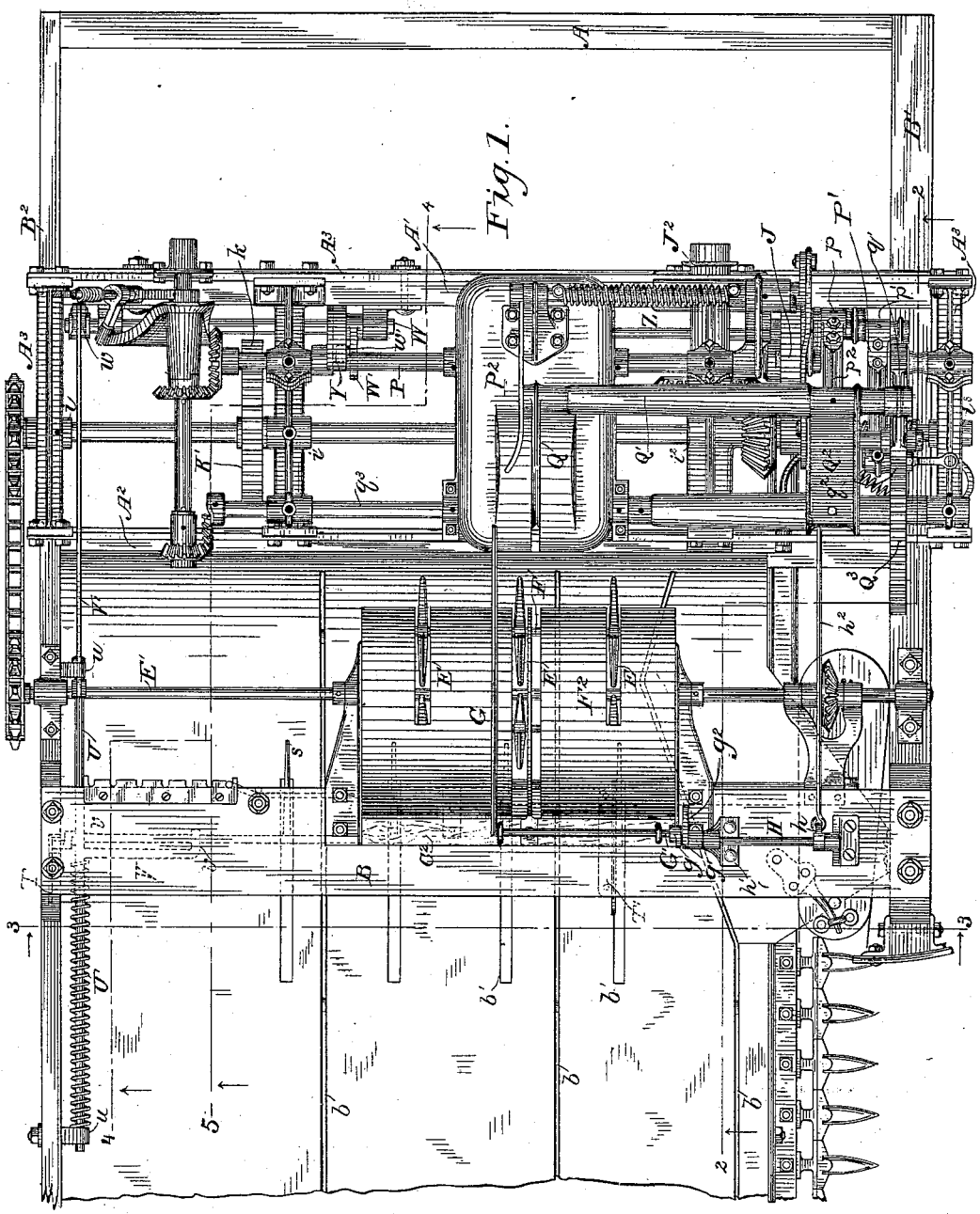
(No Model.) 5 Sheets—Sheet 1.

J. R. SEVERANCE.

GRAIN BINDER.

No. 345,546. Patented July 13, 1886.

Fig. 1.



WITNESSES

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(No Model.)

5 Sheets—Sheet 2.

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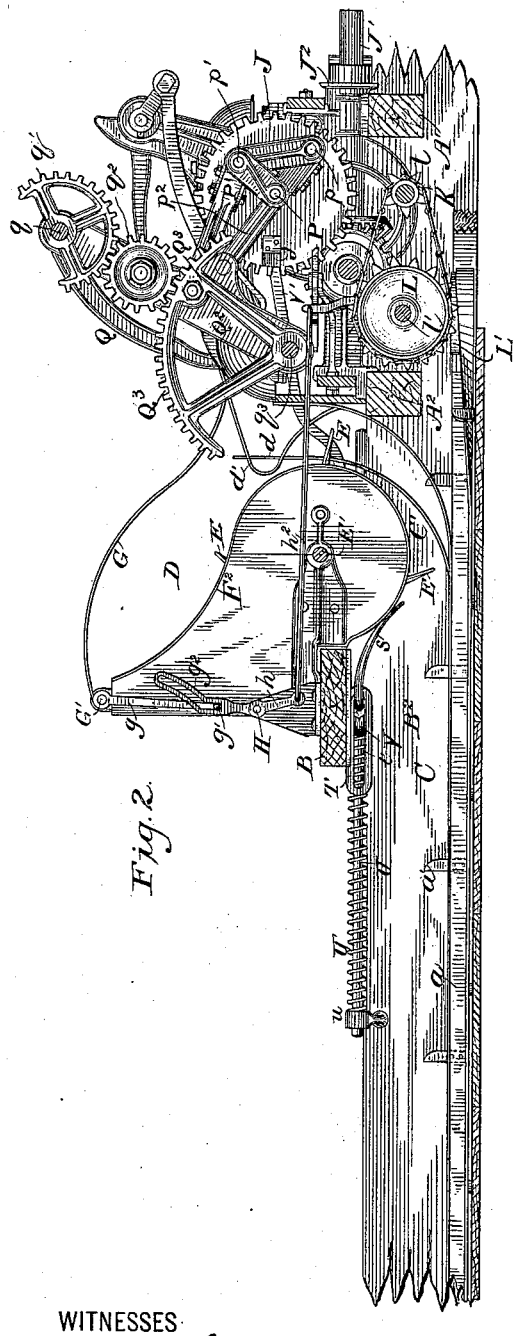

Fig. 2.

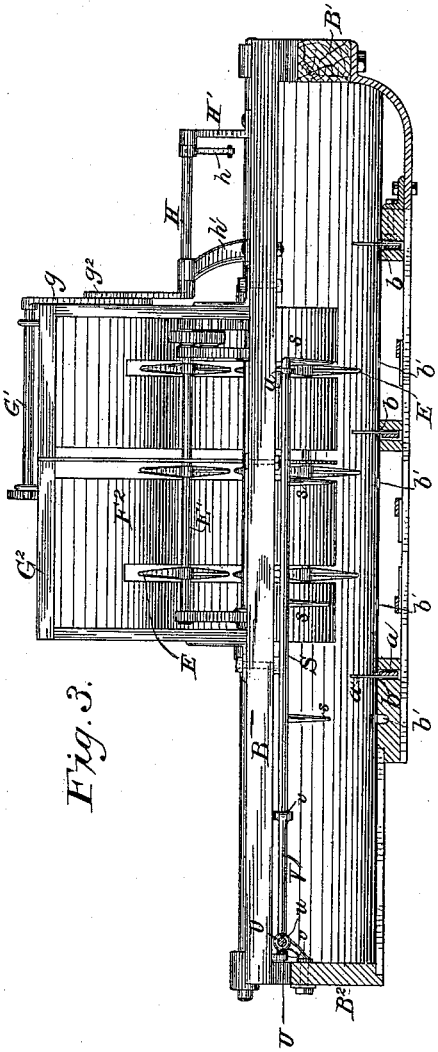

Fig. 3.

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(No Model.)

5 Sheets—Sheet 3.

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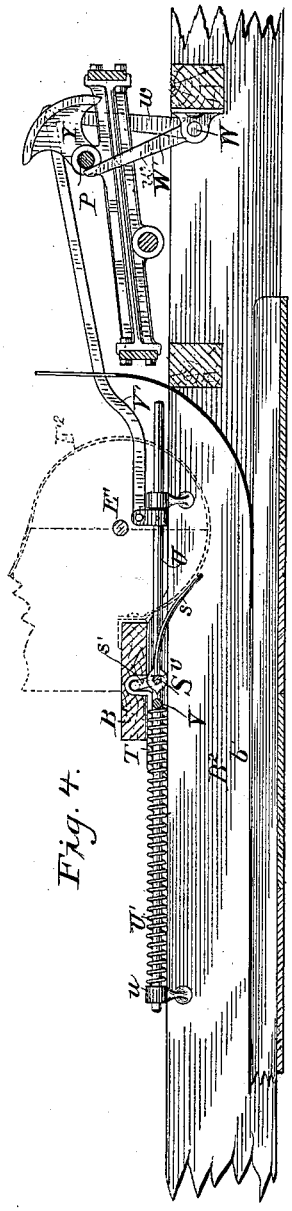

Fig. 4.

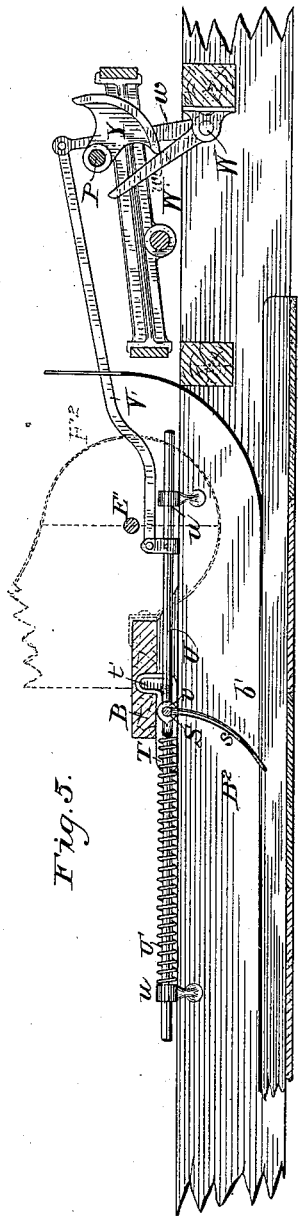

Fig. 5.

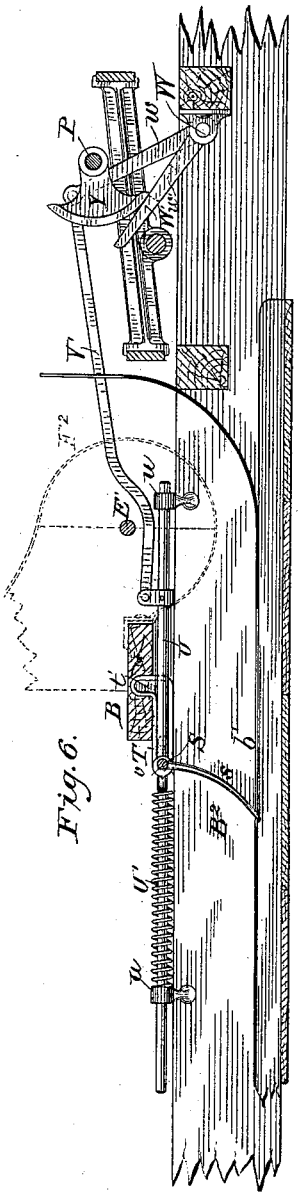

Fig. 6.

WITNESSES

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Fig. 7.

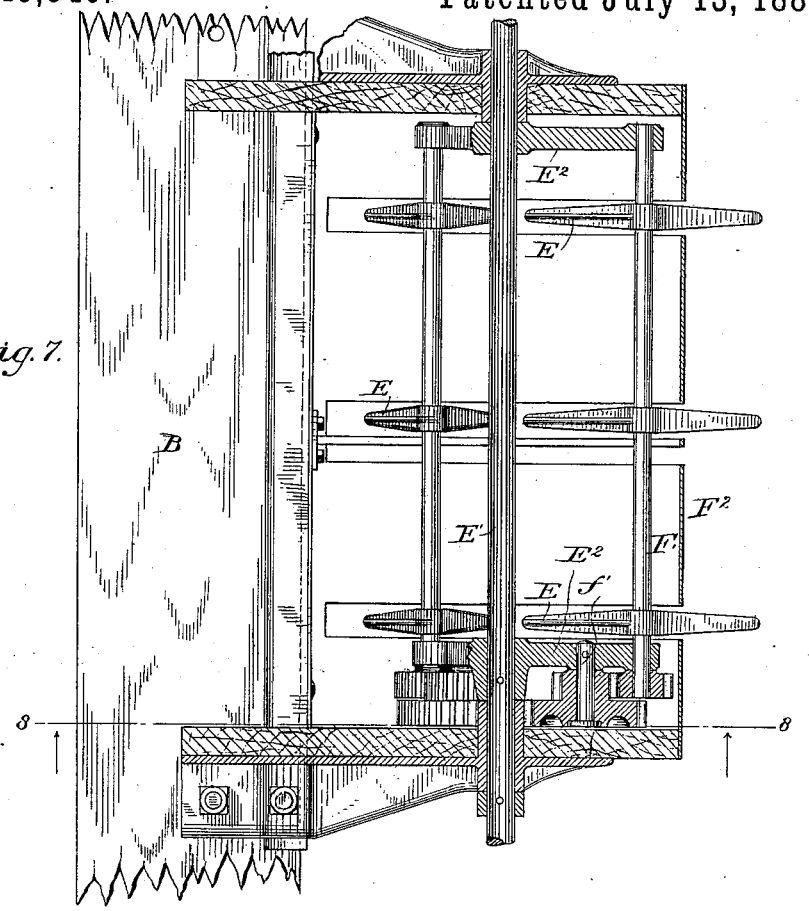
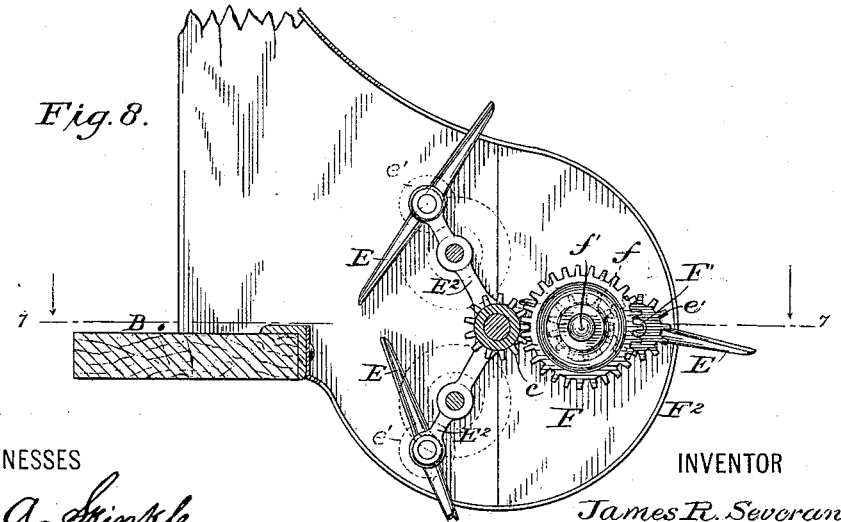


Fig. 8.



WITNESSES

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(No Model.)

5 Sheets—Sheet 5.

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Fig. 10.

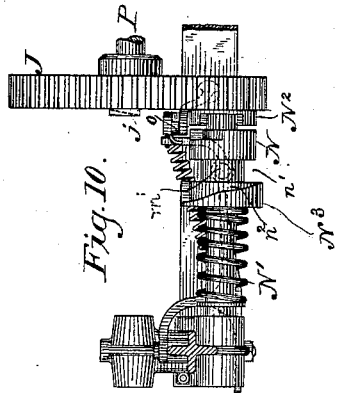


Fig. 11.

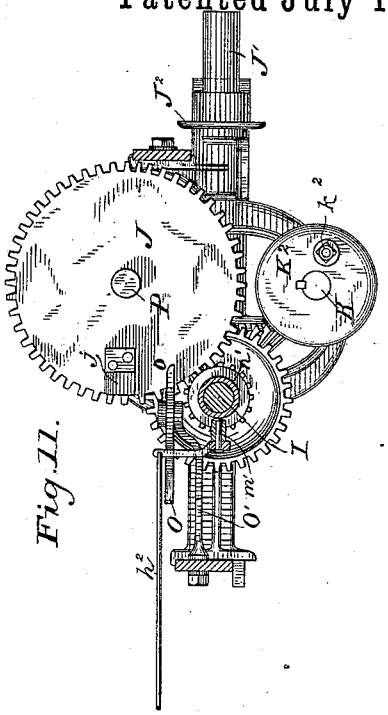
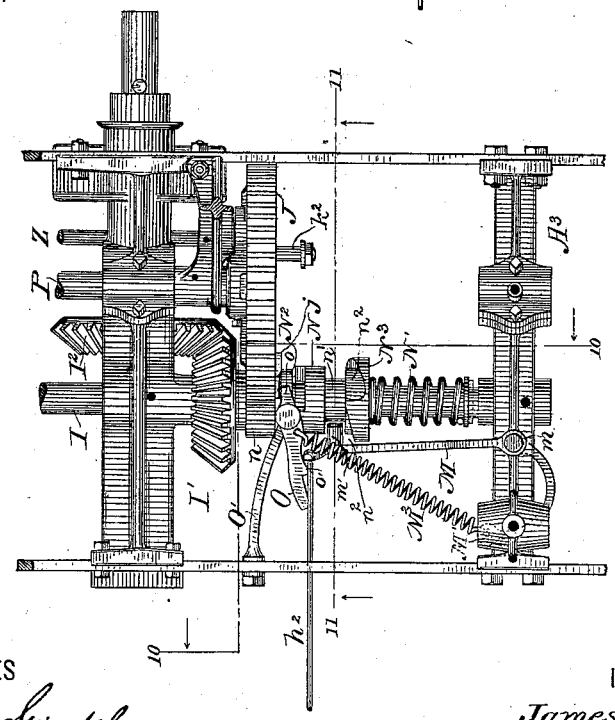


Fig. 9.



WITNESSES

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INVENTOR

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By his Attorneys,

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UNITED STATES PATENT OFFICE.

JAMES R. SEVERANCE, OF FREMONT, OHIO.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 345,546, dated July 13, 1886.

Application filed March 13, 1884. Serial No. 124,018. (No model.)

To all whom it may concern:

Be it known that I, JAMES R. SEVERANCE, of Fremont, in the county of Sandusky and State of Ohio, have invented certain new and useful Improvements in Grain-Binders, of which the following is a specification.

My invention relates to improvements applicable to grain-binding machines of the class usually designated "platform-binders."

My object chiefly is to provide simple and efficient means for completely separating the respective gavels of grain successively accumulated for binding from other grain carried by the machine, so that the connection or tangling of one bundle with another by straggling stalks of grain will be rendered impossible.

A suitable application of my improvements, which are hereinafter particularly claimed, is represented by the accompanying drawings. The drawings show only those features of appropriate mechanism an illustration of which is needed to convey a proper understanding of my improvements. Some of these improvements may, however, be used without the others, and also be employed in connection with mechanism differing in various respects from that shown and hereinafter in detail described.

Figure 1 is a plan view with some parts omitted and others broken away. Fig. 2 is a view partly in front elevation and partly in section on the line 2 2 of Fig. 1. Fig. 3 is a view partly in side elevation and partly in section on the line 3 3 of Fig. 1. Fig. 4 is a view partly in front elevation and partly in section on the line 4 4 of Fig. 1, showing the gavel-separating mechanism in its inoperative position; and Figs. 5 and 6 are similar views, the section on the line 4 5, Fig. 1, and with the mechanism represented in positions assumed at different stages in the operation. Fig. 7 is a view partly in plan and partly in section on the line 7 7 of Fig. 8; and Fig. 8, a view partly in front elevation and partly in section on the line 8 8 of Fig. 7, showing the packing mechanism. Fig. 9 is a plan view showing details of portions of the mechanism for actuating the binding mechanism; Fig. 10, a view partly in elevation and partly in section on the line 10 10 of Fig. 9, and Fig. 11 a view partly in elevation and partly in section on the line 11 11 of Fig. 9.

My improvements are in this instance shown as organized so as to be especially adapted for use in connection with sundry other improvements invented by me, in some respects features shown in connection with my present improvements being precisely the same, and in other respects substantially the same, as improvements set forth in United States Letters Patent No. 237,135, of February 1, 1881; No. 277,356, of May 8, 1883; No. 281,570, of July 17, 1883; No. 283,671, of August 21, 1883, and No. 297,723, of April 29, 1884.

A driving and supporting wheel (not shown) is properly mounted by its axle in obvious way between the bars A A′ of a suitable main frame, the other chief portions of which, as shown, are the bars A^2, B, B′, and B^2.

A metallic frame, A^3, hereinafter designated the "binder-frame," is suitably secured to the main frame and supports the binding mechanism.

Mechanism for delivering the cut grain to the inner end of the platform C consists, as shown, of an endless carrier composed of sections *a*, consisting of a series of belts with teeth *a′*, working, as moved inward, through the platform-slots *b*, and returning or moving outward beneath the platform, as fully set forth in my above-mentioned Patent No. 297,723.

A series of short slots, *b′*, for a purpose further on to be explained, are made in the surface of the platform at or near its inner end and adjacent to a grain passage-way or throat, C′, leading from the platform to a grain-receptacle, D, which, as well as the grain passage-way, its curved spring-arm *d*, and bent spring-fingers *d′*, and a series of feeding and packing teeth, E, are the same as in my Patent No. 281,570, of July 17, 1883. The slots *b′*, it should be noticed, with the exception of the rearmost one, are arranged between the slots *b* for the carrier-sections *a*.

Instead of the several series of packing-teeth being actuated from the packer-shaft E′ by planetary gearing in all respects such as before employed by me, I in this instance actuate the teeth by an arrangement of gearing as follows: The central fixed pinion, *e*, fast on the bearing-sleeve for one end of the rotating packer-shaft, engages the larger idle-gears F, (one of these gears for each of the series of

teeth,) which are of such size that each revolution of the packer-shaft will impart a half-revolution to the idle-gears. Each idle-gear is formed with a pinion, *f*, corresponding in size both with the fixed central pinion and with driven pinions *e'* on the rotating driven shafts F' of the respective series of packer-teeth. The idle-pinions *f* mesh with the driven pinions. The driven shafts F' and the stud-shafts *f'* of the idle-gears and their attached pinions are supported by the spiders E^2 E^2, which are secured to the packer-shaft. It will be seen that while the packer-teeth, which are fixed to their shafts, act alternately with their opposite ends to force the grain along the passage-way to the receptacle, and gradually withdraw from the accumulated grain, as before, yet by my present improvements I attain greater compactness of gearing, bring the shafts of the teeth closer to their casing F^2, and am enabled to reduce the area of the casing, and thus economize space, without lessening the length of the acting portions of the packer-teeth—those portions which project beyond their casing and act upon the grain. Obviously the packer-teeth must be made of a length such that they do not project from their shafts a distance exceeding that between these shafts and the packer-shaft proper. The length of the teeth being limited, it becomes important to have their shafts move as close as practicable to the concentric portion of their casing, so that the teeth may act properly upon the grain in the passage-way. Besides, the closer the shafts of the teeth pass to the casing the shorter the teeth may be made while projecting into the grain to a given extent, and so the strain upon the parts resulting from the employment of long teeth be lessened.

It will be seen that the advantages arising from the above-described construction of packing mechanism result from having the driven pinions *e'* of the same size as the fixed central pinion, instead of twice its size, as before, and causing the large idle-gears for lessening the speed of the driven pinions relatively to that of the packer-shaft to lap the driven pinions and connect with them through or by way of the idle-pinions, instead of engaging them directly. In this way the distance between the packer-shaft and the driven shafts is lessened to an extent corresponding with the amount of lap of the driven pinions by the idle-gears, while the packer-teeth are correspondingly shortened and the concentric portion of the casing brought correspondingly nearer the packer-shaft.

Tripping mechanism automatically operated by the pressure of the grain to throw the binding mechanism (a binder-arm, suitable knotter, &c.) and the gavel-separating mechanism into action, as in turn to be explained, as in this instance provided, is as follows: A tripping-lever, G, overhangs the grain-receptacle D, so as to be rocked upward to a suitable extent by the pressure of the grain when accumulated in the receptacle in quantity sufficient to form a gavel. This tripping-lever is fast at its heel end to a rock-shaft, G', turning in suitable bearings attached to a cross-piece, G^2, constituting the top of the frame of the packer-casing. As shown, the tripping-lever and its rock-shaft are made of a single rod bent into shape. At its front end the rock-shaft is provided with a crank-arm, *g*, which projects downwardly, and engages by means of a wrist or pin, *g'*, at its lower end with a slot in an upwardly-projecting and laterally-curved crank, g^2, secured to the rear end of a second and doubly-cranked rock-shaft, H, the other crank, *h*, of which is at its front end and projects downwardly. The crank *h*, like the slotted crank, projects laterally toward the grain-receptacle. The doubly-cranked shaft is supported so as to rock in bearing-brackets H' *h'* on the frame-bar B. The doubly-cranked rock-shaft H of the tripping mechanism is connected by means of its front crank and a link-rod, h^2, with suitable clutch mechanism, such as in detail to be described further on, by the actuation of which intermittingly-acting gearing for operating the binding mechanism and the gavel-separating mechanism is thrown into and out of action, the clutch mechanism serving to throw a main actuating driven shaft, I, into and out of gear with a gear-wheel, J, hereinafter termed the "primary gear," as through or by way of connections with it the binding mechanism and gavel-separating mechanism are actuated. The main actuating-shaft I is continuously rotated during the operation of the machine by means of a bevel-pinion, I', fast upon it, and a corresponding gear, I^2, fast on a short driving-shaft, J', mounted in a sleeve-bearing, J^2, of the binder-frame, and driven by means of suitable gearing connecting it with the driving-wheel in obvious way. The main actuating-shaft extends from front to rear of the machine, and is mounted in suitable bearings, *i i' i^2 i^3*, of the binder-frame. At its rear end this shaft is provided with a sprocket-pulley. A chain passing around this pulley and around a pulley on the rear end of the packer-shaft E' serves to operate the packing mechanism. A counter-shaft, K, supported in suitable bearings of the binder-frame, is actuated by means of a pinion, *k*, fastened to it, and a gear, K', fast on the main actuating-shaft and engaging this pinion. A crank-wheel, K^2, provided with the usual wrist-pin, k^2, is secured to the forward end of the counter-shaft, and serves by means of a pitman to actuate the cutters, as will readily be understood. A sprocket-pulley, *l*, on the counter-shaft K and its chain serve to impart motion to a considerably larger sprocket-pulley, L, on a shaft, *l'*, for actuating the belts of the endless carrier. This carrier-actuating shaft *l'* connects with and imparts motion to the driving-pulleys L' of the carrier-belts by means of bevel-gearing in obvious way. One only of the belt driving-pulleys is shown, (see

Fig. 2,) and the bevel-gearing connecting them with their actuating-shaft is not shown. These omitted parts are fully represented in my before-mentioned Patent No. 297,723.

As shown, the clutch mechanism for throwing the main actuating-shaft I into and out of gear with the primary gear J is in general features of construction similar to that shown in my before-mentioned Patent No. 237,135; but in various details the mechanism now to be described is different. The link-rod h^2 is connected to the upturned outer end of a horizontally-vibrating clutch-controller, M, composed of a rod forked at its inner or heel end to pass above and below the front cross-piece of the binder-frame A^3, to which it is secured by a pivot-bolt, m, and having a stud, m', near its outer end close to where it is bent upward, the stud projecting toward the sliding section N of a clutch-coupling on the main actuating-shaft. That member of the fork of the clutch-controller which passes beneath the binder-frame is extended and bent inward to constitute a heel-lever, M′, to which one end of a coiled spring, M^2, is secured. The other end of the spring is connected to a pivoted lever, O, outside of but near its pivot. This lever serves to dog and release the clutch-controller, as soon to be explained, and it is pivotally supported by an arm, O′, secured to the binder-frame, has a short inwardly-projecting arm or heel, o, and a shoulder, o', near its outer end, to engage with and dog the clutch-controller when by the action of the link h^2 the controller is pulled outward or against the force of the spring M^2, which acts also with a tendency to keep the lever and upturned end of the controller always in contact, as will readily be understood. The sliding clutch-section N is connected with the main actuating-shaft in well-known way, so as to rotate constantly with it, and is acted upon by a spring, N′, which presses inwardly upon it, or with a tendency to move it toward the non-sliding section N^2 of the clutch, which is formed with a pinion, n. This pinion-section of the clutch is loose on the main actuating-shaft, and the pinion engages the primary gear. The heads or adjacent surfaces of the clutch-sections are formed so as to interlock, as usual, when brought together. The sliding clutch-section is enlarged at its outer end, being formed with an annular shoulder or collar, N^3, between which and its head there is an annular groove, n', of a size such as to receive the stud m' of the clutch-controller. Inclined recesses or cam-grooves n^2 are formed in the periphery of the clutch-collar, corresponding in number with the spurs projecting from the head of the sliding clutch-section—two in this instance. Each cam-groove at one end extends nearly across the periphery of the collar, and is gradually narrowed from its wide end to a point at its opposite end. Throughout its length each groove extends entirely through to the inner surface of the collar, and its depth is less than that of the annular groove between the two sections of the clutch, so that when the stud of the clutch-controller is in this annular groove there can be no endwise movement of the sliding clutch-section. The wide end of the one cam-groove is adjacent to the point of the other, so that the two grooves extend nearly or entirely around the clutch-collar. The primary gear is provided with a wiper-cam, j, to act upon the heel o of the lever O, and is fast on an intermittingly-actuated shaft, P, which makes one revolution at each actuation, and is connected with the binder-arm and the gavel-separating mechanism by means such as further on to be explained.

From the above description of the clutch-tripping mechanism and the clutch mechanism it will be seen that when by the pressure of the grain accumulated in the receptacle the tripping-lever is thrown into action the operation will be as follows: The crank of the rock-shaft G′ acts by its pin first in the short vertical or straight portion of the slot of the crank g^2 of the second and doubly-cranked rock-shaft H, and after having imparted sufficient movement to this rock-shaft to cause it, by way of its crank h and the link h^2, to draw the stud of the clutch-controller M out of the groove between the clutch-sections and outside of the path of travel of the sliding clutch-section, then the crank-pin may move in the curved portion of the slot in the crank g^2 without imparting further movement to the doubly-cranked rock-shaft, because of the fact that the movement at first imparted to this rock-shaft was such as to bring its properly-curved slot into a position concentric with the axis of the rock-shaft G′. As the tripping-lever is moved upward after having performed its function, when the binder-arm is acting on the grain in the receptacle, as further on will appear, the importance of guarding against any additional movement being thus imparted to the doubly-cranked rock-shaft is obvious. The withdrawal of the stud of the clutch-controller from the annular groove in the sliding clutch-section and the dogging of the controller by the shoulder o' of the lever O leave this section free to be engaged by the action of its spring with the pinion-section of the clutch, and the rotation of the pinion with the main actuating-shaft imparts motion to the primary gear and its shaft. Shortly before the completion of its single revolution the primary gear acts by its wiper-cam against the heel o of the lever O and moves it so as to release the controller, which is acted upon by its spring to move the stud m' inward against the clutch-collar. The stud now enters one of the cam-grooves in the collar, first engaging its wide end, and forces back the sliding clutch-section against its spring, disengaging the clutch-sections at about the time the stud passes from the point of the cam-groove into the annular groove, as will readily be understood. After each actuation the primary gear, the tripping-lever, and the rock-shafts come to rest in the positions in which they are rep-

resented in the drawings, preparatory to repeating the above-described operation. A rocking binder-arm, Q, is fastened to the inner end of a rock-shaft, q, mounted in a sleeve-bearing, Q', formed with or rigidly connected to the upper end of a rocking post, Q^2. At its outer end the binder-arm rock-shaft has a segment-gear, q', keyed to it, and this gear engages an idle-pinion, q^2, which is supported by a stud-shaft of the rocking post Q^2, and engages a segment-gear, Q^3, which is loosely mounted on a shaft, q^3, to which is fastened the rocking post which supports the binder-arm rock-shaft. The intermittingly-actuated shaft P is doubly cranked, its cranks p p' projecting from it at or about a quadrant apart, or at a right angle to each other. A pitman, p^2, connects the crank p with the rocking post, and a pitman, P', connects the other crank, p', with the segment-gear Q^3. By these means the binder-arm is operated at each actuation of the shaft P, as fully set forth in my Patent No. 237,135, and, as will readily be understood from inspection of said patent, the binder-arm, by reason of the two motions imparted to it—the one about its own axis, or independently of the movements of its supporting-post, and the other with the post—is caused to reach out far enough to embrace the grain in the receptacle D, where the gavels are accumulated, and then draw it inward past the free end of the tripping-lever to a suitable binding-receptacle above proper knotting mechanism. The binding-receptacle in this instance is constituted by the upper surface of the knotter-casing P^2, which is provided with a depression for the bundle to rest in, and a casing (not shown) for the binder shafting and gearing, which extends to or nearly to the rear of the binder-frame from a point about over the driving-shaft J', as will readily be understood.

In order to effect a thorough separation of the grain forming one gavel from that for another without loss of time or to the slightest extent encroaching upon the time allowed for the operation of the binding mechanism in securing the respective bundles, I provide intermittingly-operated gavel-separating mechanism acting upon the grain on the platform in opposition to the action upon it of the mechanism by which it is delivered to the passage-way and within reach of the packing mechanism, the gavel-separating mechanism serving not only to arrest the movement of the grain inward by the endless carrier, but also to move the grain subjected to its action outward or away from the packing mechanism, thus quickly providing a sufficient space between the grain inside of the separating mechanism and that outside of it, to insure complete isolation of the grain about to be bound from other grain.

As in this instance shown, the gavel-separating mechanism and the connecting mechanism by which it is operated from the intermittingly-actuated shaft P are as follows: A shaft, S, is provided with a series of rigidly-attached separating-teeth, s, arranged in a row extending crosswise of the platform, above which the shaft is adjustably supported, so that the teeth may be caused to enter and leave the platform-slots b' and be moved outward therein against the incoming grain. The toothed shaft is of a length less than the width of the platform, and is adjustably supported at its ends by being mounted in guideway-brackets T T', so that it may rock vertically and move to and fro horizontally, the ends of the shaft projecting into guide-slots t t' of these brackets, which are secured beneath the bar B of the main frame. The toothed shaft has a short crank, s', at its rear end, and the slot t, in which this cranked end works, is angular, the main or horizontal portion of the slot terminating at its inner end in a shorter vertical portion. The slot t' in the bracket T' may also be of angular form, and the front end of the shaft be cranked, if preferred; but the desired to-and-fro and vertical movements may readily be imparted to the toothed shaft with the parts constructed as shown. A spring is caused to act upon the toothed shaft of the gavel-separating mechanism to restore it to its inoperative position after it has been operated by positively-actuated mechanism. A rod, U, sliding in suitably-supported brackets u u, is connected with the toothed shaft by eyes v v, through which the shaft passes. One of these eyes is formed in the sliding rod, and the other at the outer end of an arm, V, projecting inwardly therefrom. A spring, U', coiled about the sliding rod, bears at one end against the outer one of the brackets u, and at its other end against the arm V. A rod, V', forming part of the mechanism connecting the gavel-separating mechanism with the shaft P, has jointed connection at its opposite ends, respectively, with the sliding rod of the gavel-separating mechanism, and a crank, w, at the rear end of a rock-shaft, W, of the connecting mechanism. This rock-shaft is mounted in suitable bearing-brackets, shown as secured to the bar A' of the main frame, and has another crank, W', near its front end, which is provided with a slightly-projecting elongated side lug, w', to be acted upon by a segment-wiper, Y, fast on the intermittingly-actuated shaft P, against or close to which shaft the outer end of the crank W' rests when the gavel-separating mechanism is not in action.

From the above description it will be seen that at each actuation of the binder-arm, and as the mechanism is in this instance adjusted just after the binder-arm begins its movement, the gavel-separating mechanism is thrown into action, the operation being as follows: The wiper Y acts against the side lug of the crank W', and by the motion thus imparted to the rock-shaft W the sliding rod U is moved outward against the force of its spring, the toothed shaft being rocked during the first part of this movement, owing to the control exercised over it by its crank when being drawn down the vertical portion of its guide-slot, and the points

of the separating-teeth are thus caused to enter their platform-slots at or close to the mouth or entrance to the grain passage-way. By the continued action of the wiper the separating-teeth are then forced outward as their shaft is moved along its guide-slots, and the crank on the shaft, working in the horizontal portion of its guide-slot, prevents the teeth from being turned back by the pressure of the grain being moved outward by them against the action of the endless carrier. As that portion of the grain about to be bound, which is acted upon by the packing mechanism and carried along the passage-way while the separating-teeth are in action, is being moved one way at the same time the grain in the platform is being moved the other way, it will be seen that a very quick separation results, and that by the time the wiper ceases to act on the crank there will be a considerable space unoccupied by grain extending from the separating-teeth to the grain-receptacle. When the wiper releases the crank, which, as the mechanism is in this instance timed, is when the binder-arm is well advanced on its inward movement and nearing the end of its actuation, the toothed shaft is actuated by the spring U′ and the gavel-separating mechanism is returned to its position of rest, as will readily be understood, the above-described operation being repeated at each revolution of the intermittingly-actuated shaft carrying the wiper. The endless carrier being left free to act by the backward horizontal and rocking movements of the separating-teeth, the delivery of grain to the passage-way and packing mechanism is resumed.

I do not wish to be understood as confining my invention herein claimed to the details of construction and precise arrangements of parts described and illustrated, as my improvements may be modified in various respects without departure from my invention.

I claim as of my own invention—

1. The combination of the packer-shaft, the fixed central pinion, the larger idle-gears, the idle-pinions, the packer-teeth, their shafts, and the driven pinions thereon lapped by the larger idle-gears and engaged by the idle-pinions, substantially as hereinbefore set forth.

2. The combination of the grain-receptacle, the tripping-lever operated by the pressure of the grain therein, the rock-shaft of the tripping-lever, its crank-arm, the second rock-shaft, its crank-arm having the curved slot engaged by the crank-arm of the tripping-lever rock-shaft, and clutch mechanism having connection with said second rock-shaft, substantially as and for the purpose hereinbefore set forth.

3. The combination of the tripping-lever, its rock-shaft, the crank-arm of this rock-shaft, the second rock-shaft, its crank-arm having the curved slot engaged by the crank-arm of the tripping-lever rock-shaft, and the link-rod connecting said second rock-shaft with clutch mechanism, substantially as and for the purpose hereinbefore set forth.

4. The combination of tripping mechanism, the spring-actuated clutch-controller provided with the stud, and with which said mechanism has connection, the spring-actuated lever for dogging and releasing the clutch-controller, the spring-actuated sliding clutch-section having the annular groove, its collar cam-grooved at its inner surface, the pinion-section of the clutch, the shaft on which the clutch-sections are secured, the intermittingly-actuated gear engaged by the clutch-pinion, and the wiper-cam on said gear acting upon the heel of the dogging and releasing lever, substantially as and for the purpose hereinbefore set forth.

5. The combination of the platform, the grain-delivering mechanism, the intermittingly-operated gavel-separating fingers, mechanism whereby they have a combined rocking and to-and-fro movement imparted to them, to cause them to act upon the grain upon the platform in opposition to the action upon it of the grain-delivering mechanism, and to move the grain subjected to their action outward upon the platform, substantially as and for the purpose hereinbefore set forth.

6. The combination, substantially as hereinbefore set forth, of the platform having the two series of slots *b b′*, the sectional grain-delivering mechanism, the teeth of which work in one of the series of slots, and the gavel-separating mechanism, having fingers which work in the other series of slots, and acting to arrest the movements of the grain inward, and to move it outward against the action of the delivering mechanism, for the purpose described.

7. The combination, substantially as hereinbefore set forth, of the platform, its sectional grain-delivering mechanism, the gavel-separating mechanism, means for rocking and moving the gavel-separating mechanism to and fro to act upon and release the grain upon the platform, the packing mechanism, and a receptacle into which the grain inside of the gavel-separating mechanism is forced by the packing mechanism.

8. The combination, substantially as hereinbefore set forth, of the main actuating-shaft, clutch mechanism thereof, tripping mechanism operated by the pressure of the grain for actuating the clutch mechanism, the primary gear thrown into and out of connection with the main actuating-shaft by the clutch mechanism, the intermittingly-actuated shaft of the primary gear, the gavel-separating mechanism, and the connecting mechanism by which it is operated from said intermittingly-actuated shaft.

9. The combination of a receptacle in which grain for forming a gavel is accumulated, tripping mechanism operated by the pressure of the grain, the main actuating-shaft, clutch mechanism thereof actuated by connection with the tripping mechanism, the intermittingly-actuated shaft thrown into action by connection with the clutch mechanism of the

main actuating-shaft, the binder-arm, mechanism connecting it with the intermittingly-actuated shaft, and by means of which it is thrown into operation upon the starting into action of said shaft, the gavel-separating mechanism, and the connecting mechanism by which it is operated from the intermittingly-actuated shaft, for the purpose described.

10. The combination of the intermittingly-actuated shaft P, the rocking to-and-fro-moving gavel-separating mechanism, its guideway-brackets, and the mechanism connecting the gavel-separating mechanism with the intermittingly-actuated shaft, and by which it is moved outward against the incoming grain on the platform, substantially as and for the purpose hereinbefore set forth.

11. The combination of the gavel-separating mechanism, the spring acting upon it to move it inward, the connecting mechanism by which it is moved outward, and the brackets, in the guide-slots of which the separating mechanism moves up and down and horizontally, substantially as and for the purpose hereinbefore set forth.

12. The combination of the gavel-separating teeth, their rocking and sliding crank-ended shaft, the guideway-brackets for the shaft, the sliding rod connected with the shaft, and the positively-actuated connecting mechanism for operating the separating-teeth, substantially as and for the purpose hereinbefore set forth.

13. The combination of the platform having the series of short slots *b'*, the gavel-separating teeth, their crank-ended shaft, the guideway-brackets, in slots of which the shaft rocks and moves to and fro, the sliding rod connected with the toothed shaft, the spring acting on this shaft, and the connecting mechanism for operating the shaft against the action of its spring, substantially as and for the purpose hereinbefore set forth.

14. The combination of the gavel-separating teeth, their sliding and rocking carrying-shaft, the rod connected with said shaft, the rock-shaft, with the crank of which said rod is connected, the intermittingly-actuated shaft provided with the segment-wiper, and the rock-shaft crank acted upon by said wiper, substantially as and for the purpose hereinbefore set forth.

In testimony whereof I have hereunto subscribed my name this 19th day of February, A. D. 1884.

JAMES R. SEVERANCE.

Witnesses:
H. S. BUCKLAND,
JAMES H. FOWLER.