(No Model.) 4 Sheets—Sheet 1.

R. E. DORTON.

BAND CUTTER AND FEEDER.

No. 482,677. Patented Sept. 13, 1892.

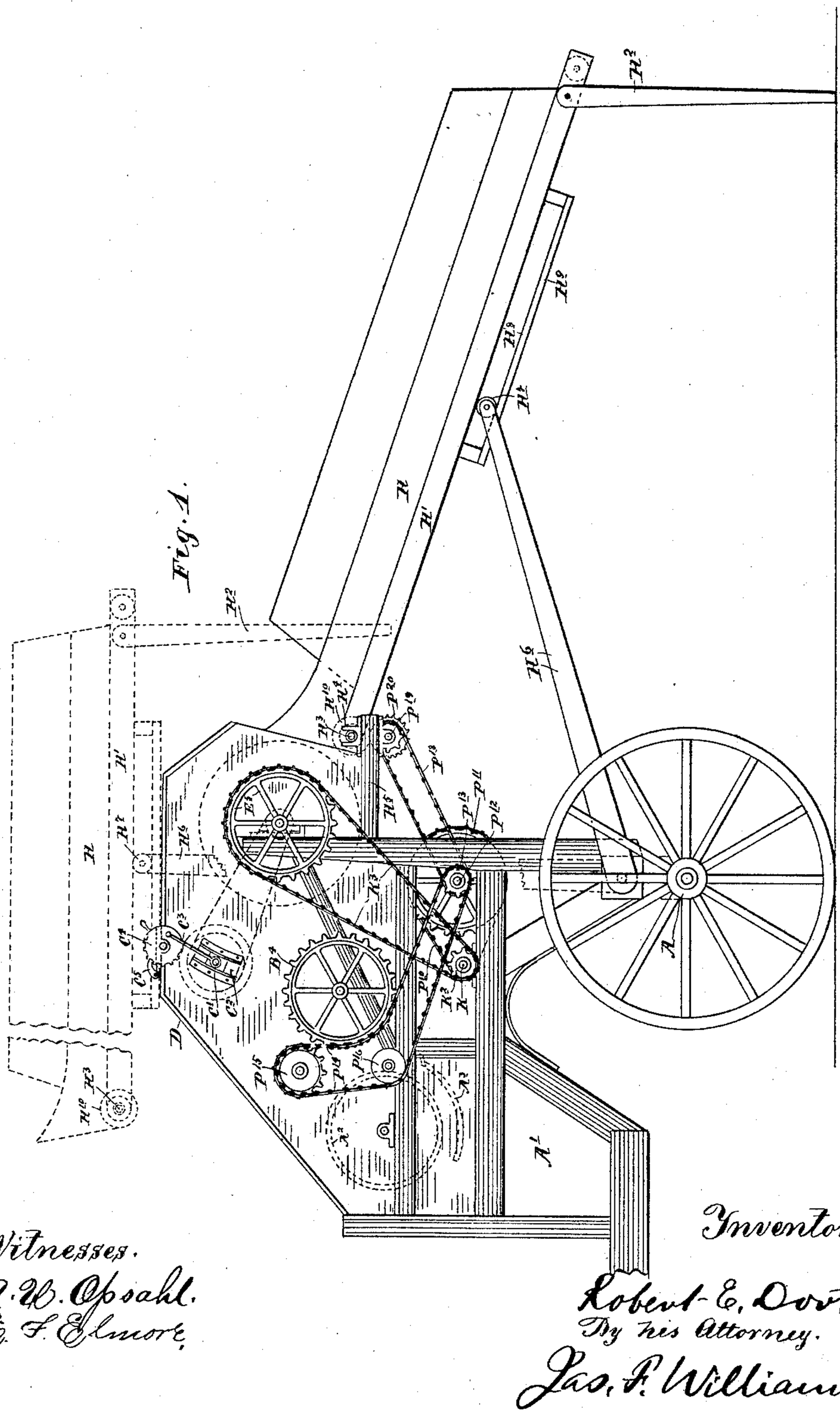

Fig. 1.

Witnesses.
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E. F. Elmore.

Inventor.
Robert E. Dorton
By his Attorney.
Jas. F. Williamson

(No Model.) 4 Sheets—Sheet 2.

R. E. DORTON.

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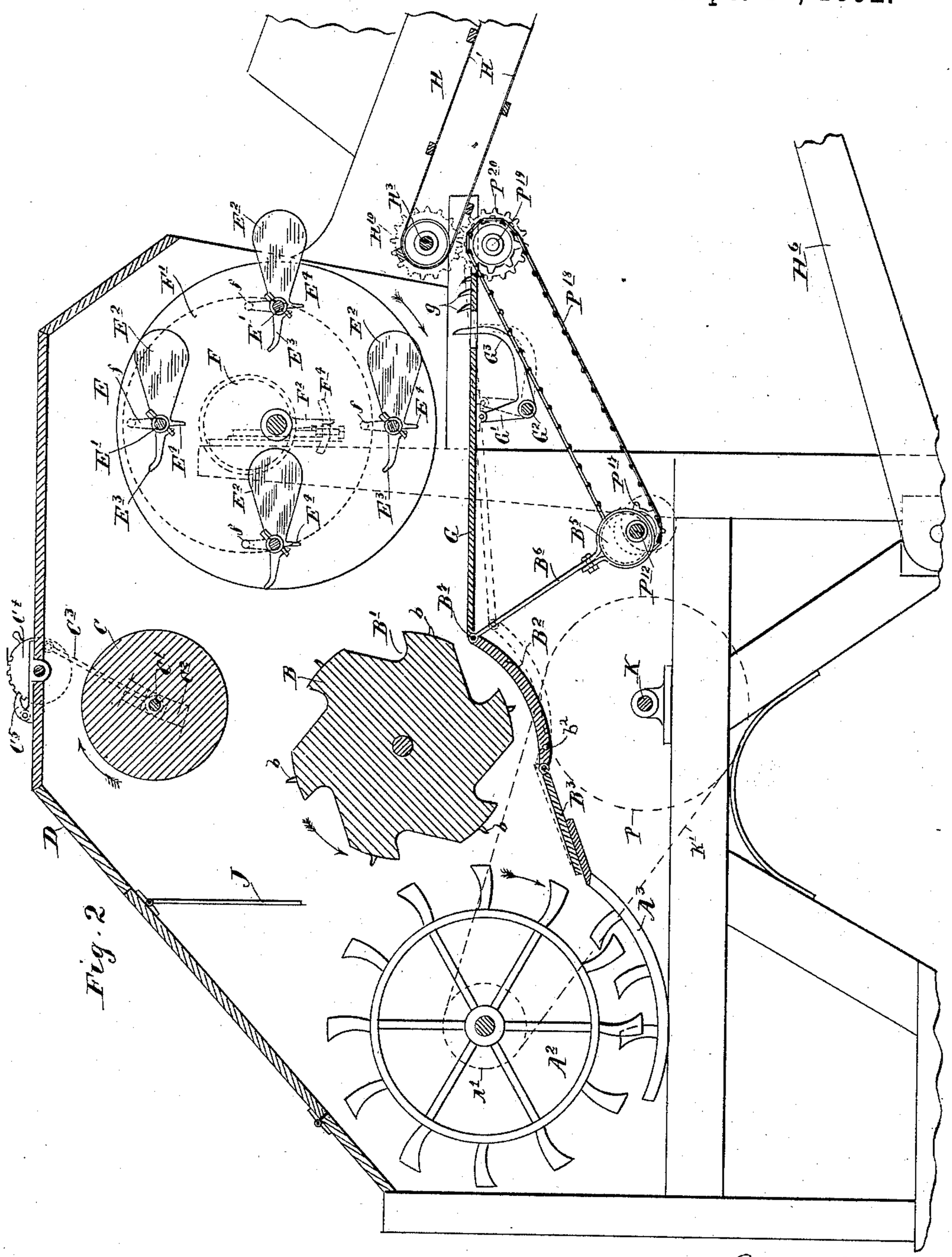

Fig. 2

Witnesses.
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(No Model.) 4 Sheets—Sheet 3.

R. E. DORTON.

BAND CUTTER AND FEEDER.

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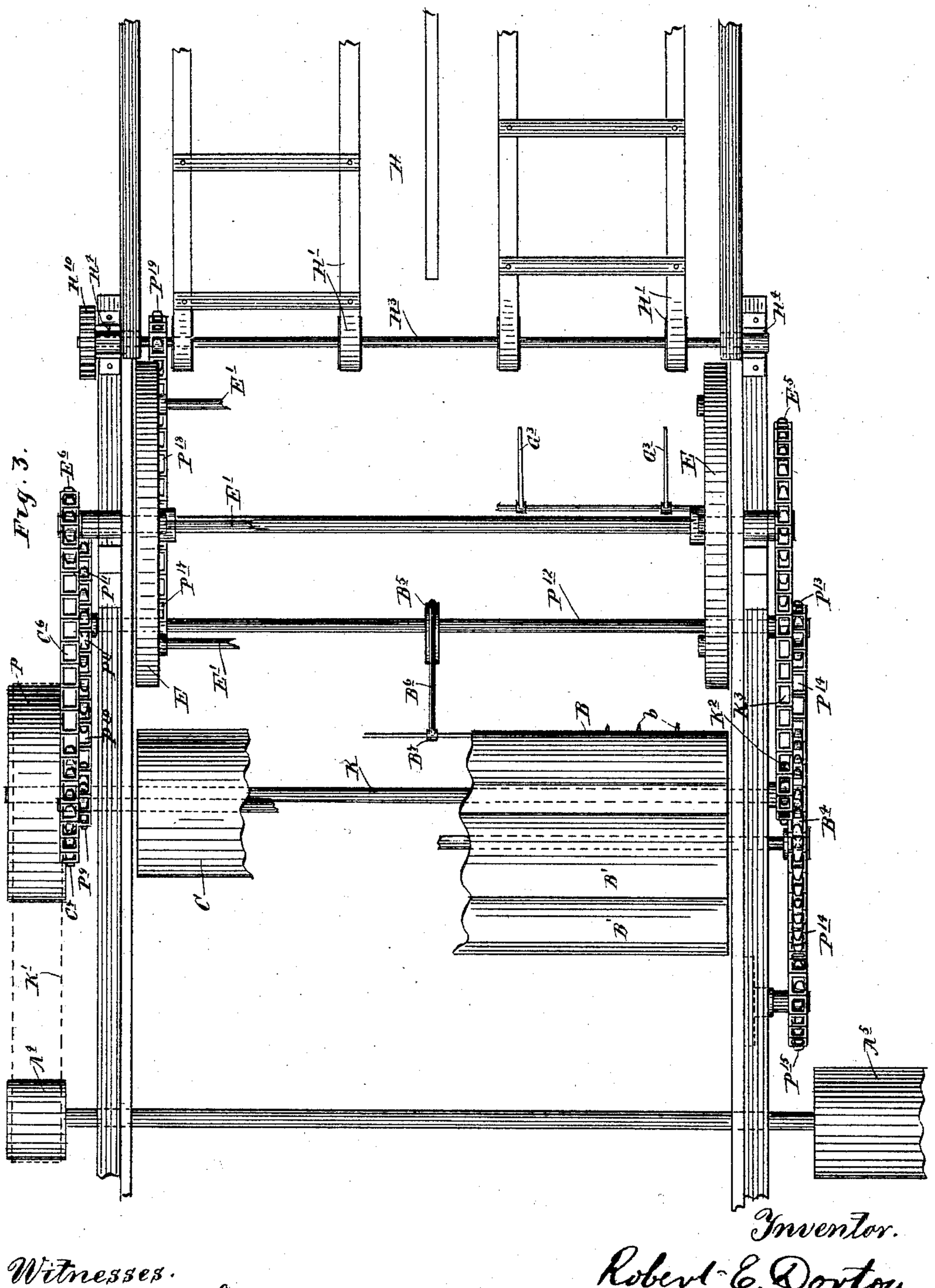
Fig. 3.



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(No Model.) 4 Sheets—Sheet 4.

R. E. DORTON.

BAND CUTTER AND FEEDER.

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Fig. 4.

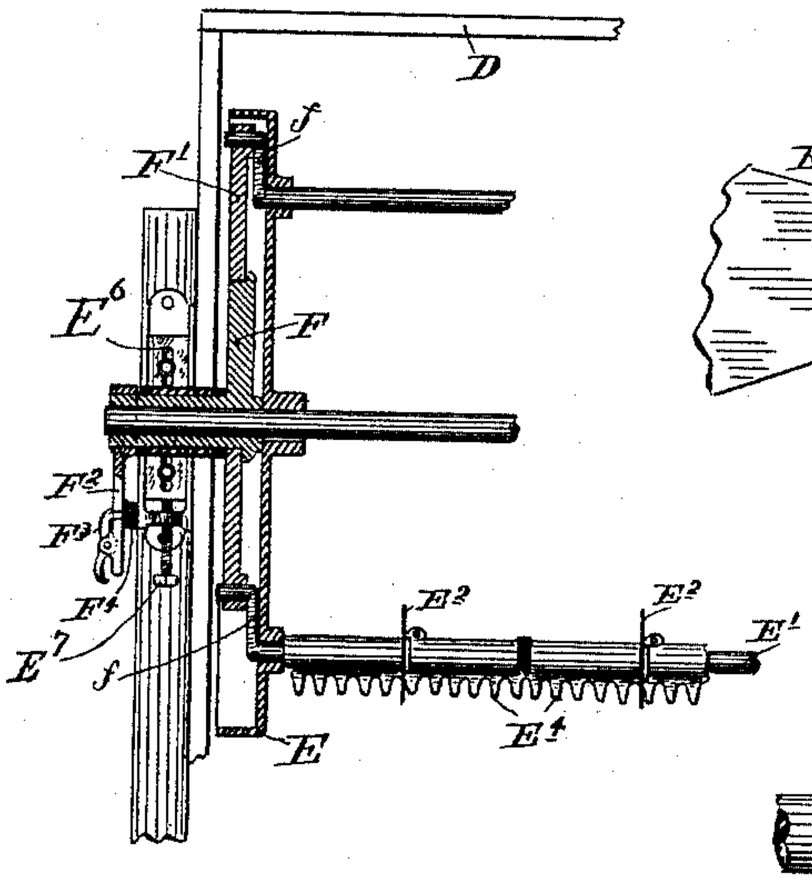


Fig. 5.

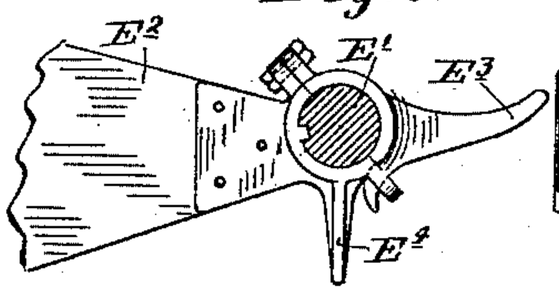


Fig. 7.

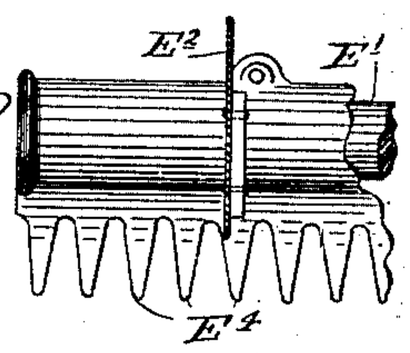


Fig. 6.

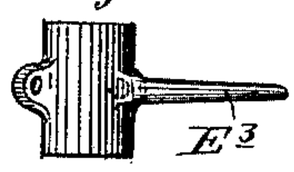


Fig. 8.

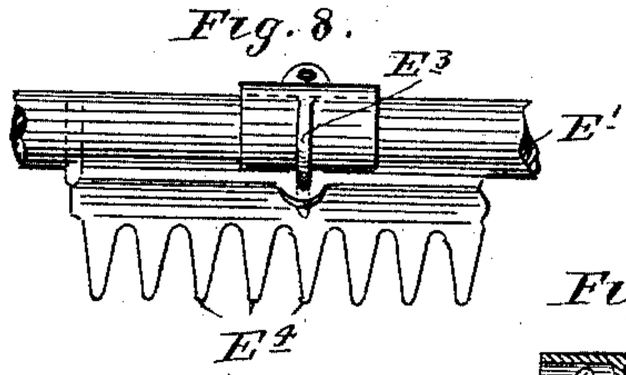


Fig. 9.

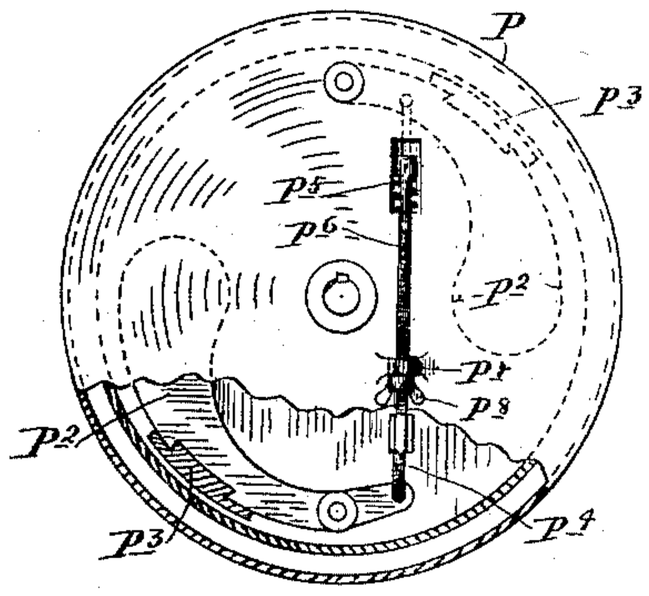
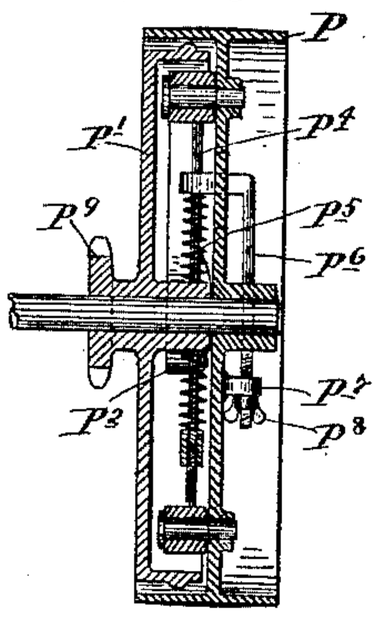


Fig. 10.



Witnesses.
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Inventor.
Robert E. Dorton
By his Attorney.
Jas. F. Williamson

UNITED STATES PATENT OFFICE.

ROBERT E. DORTON, OF MINNEAPOLIS, MINNESOTA.

BAND-CUTTER AND FEEDER.

SPECIFICATION forming part of Letters Patent No. 482,677, dated September 13, 1892.

Application filed March 15, 1892. Serial No. 424,947. (No model.)

To all whom it may concern:

Be it known that I, ROBERT E. DORTON, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Band-Cutters and Feeders; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to provide a band-cutter and feeder for thrashing-machines which shall have an improved action and be of large capacity.

To these ends my invention comprises certain novel devices and combination of devices, which will be hereinafter fully described, and be particularly defined in the claims.

The great distinctive feature in respect to the action or working of the mechanism, taken as a whole, is that the stock is subjected to a series of stripping actions, beginning at the band-cutter and ending at the thrashing-cylinder, by which a successive series of endwise divisions of the stock is effected, at each division of which one of the divided parts is fed forward in advance of the other, resulting in the presentation of the stock to the cylinder with a sliding feed and an upward and spreading motion of the butts, corresponding almost exactly to the action of hand-feeding. The general result is to give much greater capacity, effect a better separation, and require less power.

A machine embodying my invention is illustrated in the accompanying drawings, wherein, like letters referring to like parts throughout—

Figure 1 is a left-side elevation of the machine, positions being taken with reference to an observer standing at the head of the machine and looking in the direction of the travel of the stock. Fig. 2 is a vertical longitudinal section of the machine, looking from the left, some parts being broken away. Fig. 3 is a plan view of the machine, some parts being removed and others broken away. Fig. 4 is a vertical section through the left end of the rotary cylinder carrying the band-cutting knives, stripping-combs, &c. Figs. 5, 6, 7, and 8 are details illustrating the construction of the comb and clearing-finger castings and their connections with the feathering shafts. Figs. 9 and 10 are views in end elevation and vertical section, respectively, showing the construction of a friction-clutch governor employed as part of the mechanism.

A is the front truck, and A′ the front part, of a separator-frame especially designed for supporting my band-cutting and feeding mechanism.

A^2 is the thrashing-cylinder, and A^3 the concave.

B is the feed-cylinder, arranged parallel with and adjacent to the thrashing-cylinder a short distance in advance of the same. This cylinder turns at a slow speed in a direction opposite to the rotation of the thrashing-cylinder and is provided on its periphery with cells B′ for catching and carrying over the shattered grain and delivering the same to the thrashing-cylinder and concave. A grain-board B^2 is located under the said feed-cylinder and is movable at its outer end toward and from the feed-cylinder and serves to force the shattered grain which may accumulate at that point into the cells of the feed-cylinders. The said grain-board is pivotally connected to the frame at its lower end, as shown at b^2, and has connected thereto an inner end feed-board or a combined grain-table and feed-board B^3, the innermost or free end of which rides on the edge of the concave. The word "cells" as applied to the conveying-surfaces B′ on the periphery of the feed-cylinder will be understood to cover any construction capable of that function—such, for example, as flights or cups. The feed-cylinder is preferably provided with short teeth *b* to give to the same a short bite on the stock. The cylinder will, however, work without the teeth.

C is a combined resistance and stripping cylinder overhanging the feed-cylinder, preferably with its center or axis slightly in advance of the axis of the feed-cylinder. The cylinder C turns in a direction opposite to the rotation of the feed-cylinder, or in the same direction as the thrashing-cylinder, and is driven at a relatively-high rate of speed as compared with the feed-cylinder. The cylinder C is journaled in sliding boxes C′, movable in ways C^2 on the sides of the frame and

suspended by links C^3 from a notched hand-wheel C^4, located on the top of the overdecking hood D, which incloses the feeding and band-cutting mechanism. A drop-pawl C^5 co-operates with the notches on the hand-wheel C^4 to hold the cylinder C in whatever position it may be set. It is evident that with this construction the cylinder C may be adjusted at will to regulate the passage or throat between the same and the feed-cylinder, as may be required. It is also obvious that by throwing back the pawl C^5 the said cylinder C would when the machine is at work ride as a float on the moving stock. Under some conditions this might be desirable. Ordinarily, however, the said cylinder would be held rigid in order to fix the flow of the stock by the size of the throat.

E is the combined band-cutting, stripping, and clearing cylinder. It is kept in continuous motion at a high rate of speed as compared with the feed-cylinder and turns in a direction opposite thereto. This cylinder E is provided with a series of feathering shafts E′, having secured thereto a series of backwardly-extended band-cutting knives E^2, a series of forwardly-extended clearing-teeth E^3, and a series of downwardly-extended stripping-combs E^4. The feathering motion is imparted to the shafts E′ by means of an eccentric F and an eccentric-strap F′, which engages crank-arms *f* on the left ends of the said shafts outside the cylinder-heads. The eccentric F is loosely mounted on the cylinder-shaft and is provided with means for securing the same against movement thereon. As shown, the hub of the eccentric is extended outward through the bearing-box and has rigidly secured thereto a hand-lever F^2, provided with a lock-pawl F^3, which engages with the notches of a segment-plate F^4. This form of securing device for the eccentric F permits the same to be adjusted on the cylinder-shaft and secured in any desired position for varying the positions of the feathering shafts and any parts carried thereby in respect to the movement of the cylinder.

It is evident that in virtue of the eccentric F, the strap F′, and the terminal crank-arms *f* on the shafts E′, the said shafts will be feathered under the forward motion of the cylinder, so as to preserve a constant relation thereto. Hence the knives E^2 the clearing-teeth E^3, and the stripping-combs E^4 will always stand in whatever position they may be set. Under ordinary conditions they will stand in the positions as shown in Fig. 2, but may be thrown to and held in any other desired position by shifting the eccentric F with the hand-lever F^2. As a matter of convenience in construction and application of the parts the comb-castings E^4 are formed with half-hubs and projecting shanks, to which the knives E^2 may be secured, and are provided with clamping-lugs on the lips of the half-hub, one of which lugs is perforated, and the clearing-tooth castings are formed with corresponding half-hubs and match-lugs, one of which is of hook shape adapted to engage with the said perforated lug on the comb-casting. Hence these castings may be detachably secured together and to the feathering shafts E′ by the use of a single bolt and nut. A series of these castings are placed end to end on the feathering shafts, so that the combs extend the entire length of the same. The knife-shanks and the match-lugs on the comb-castings are differently located on the respective sets attached to the different feathering shafts, so that the knives and the clearing-teeth carried with the different shafts will break joints with each other.

G is the feed-board, located under the cylinder E, mounted for longitudinal reciprocating movement, and provided with teeth *g* at its receiving end. As shown, it is pivotally connected at its delivery end to the receiving end of the grain-board B^2 and is carried at its receiving end by a crank-arm G′ on a rock-shaft G^2. This same rock-shaft carries a series of retarding-teeth G^3, the tips of which work through slots of the feed-board and move into and out of engagement with the lower layers of the stock and serve to retard the movement of the same as compared with the movement of the top layers under the action of the stripping-combs.

H H′ is the bundle-table, of which H is the frame, and H′ the conveyers, of the slat-and-belt variety, for delivering the bundles to the band-cutter and feed-board. This bundle-table is so arranged that the delivery end of the conveyer is offset from the feed-board in the vertical plane with respect to the receiving end of the feed-board. This offset arrangement provides a drop at that point, which facilitates the endwise division of the bundle. As shown, the delivery end of the conveyer H′ overlaps the receiving end of the feed-board. Hence any shattered grain delivered thereby will be caught by the feed-board. The bundle-table is supported at its outer or receiving end by pivoted legs or rests H^2 and at its delivery end by means of the driving-gear on its conveyer-shaft H^3 and by forked lugs H^4, projecting from the side brackets H^5 of the separator-frame, engaging the outwardly-extended ends of the conveyer-shaft H^3. Cross-pins may be passed through the prongs of the forks H^4 above the conveyer-shaft, if necessary, to hold the parts in their working position.

A pair of riser-arms H^6 are pivoted to the sides of the separator-frame directly over the forward trucks at their rear ends and at their outer ends are provided with lateral extension or antifriction-rollers H^7, which work in ways H^8, formed by hanger-bars H^9, secured to the underside of the bundle-table, beginning at or about the center of the same and extending toward its receiving end. The effect of this construction is to permit the bundle-table to be raised on the arms H^6, so as to ride on the top deck of the separator when

not in use, as shown in dotted lines in Fig. 1. The bundle-table may be raised into this elevated and idle position in any suitable way. In practice I raise the same by means of a windlass located on some part of the separator-frame near the ground and a strap passing forward over the top of the separator and attached to the delivery end of the bundle-table. These parts are not shown in the drawings.

The overdecking hood D, which covers the band-cutting and feeding mechanism, is preferably made up of fixed and pivoted sections, so as to give ready access to the parts and permit the same to yield at certain points, if necessary. This hood is also open at its forward end and has its forward section set on a downward angle for co-operation with the clearing-teeth E^3 to redeliver the stock thrown back thereby onto the conveyers.

J is a pivoted drop suspended from the hood D for deflecting the draft from the thrashing-cylinder and preventing the outward movement of the dust therefrom.

The driving connections are as follows, to wit: The driving-shaft K has keyed to its right end a driving-pulley P, which is belted by a belt K′ directly to pulley A^4 on the right end of the thrashing-cylinder shaft. The driving-shaft K carries on its left end a small sprocket K^2, connected by chain K^3 with a large sprocket E^5 on the left end of the band-cutting, clearing, and stripping cylinder E, thus keeping the same in continuous motion. The driving-pulley P also serves as one member of a friction-clutch governor, the other members of which are a flanged clutch-head P′, loosely mounted on the shaft K, with its flange facing the inner surface of the pulley-web, a pair of centrifugal weights P^2, pivoted to the pulley-web and carrying friction-shoes P^3, adapted to clamp the flange of the clutch-head, a tie-rod P^4, connecting said weights on the opposite sides of their pivots, a tension-spring P^5 on the said tie-rod, and an angular-headed draw-rod P^6, having its head working on the said tie-rod against the said spring and its screw-threaded stem adjustably secured to the web of the pulley. As shown, the said draw-rod P^6 has its head extended outward through a slot in the web of the pulley and its stem working through a lug P^7 on the outer face of the same, and is held thereto by a thumb-nut P^8. With this construction it is evident that whenever the centrifugal force from the driving-pulley overcomes the tension of the spring the weights will clamp together the said pulley and the clutch-head P′ and cause the latter to turn with the pulley, permitting the same to yield when necessary. The clutch-head P′ carries a small sprocket P^9, connected by chain P^{10} with large sprocket P^{11} on a counter-shaft P^{12}. The said counter-shaft carries on its left end a small sprocket P^{13}, which is connected by a chain P^{14} with an idler-sprocket P^{15}, and is held taut by a tightener P^{16}. The sprocket P^{14} passes under and engages with a large sprocket B^4 on the left end of the feed-cylinder, driving the same at a slow speed. The counter-shaft P^{12} also carries near its left end a small sprocket P^{17}, connected by chain P^{18} with a sprocket P^{19}. This shaft has a gear P^{20}, which engages with a gear H^{10} on the conveyer-shaft H^3. The interposition of the extra sprocket P^{19} is for the purpose of reversing the motion from the chain P^{18} through the gears P^{20} and H^{10}, so as to drive the conveyers H′ in the right direction, and also to permit the table to be detached. The cylinder E carries at its right end a sprocket E^6, connected by chain C^6 with a sprocket C^7 on the right end of the combined resistance and stripping cylinder C. The counter-shaft P^{12} carries an eccentric B^5, connected by strap and rod B^6 with the hinge or pivot rod B^7, connecting the feed-board G and the grain-board B^2. The thrashing-cylinder is driven in the customary way by belt from an engine (not shown) applied to a driving-pulley A^5 on the left end of the cylinder-shaft. The cylinder E, which carries the band-cutter knives, stripping-combs, and clearing-teeth, is mounted in sliding bearings E^6, by which the said cylinder is made adjustable up and down with respect to the feed-board G by draw-bolt E^7.

The operation of the machine: It is evident that with the driving connections arranged as just above described the cylinders E and C will be kept in constant motion at a relatively-high rate of speed and that the feed-cylinder B and the conveyers H′ will be driven through the friction-clutch governor whenever the thrashing-cylinder is running at the proper speed required for performing its work. Whenever the thrashing-cylinder falls below the proper speed, the feed-cylinder and conveyers will be stopped until the proper velocity is again recovered. The feed-board G will be kept constantly reciprocating in the line of the travel of the stock by the eccentric B^5, and the grain-board B^2 will be kept moving toward and from the feed-cylinder. Throughout the greater part of the inward movement of the feed-board G the retarding-teeth G^3 will be held up in engagement with the lower layers of the cut bundle, and on the return outward of the said feed-board the retarding-teeth will be held down below the face of the same, permitting a free movement to the stock. The bundles are thrown endwise, and preferably heads forward, onto the conveyers H′ on the opposite sides of the center-board of the bundle-table. Under the co-operation of the delivery end of the conveyers, the cylinder E, the toothed feed-board G, and the retarding-teeth G^3 the bands are cut. An endwise division of the cut bundle is effected and the top division of the same is fed forward first to the feed-cylinder B. Under the co-operation of the feed-cylinder and the combined resistance and stripping cylinder C another endwise division of the stock is effected and the top section is car-

ried forward within the reach of the thrashing-cylinder. A sliding feed is then produced from the top of the feed-cylinder, in which the back ends of the stock are tilted forward and spread out fan shape, permitting a free sliding movement to the outer layers of the stock under the stripping action of the thrashing-cylinder, which is almost an exact imitation of the hand-feeding action. This permits the thrashing-cylinder to run comparatively free and to put through and efficiently thrash a large quantity of stock without choking and with a minimum of power. In case any excess of stock over and above the normal feed should be carried in by the cylinder E it will accumulate and be thrown out by the clearing-teeth E^3 working against the back-pressure from the cylinders B and C and be redelivered through the open end of the hood onto the conveyers H′. The shattered grain will either follow down the grain-board B^2 and the inner end feed-board B^3 to the concave or be carried over by the cells B′ on the feed-cylinder. If by reason of the stock being damp, matted, or tough, or for any other reason the thrashing-cylinder should fall below the proper speed, the feed-cylinders and conveyers will be stopped by the friction-clutch governor. In view of its special construction and its direct connection to the thrashing-cylinder by an independent belt arranged so that the cylinder-driving belt from the engine cannot interfere with the same, the special form of governor herein shown and described is particularly sensitive and serviceable for this class of work.

It will be understood that minor changes in the construction and arrangement of the devices herein shown and described or the substitution of equivalents might be made without departing from the spirit of my invention. For example, the feed-board might be fixed instead of movable and short-toothed chains be employed in lieu thereof, and the stripping-combs and clearing-teeth might be carried on an independent cylinder instead of on the same cylinder with the band-cutting knives, in which event, of course, the band-cutter will have to be set forward and suitably spaced apart from the same.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In a band-cutter and feeder, a rotary cylinder carrying the band-cutting knives and provided with a series of stripping-combs, whereby the bands are cut and a series of endwise divisions of the bundles are effected, substantially as described.

2. The combination, with the longitudinally-reciprocating toothed feed-board, of the rotary cylinder overhanging said board transversely to the line of feed and provided with band-cutting knives and stripping-combs and a bundle-supplying conveyer having its delivery end overlapping the receiving end of the feed-board and offset from the same in the vertical plane, whereby an endwise division of the cut bundle is effected and the shattered grain from the conveyer is caught by the feed-board, substantially as described.

3. The combination, with the rotary cylinder provided with band-cutting knives and stripping-combs, of the reciprocating toothed feed-board and the retarding-teeth working through slots of the feed-board into and out of engagement with the lower layers of the stock, substantially as described.

4. In a thrashing-machine, the combination, with the feed-board, of a pivoted grain-board spanning the space between the feed-board and the thrashing-cylinder and concave, a band-cutter located over said feed-board, a celled feed-cylinder overhanging the said grain-board and having a movement opposite to that of the thrashing-cylinder, delivering thereto from its top, and means for moving said grain-board toward and from the celled feed-cylinder, whereby any shattered grain accumulating at the throat between the grain-board and feed-cylinder will be forced into the cells of the said cylinders and be carried over to the thrashing-cylinder, substantially as described.

5. The combination, with the feed-board G, of the grain-board B^2 B^3, pivoted to the frame near its inner end and pivotally connected to the feed-board G at its outer end, means, such as the eccentric B^5 and the rod B^6, for imparting a rocking motion to said grain-board, the cylinder E, overhanging the said feed-board and provided with band-cutting knives and stripping-combs, and the celled feed-cylinder B B′, overhanging the grain-board B^2 and delivering from its top to the thrashing-cylinder, the said parts operating substantially as and for the purpose set forth.

6. The combination, with a thrashing-cylinder and concave, of a parallel oppositely-moving feed-cylinder delivering thereto from its top and a combined resistance and stripping cylinder overhanging the feed-cylinder and spaced apart therefrom to form a feed-throat, the said feed-cylinder being driven at a slow speed and the said resistance and stripping cylinder at a relatively-high speed, substantially as and for the purpose set forth.

7. The combination, with a thrashing-cylinder and concave, of the parallel oppositely-moving slow-speeded feed-cylinder delivering thereto from its top, the overhanging relatively-high-speeded combined resistance and stripping cylinder turning in the same direction as the thrashing-cylinder, and a clearing-cylinder located in the front angle between said feed and resistance cylinders, turning in the same direction as the feed-cylinder at a relatively-high speed, and provided with projecting teeth working against the back-pressure from said feed and resistance cylinder to throw back any accumulating excess of stock, substantially as described.

8. The combination, with the slow-moving feed-cylinder B, of the fast-moving resistance and stripping cylinder C, the fast-moving cyl-

inder E, provided with the feathering shafts E′, having secured thereto the backwardly-extended band-cutting knives E^2 and the forwardly-extended clearing-teeth E^3, the reciprocating toothed feed-board G, and the retarding-teeth G^3, substantially as described.

9. In a band-cutter and feeder, the combination, with the feed-board, of sliding boxes mounted on the side of the frame and provided with draw-bolts for adjusting the same, the rotary cylinder mounted in said sliding boxes and provided with feathering shafts having secured thereto the band-cutting knives, stripping-combs, and clearing-teeth, substantially as described.

10. In a band-cutter and feeder, the combination, with a rotary cylinder having feathering shafts for carrying parts operating on the stock, of an adjustable feathering mechanism for setting said shafts and parts carried thereby in any desired angular relation to said cylinder, substantially as described.

11. In a band-cutter and feeder, the combination, with a rotary cylinder provided with a series of shafts journaled in its head for carrying parts operating on the stock, of an eccentric loosely mounted on the cylinder-shaft, having an extended hub provided with a locking-arm for adjustably securing the same in any desired position, and an eccentric strap or ring on said eccentric engaging crank-arms on said shaft for feathering the said shafts under the motion of the cylinder, substantially as described.

12. In a band-cutter and feeder, the combination, with the rotary cylinder having feathering shafts for carrying the band-cutting knives, striping-combs, and clearing-teeth, as described, of the stripping-comb and clearing-teeth castings formed with half-hubs and means for detachably clamping the same together and to the said shafts, and the comb member of which casting is provided with a shank for securing the knives thereto, substantially as described.

13. The combination, with the bundle-table detachable from the separator at its delivery end, of the riser-arms pivotally connected at their lower ends to the separator-frame and having a pivotal and sliding connection with the bundle-table at their outer end for lifting the bundle-table to the top deck of the separator, substantially as described.

14. In a band-cutter and feeder, the combination, with fixed ways secured to the frame, of sliding boxes mounted in said ways, hangers suspending said boxes from the top of the frame with freedom for upward and downward movement in the said ways, and the combined resistance and stripping cylinder journaled in said boxes overhanging the feed-cylinder and riding on the stock as a float, substantially as described.

15. In a band-cutter and feeder, the combination, with the feed-cylinder B, of the curved ways C^2, fixed to the frame, the sliding boxes C′, mounted in said ways, the combined resistance and stripping cylinder C, journaled in said boxes, the link C^3, connected to said boxes at their lower end and pivotally connected at their upper end to the hand-wheel C^4, and means for securing the said hand-wheels in any desired position, substantially as and for the purpose set forth.

16. A band-cutting and feeding mechanism organized for cutting the bands, spreading the cut bundles, and effecting a series of endwise divisions of the stock and the delivery of the same to the thrashing-cylinder with a sliding and butt-spreading feed in imitation of hand-feeding, the said mechanism consisting of the following combination of elements, to-wit: suitable bundle-supplying conveyers, as H, the fast-moving cylinder E, in constant motion, having the feathering shaft E′, carrying the knives E^2, the clearing-teeth E^3, and the stripping-combs E^4, the slow-moving feed-cylinder B, delivering from its top to the thrashing-cylinder, the fast-moving resistance and stripping cylinder C, overhanging the feed-cylinder, the overdecking hood D, and a suitable resistance surface, such as the feed-board G, and the grain-board B^2, underlying the said cylinders E and B, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT E. DORTON.

Witnesses:
JAS. F. WILLIAMSON,
EMMA F. ELMORE.