardly at an angle to the lower portion of the slot and forms an upwardly-facing socket or shoulder k^2 on said arm.

k^3 is a roller or projection arranged on the front portion of the compressor-bar and engaging with the slot of the supporting-arm. The compressor is held in its elevated position by engaging the shoulder of the supporting-arm with the projection of the compressor-bar, the supporting-arm being yieldingly pressed inwardly for this purpose by a spring k^4, surrounding the pivot of the supporting-arm, as shown in Figs. 7, 8, 9, and 10. Upon moving the supporting-arm forwardly against the pressure of the spring k^4 sufficiently to disengage the shoulder thereof from the projection of the compressor-bar the compressor is permitted to drop, so that its arm clears the binder-deck, during which movement the projection of the compressor-bar drops through the slot of the supporting-arm to the lower end thereof, as shown in Fig. 10.

L represents a releasing-bar whereby the supporting-arm is released from the compressor, and which is pivoted at its front end to one side of the supporting-arm. The rear end of the releasing-bar is preferably curved upwardly and held yieldingly against the under side of the hub of the needle by a spring l, which surrounds the pivot of the releasing-bar. The rear end of the releasing-bar is held against lateral displacement by an upwardly-projecting guide-lug l', arranged on the hub i^2 of the trip-lever and engaging with a longitudinal slot l^2 in the releasing-bar.

m is a hook-shaped nose or shoulder arranged on the compressor-crank j^2 and adapted to engage with a similar nose or shoulder n on the upper side of the adjacent rear portion of the releasing-bar. During the forward movement of the needle the compressor while in an elevated position is moved backwardly by the compressor-crank, which latter moves in a direction opposite to that of the point of the needle, whereby the gavel is compressed between the needle and the compressor-arm preparatory to tying the cord around the gavel. During the last portion of the upward movement of the needle its compressor-crank deflects the releasing-bar downwardly, and when the shoulder of the compressor-crank has passed in rear of the shoulder of the releasing-bar the latter is lifted by the spring l, so that its shoulder or nose stands in front of the shoulder or nose of the compressor-crank. During the first portion of the subsequent backward movement of the needle the nose of its compressor-crank while moving forwardly engages with the nose of the releasing-bar, as shown in Figs. 10 and 12. During the next portion of the backward movement of the needle and the forward movement of its compressor-crank the latter moves the releasing-bar forward, together with the supporting-arm, whereby the shoulder k^2 of the supporting-

arm is disengaged from the projection k^3 of the compressor-bar, thereby causing the latter to drop quickly with its arm below the binder-deck and permitting the bundle to be discharged from the deck. During the continued backward movement of the needle after the compressor has been depressed the compressor-crank moves upwardly and the rear end of the releasing-bar engages with the under side of the hub of the binder-needle and is prevented from following the upward movement of the nose of the compressor-crank, whereby this nose is disengaged from the nose of the releasing-bar. After the releasing-bar is disengaged from the compressor-crank the toe j^3 of the compressor-bar engages with the hub of the needle and during the last portion of the backward movement of the latter the compressor is raised into its operative position by the compressor-crank. When the compressor has reached its highest position, the supporting-arm is moved backwardly by the spring k^4 and its shoulder k^2 is carried underneath the projection k^3 of the compressor-bar, as represented in Fig. 9, thereby holding the same in an elevated position during the forward movement of the needle while compressing the next gavel. If desired, the lifting of the releasing-bar for carrying its shoulder in front of the shoulder of the compressor-crank may be effected by inclining the front side of the guide-lug l', as shown at o, Figs. 10, 11, and 12. This incline is engaged by the front end of the slot l^2 in the releasing-bar during the last portion of the backward movement of the releasing-bar and its shoulder is carried up in front of the shoulder of the compressor-crank, so that during the subsequent forward movement of the latter the shoulder of the releasing-bar will be engaged by the shoulder of the compressor-crank for disengaging the supporting-arm from the compressor.

My improved knotter mechanism is constructed as follows:

P represents the knotter-shaft, which is journaled in the upper portion of the standard C; p, the knotter-frame, hung on said shaft; p', the breastplate, secured to the lower portion of the knotter-frame; Q, the rotary tying-bill, journaled on the knotter-frame and provided with a bevel gear-pinion q; R, the rock-lever, pivoted on the knotter-frame and provided with a cord-guide r in rear of the tying-bill and a cord-cutter r' in front of said bill; S, the knotter-wheel, secured to the knotter-shaft on the front side of the knotter-frame and provided with a cam-groove s, which operates the cord guide and cutter, and with a gear-segment s', which intermittently operates the tying-bill, and s^2 the bundle discharging or ejector arm, which is secured to the knotter-wheel. This portion of the knotter mechanism is of well-known construction.

T represents the cord-clamping disk, mounted horizontally or nearly so on a pivot on the knotter-frame in front of the tying-bill and cutter and provided in its edge with cord-receiving notches, each of which has an inclined or curved advancing side t and an abrupt trailing side t'. t^2 is a cord-clamping arm pivoted at its front end to the knotter-frame and provided with a groove which receives the edge of the clamping-disk and forms two jaws t^3 t^4, arranged above and below the disk. The clamping-arm is yieldingly pressed against the clamping-disk by a spring t^5. After the cord has been laid by the needle across the cord-guide and tying-bill and into one of the notches of the disk the latter is turned forwardly through the clamping-arm, whereby the cord is clamped between the bottom of the notch in the disk and the jaws of the clamping-arm. During the subsequent turning of the tying-bill for forming the knot in the cord the latter is strained, thereby producing a pull on the disk which causes the latter to be turned forward slightly and to supply the necessary cord for forming the knot. By inclining the advancing sides of the notches in the clamping-disk the cord upon being pulled by the tying-bill is wedged between the inclined side of the notch and the clamping-jaws, thereby increasing the grip of the clamping devices upon the cord in proportion to the pull on the cord and preventing the clamping-disk from being turned by the pull of the cord to such an extent as to displace the clamping-disk and prevent the cord from being laid into the next-following notch by the needle. In order to prevent the cord from being pulled out of the clamping-jaws by the tying-bill or the cutter, the upper clamping-jaw is provided with a forwardly-facing hook t^6, which intercepts the cord as it is carried rearwardly by the clamping-disk and tying-bill. U represents a rock-lever whereby the clamping-disk is rotated intermittently, and which is pivoted to the knotter-frame, so as to swing transversely. This construction of clamp causes the clamping-disk to be wedged in the clamping-arm sufficiently tight to render the usual detent-pawl for holding the disk against backward movement unnecessary. The lower arm of the rock-lever is provided with a pawl u, which engages with a ratchet-wheel u' on the under side of the clamping-disk. This pawl is pivoted on a holder u^2, arranged in a socket in the lower arm of the lever, and is yieldingly held in engagement with the ratchet-wheel by a spring u^3, interposed between the holder and the pawl. The pawl is adjusted in the lever by a screw u^4, arranged in the lever and bearing against the holder, and the latter is held in its adjusted position by a set-screw u^5. The rock-lever U is rocked by a grooved cam v, which is mounted on the knotter-shaft on the side of the knotter-frame opposite to that on which the knotter-wheel is arranged and which engages with the upper arm of the rock-lever for op-

erating the clamping-disk. The clamping-cam is provided with a discharge-arm v'. By arranging the wheel S and cam v for operating the knotting and clamping mechanism on opposite sides of the knotter-frame the strain upon the parts is better distributed and the separate parts can be made of simpler construction. In the operation of the knotter mechanism the cord is carried by the needle around the gavel and grasped by the clamp. The tying-bill then rotates and forms the loop in the cord, and at the end of this movement the cutter severs the cord between the tying-bill and the clamp, and the cord-guide strips the loop from the tying-bill and completes the knot in the cord. The bundle is then discharged from the binder-deck by the discharge-arms.

My improved mechanism for driving the shafts of the needle and knotter mechanisms is constructed as follows: The knotter-shaft is rotated from the counter-shaft G once during the operation of tying each bundle. The motion is transmitted from the counter-shaft to the knotter-shaft by a forked connecting-rod W, which is pivoted at its rear end to the crank g of the counter-shaft and at its front end to a crank w on the end of the knotter-shaft. The intermediate portion of the connecting-rod is pivotally connected with the standard C by a guide-crank w', the latter and the cranks of the counter and knotter shafts being of the same length. During the operation of tying a bundle the counter-shaft makes one rotation in the direction of the arrow, Fig. 1, and then stops, and the knotter-shaft is also rotated once and in the same direction as the counter-shaft by the connecting-rod W, which latter is compelled to move in a circle and make a complete turn by the guide-crank w'. At the beginning of the binding operation the several cranks stand in a forwardly-depending position, as shown in Fig. 1. As the counter-shaft rotates the leverage of the counter-shaft crank increases as the crank passes the dead-center in rear of the counter-shaft, at which time the needle has reached the end of its forward movement and the gavel has been compressed to the fullest extent. During the compressing operation of the needle and compressor the knotter mechanism is at rest; but when the counter-shaft crank has passed the dead-center the knotter mechanism performs its operation and then the discharge-arms remove the bundle from the binder-deck. While the bundle is being removed from the deck, the cranks of the counter and knotter shafts are moved forwardly through the lower portion of the circle, in which position the leverage of these cranks is most effective in relation to the knotter mechanism. By this arrangement of the driving mechanism of the needle and the knotter mechanism the strain upon the parts is properly distributed, thereby enabling the same to be made lighter.

By transmitting the motion from the counter-shaft to the knotter-shaft by means of a connecting-rod the construction of the driving mechanism is simplified and its cost is reduced and the parts are enabled to be assembled without requiring particular attention to keep the several parts in time with each other, which is not the case where the motion is transmitted by a chain belt and sprocket-wheels from the counter-shaft to the knotter-shaft.

I claim as my invention—

1. The combination with the binder-needle provided with a crank and the compressor pivoted to said crank and provided with a lateral projection, of a supporting-arm pivoted at its lower end and provided at its upper end with a shoulder adapted to engage under the projection of the compressor and support the same, and a releasing-bar connected with the supporting-arm and actuated by said crank to move the shoulder of the supporting-bar from underneath the projection on the compressor, thereby releasing the latter, substantially as set forth.

2. The combination with the binder-needle provided with a crank and the compressor pivoted to said crank and provided with a projection, of a supporting-arm provided with a longitudinal slot and with a shoulder or notch in the slot adapted to receive the projection of the compressor, and a releasing-bar pivoted to the supporting-arm and engaging with said crank, substantially as set forth.

3. The combination with the binder-needle provided with a crank and the compressor pivoted to said crank and provided with a projection, of a supporting-arm provided with a longitudinal slot and with a shoulder or notch in the slot adapted to receive the projection of the compressor, a spring whereby the supporting-arm is held with its shoulder in engagement with the projection of the compressor, a releasing-bar pivoted to the supporting-arm and extending underneath the hub of the needle, a shoulder arranged on the releasing-bar and adapted to engage with a shoulder on the crank, and a spring whereby the releasing-bar is held in an elevated position, substantially as set forth.

4. The combination with the binder-needle provided with a crank and the compressor pivoted to said crank, of a supporting-arm engaging with the compressor, a releasing-bar connected with the supporting-arm and adapted to engage with said crank and a guide-lug engaging with a slot in said releasing-bar, substantially as set forth.

5. The combination with the binder-needle provided with a crank and the compressor pivoted to said crank, of a supporting-arm engaging with the compressor, a releasing-bar connected with the supporting-arm and adapted to engage with said crank, and a guide-lug arranged in a slot in the releasing-arm and provided with an incline adapted to

engage with said bar, substantially as set forth.

6. The combination with the needle provided with a crank, of a compressor-bar pivoted at one end to said crank, a compressor-arm pivoted at its lower end to said bar near the opposite outer end thereof and provided on the outer side of its pivot with a heel arranged over the outer end portion of the compressor-bar, which projects beyond the pivot, and a spring interposed between the outer end portion of said bar and the heel of the arm, substantially as set forth.

Witness my hand this 5th day of January, 1898.

HENRY J. CASE.

Witnesses:
JOHN E. MACK,
JAMES E. CARROLL.