No. 631,934. Patented Aug. 29, 1899.

A. JOHNSON.

BAND CUTTER AND FEEDER FOR THRESHING MACHINES AND SEPARATORS.

(Application filed June 22, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

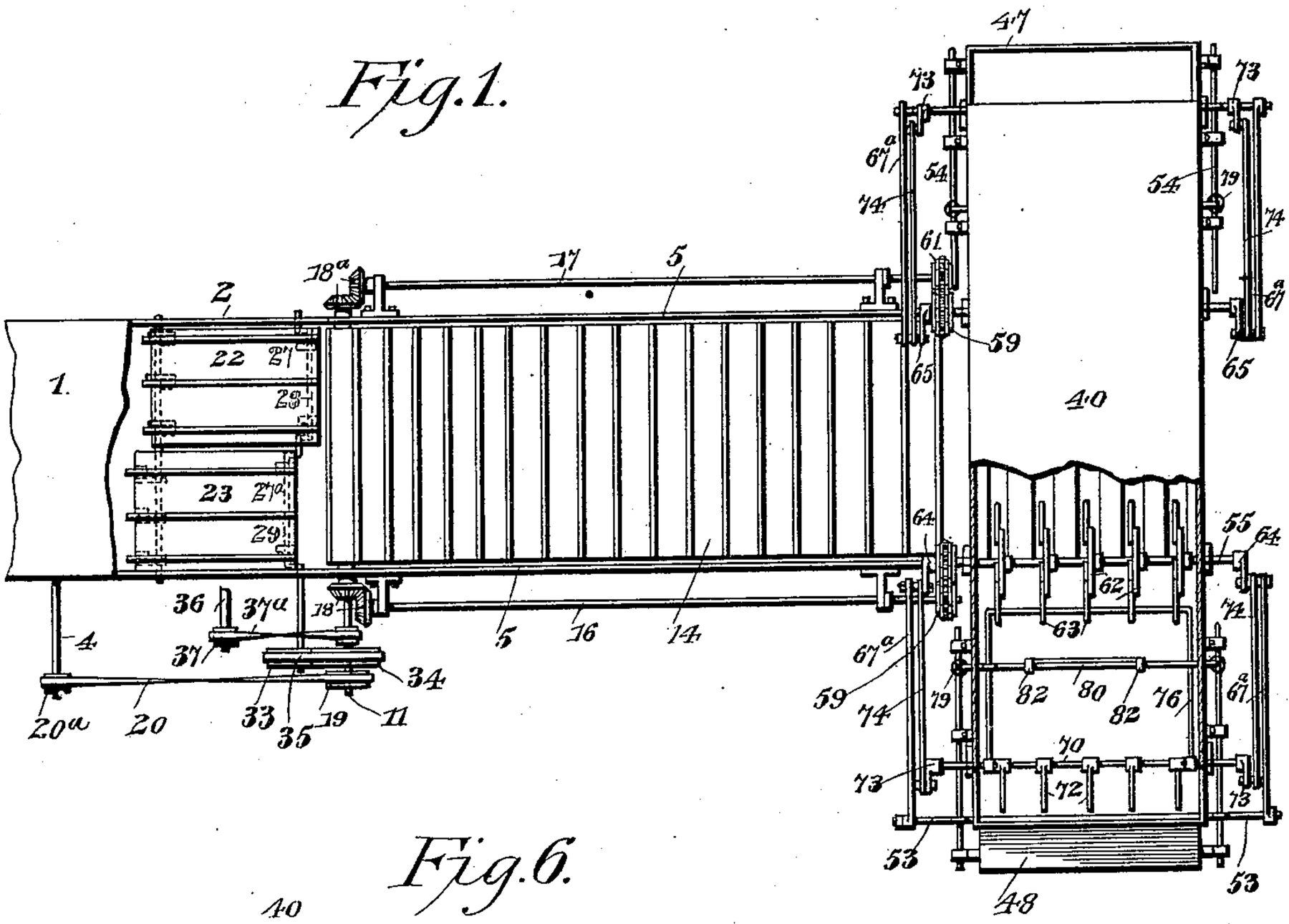


Fig. 6.

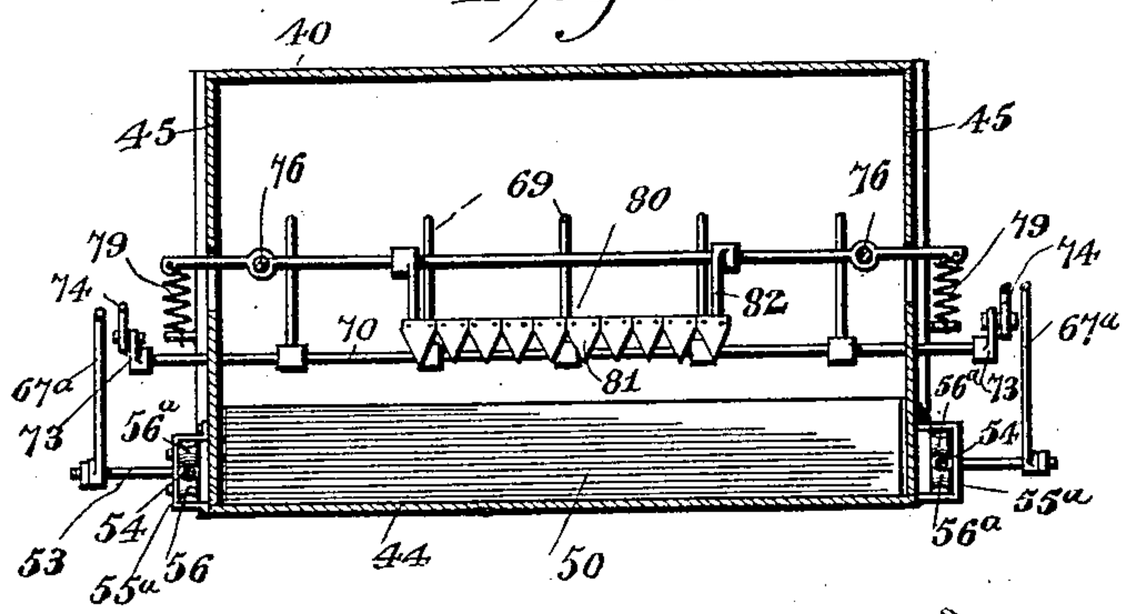
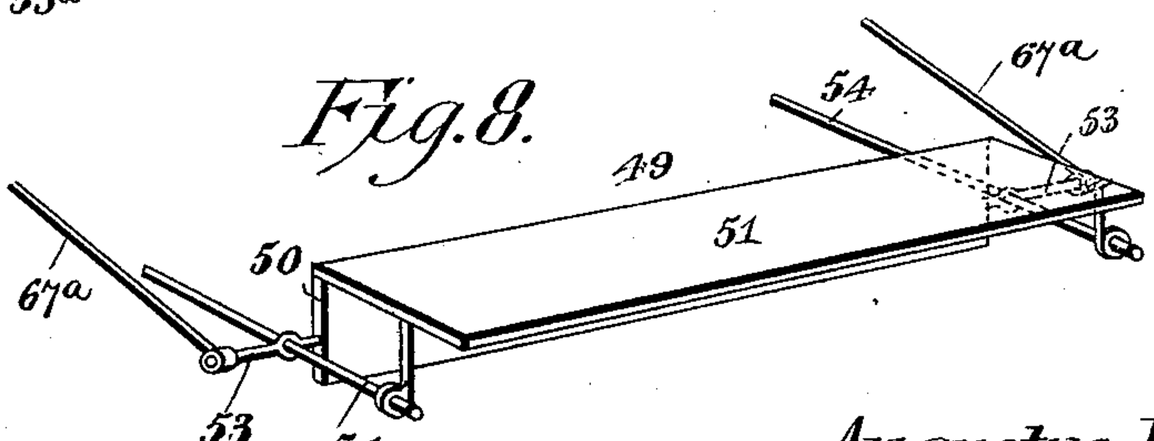


Fig. 8.



Witnesses
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(No Model.) 3 Sheets—Sheet 2.

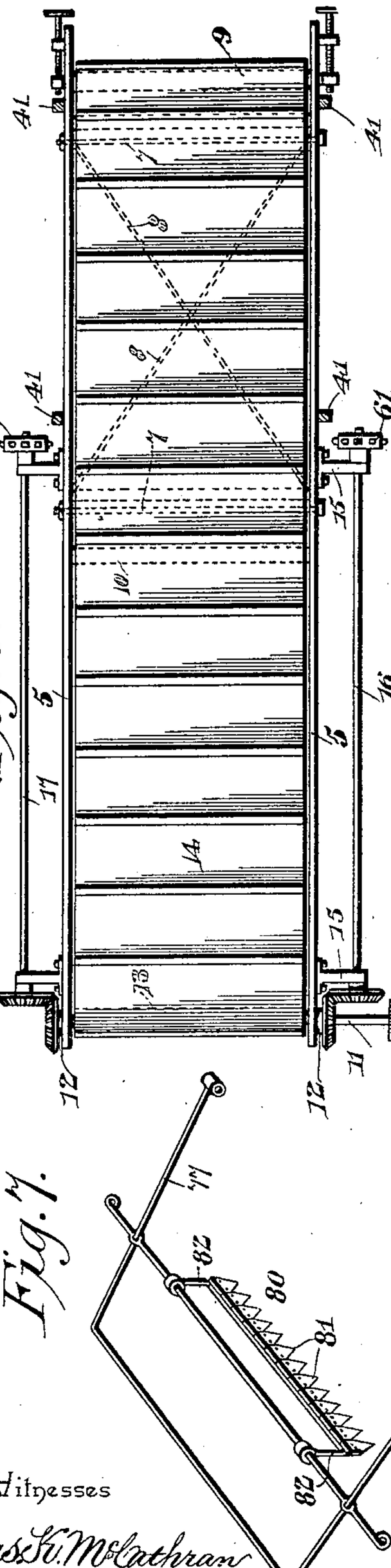

Fig. 3.

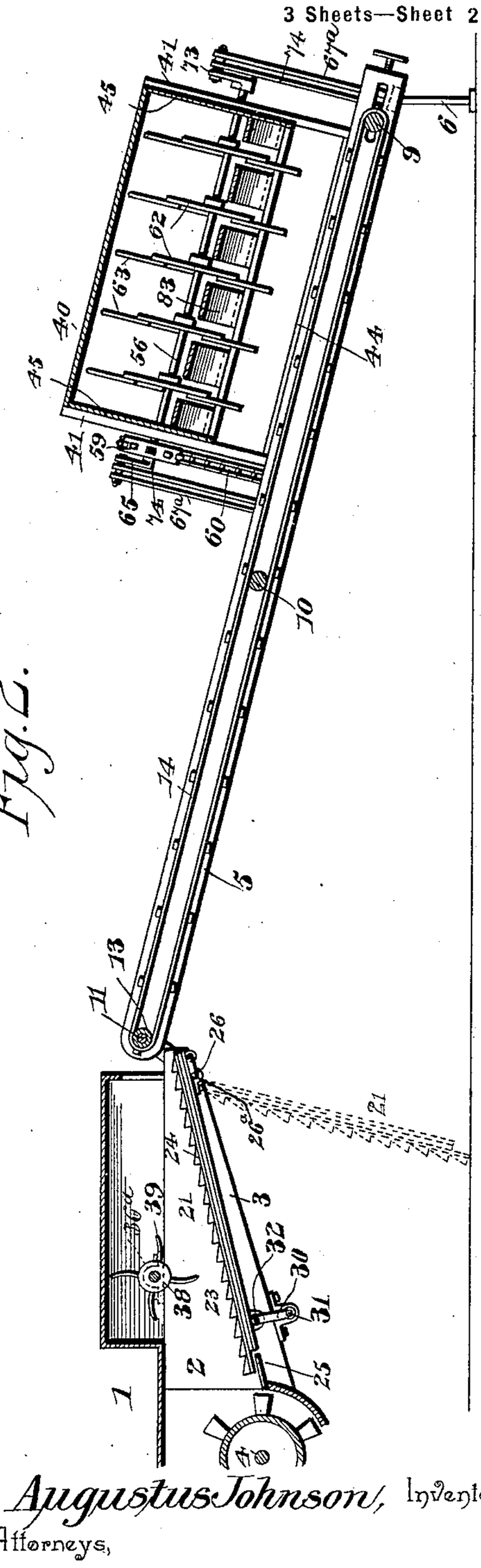

Fig. 2.

Fig. 1.

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(No Model.) 3 Sheets—Sheet 3.

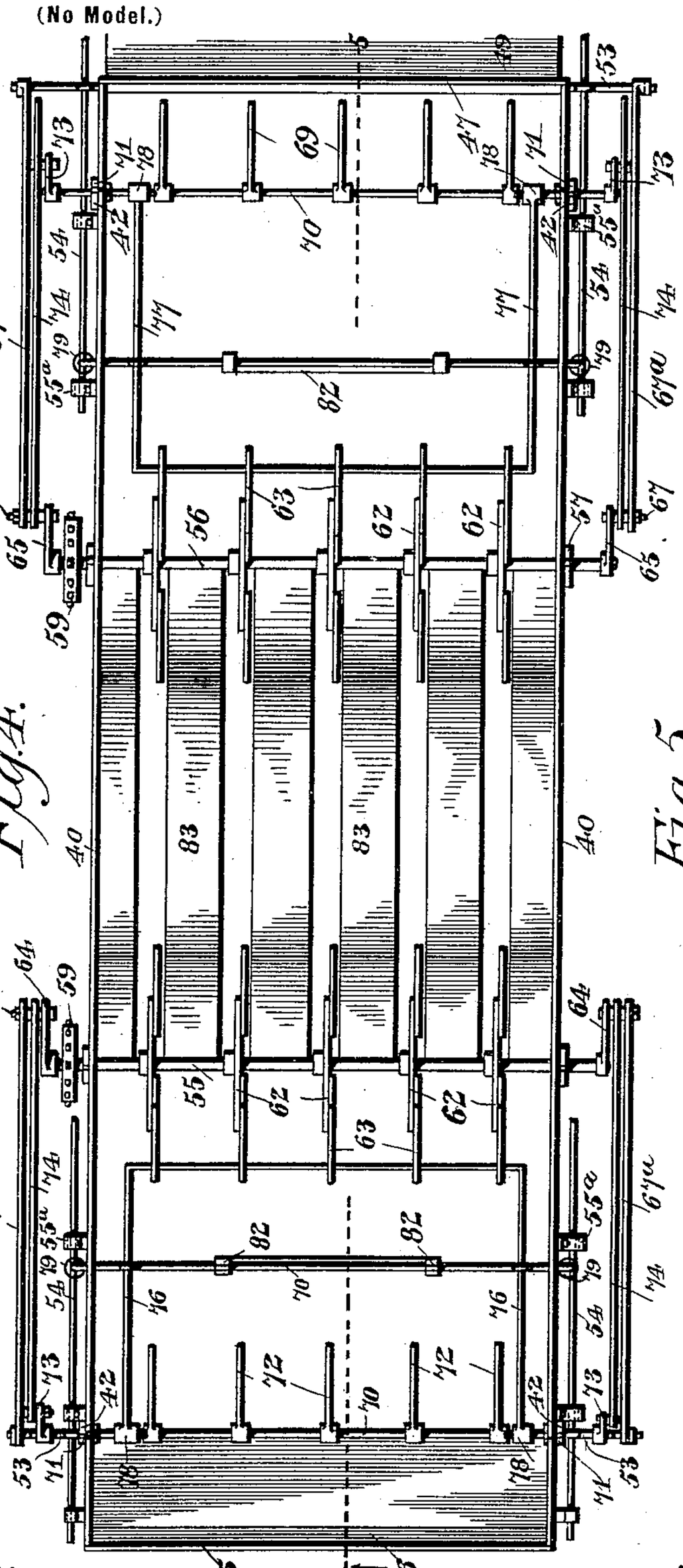

Fig. 4.

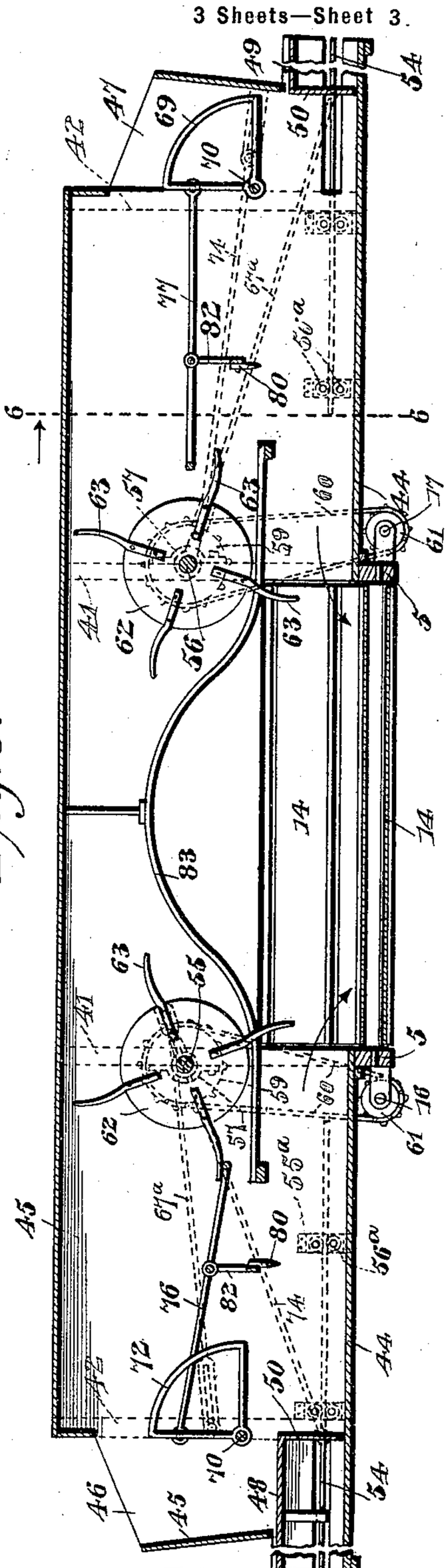

Fig. 5.

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UNITED STATES PATENT OFFICE.

AUGUSTUS JOHNSON, OF FALUN, KANSAS.

BAND-CUTTER AND FEEDER FOR THRESHING-MACHINES AND SEPARATORS.

SPECIFICATION forming part of Letters Patent No. 631,934, dated August 29, 1899.

Application filed June 22, 1898. Serial No. 684,171. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTUS JOHNSON, a citizen of the United States, residing at Falun, in the county of Saline and State of Kansas, have invented a new and useful Band-Cutter and Feeder for Threshing-Machines and Separators, of which the following is a specification.

My invention relates to improvements in band-cutters and feeders for threshing-machines and separators; and the primary object is to provide means by which the grain may be pitched or dumped into the mechanism from either side thereof, and said grain is fed or carried alternately from the side hoppers and delivered into a centrally-disposed conveyer.

A further object of the invention is to provide means by which the grain is packed previous to its delivery to the band-knives and is subsequently separated or loosened by positively-acting devices which operate in unison with the elevator mechanism.

A further object of the invention is to provide a vibratory mechanism for transferring the grain from the elevator to the threshing-cylinder and for loosening the grain, so as to deliver it in proper condition for action by the cylinder and the separator, and this transfer mechanism is supported and operated by means which permit the transfer devices to be dropped out of the way when it is desired to obtain access to the threshing-cylinder for making repairs thereto.

My improved band-cutter and feeder has the following elements, combined and organized for service—to wit, an endless elevator, a feed-frame arranged transversely across the receiving end of the elevator and provided on opposite sides of the latter with hoppers into which the grain may be pitched or dumped, pusher devices acting alternately within the feeder-frame and the hoppers thereof to move the grain from each hopper to the elevator, rotary beaters situated on opposite sides of the conveyer or elevator, packer devices which overhang the path of the grain and are situated between the beater-shafts and the hoppers, and vibrating frames carrying a series of band-knives and situated between the packer devices and the rotary beaters.

My invention also contemplates the provision of an endless elevator, an inclined transfer mechanism situated between the delivery end of the elevator and the throat of the separator and constructed in sections which are loosely hung at their lower ends, a crank-shaft operatively connected with both sections of the transfer mechanism and serving to actuate the latter in opposite directions simultaneously, and a rotary separator or beater arranged over the transfer mechanism to act on the grain and loosen the same as it passes to the feed-throat which leads to the threshing-cylinder.

The invention further consists in the novel combination of elements and in the construction and arrangement of parts which will be hereinafter fully described and claimed.

To enable others to understand the invention, I have illustrated a preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a plan view of my improved band-cutter and feeder in operative relation to a grain-separator or threshing-machine, a part only of the latter being illustrated. Fig. 2 is a vertical sectional elevation taken longitudinally through the improved band-cutter and feeder and a portion of the separator on the plane indicated by the dotted line 2 2 of Fig. 1. Fig. 3 is an enlarged detail plan view of the endless elevator. Fig. 4 is an enlarged plan view of the feeder-frame, illustrating the operating mechanisms fitted thereto. Fig. 5 is a vertical sectional elevation taken longitudinally through the feeder-frame on a plane at right angles to the axis of the elevator mechanism, the pusher-head below the right-hand hopper being shown as forced to the outer wall of the hopper and with the cut-off partly broken away and indicated by the dotted line 5 5 of Fig. 4. Fig. 6 is a sectional elevation taken through the feeder mechanism at right angles to the plane of section in Fig. 5 and on the plane indicated by the dotted line 6 6 of Fig. 1. Fig. 7 is a detail perspective view of one of the vibrating frames which carry the band-knives; and Fig. 8 is a detail perspective view of one of the pusher devices for moving the grain from one hopper part way across the feeder-frame, beneath the packer and feeder mechanisms

therein, and to deliver the grain to the receiving end of the endless elevator.

Like numerals of reference denote like and corresponding parts in each of the several figures of the drawings.

In order that others skilled in the art may understand my improvements, I have illustrated the same by Figs. 1 and 2 in operative relation to a part of an ordinary grain-separator or threshing-machine 1. As is usual in the art, the machine 1 is constructed with a feed mouth or throat 2, and from the front end of said machine is extended the horizontal arms 3, which are rigidly secured to the machine-casing and are arranged on opposite sides thereof. These arms are arranged in the same horizontal plane, and they provide the means for attachment of the inclined frame forming a part of the elevator mechanism and also serve to support the transfer mechanism which is situated between the delivery end of the elevator mechanism and the mouth or throat 2 of the machine. The shaft of the rotary cylinder forming one of the operative elements of the separator is indicated by the numeral 4, and from a pulley on this shaft runs a driving-belt that serves to rotate the main driving-shaft of the band-cutter and feeder mechanism which constitutes the present invention and the subject-matter of this application.

One of the elements of the band-cutter and feeder mechanism is an endless elevator which serves to carry the grain from a transversely-arranged feeder-frame to the transfer mechanism by which the grain is delivered to the machine throat or mouth, and this endless elevator is supported by a vertically-inclined frame 5. This frame consists of suitable longitudinal rails united together by transverse rails, and the upper end of the elevator-frame is attached or secured in any suitable way to the arms 3 of the separator-casing, while the lower end of the elevator-frame is suitably supported above the ground by the rests or supports 6 of any suitable character. The elevator-frame is strengthened by the employment of tie-bolts 7, which extend transversely across from side to side of the frame and are secured to the longitudinal rails thereof, and diagonal braces 8 are also employed for attachment to the lower part of the inclined elevator-frame, so as to brace the latter.

In the lower receiving end of the vertically-inclined frame 5 is suitably journaled the lower idler-roller 9, and an intermediate idler-roller 10 is also journaled in the side rails of the frame 5 at a point about midway the length thereof.

To the upper end of the inclined elevator-frame is rigidly secured the shaft-bearings 12, and in these bearings is journaled a horizontal driving-shaft 11, which is firmly supported in place by the bearings and frame, so as to lie parallel to the line of the cylinder-shaft 4. This main driving-shaft carries the driving-roller 13, which is arranged parallel to the rollers 9 and 10 and is situated at the upper delivery end of the inclined elevator 14. The elevator is shown as consisting of an endless web of suitable material provided on its working faces with a series of transverse slats or bars, and this elevator web or apron extends the full width and length of the inclined frame 5, the lower end of said apron being in operative relation to the feeder-frame to receive the grain therefrom, while its upper end delivers to the transfer mechanism.

The main driving-shaft 11 is belted to the cylinder-shaft 4, so that the elevator is positively driven by connections with the primary machine, and this shaft 11 is geared through inclined longitudinal shafts to the rotary beater mechanisms supported on the feeder-frame, from which beater mechanisms extend devices by which the pusher mechanisms and the packers are actuated, whereby the shaft 11 imparts motion to all of the working devices of the improved band-cutter and feeder.

On opposite sides of the inclined elevator 5 are secured the pairs of brackets 15, one pair of brackets being on one side of the elevator-frame and the other pair of brackets on the opposite side of the frame. In one pair of brackets is journaled the longitudinal shaft 16, and in the other pair of brackets is journaled a similar shaft 17. Both of these shafts are disposed outside of the elevator-frame, so as to be out of the path of the endless apron, and these shafts extend longitudinally of the elevator-frame, parallel therewith, so as to have their lower ends terminate below the transverse feeder-frame for the purpose of operatively connecting said shafts with the transverse beater-shafts within said feeder-frame. The upper ends of the vertically-inclined counter-shafts 16 17 terminate adjacent to the main driving-shaft 11, and said shafts 16 and 17 are driven from the shaft 11 through the intermeshing gears 18 and 18ª, which are secured, respectively, to the driving and counter shafts. One end of the driving-shaft 11 is extended beyond the frame 5 and to it is secured the belt-pulley 19, around which passes the driving-belt 20, that is fitted to a pulley 20ª on the cylinder-shaft 4.

Between the upper delivery end of the inclined elevator and the mouth or throat 2 of the machine-casing is arranged a vertically-inclined transfer mechanism 21, which is positively driven to move the grain from the elevator into the separator and is constructed so that it may be moved out of position for the operator to obtain access to the threshing-cylinder when it is desired to repair the latter. This transfer mechanism consists of a bottom or floor, which is divided centrally and longitudinally into two independent sections 22 23, which are movable in opposite directions simultaneously in order to impart a shaking motion to the grain and insure the proper feed thereof into the machine mouth or throat. These movable sections of the

transfer mechanism are provided on their upper faces with the longitudinal serrated bars 24, which are properly secured to the sections and are spaced at suitable intervals thereon, and the lower ends of these serrated bars are extended beyond the floors or bottoms of the sections, so as to deliver the grain upon a stationary horizontal board 25, which is suitably secured to the casing of the primary machine, whereby the grain may be delivered from the transfer mechanism to the primary machine without appreciable loss.

The independently-movable sections of the transfer mechanisms are supported at their upper ends and are actuated from a shaft 26, which is journaled in suitable bearings 26ª, on the arms 3 of the separator or the inclined elevator-frame 5, and this shaft is bent to form the cranks 28 and 29, the crank 29 lying at right angles to the crank 28. The section 22 of the transfer mechanism is provided at or near its upper end with a shaft-bearing 27, that receives the crank 28 of the shaft 26, while the other section 23 of said transfer mechanism is provided with similar bearings 27ª, that receive the crank 29 of the shaft 26, whereby the two sections of the transfer mechanism are properly supported by the shaft 26 and the oppositely-disposed cranks serve to impart reciprocating or vibrating motion in opposite directions simultaneously to the independent transfer-sections 22 23. The lower ends of these transfer-sections are movably supported in proper position over the grain-board by means of the swinging links 30, which are suitably connected to the sections 22 23 and are loosely fitted upon a common idler-shaft 31, that is supported on the frame of the primary machine. These links 30 elevate the lower ends of the inclined transverse sections above the grain-board, so as to permit the protruding ends of the serrated bars to move or play freely over said grain-board, and in order to permit the sections of the transfer mechanism to be adjusted out of the way of the operator when it is desired to gain access to the threshing-cylinder I prefer to detachably connect, as at 32, the upper ends of the links 30 to said sections 22 and 23. It will be evident that the links may be disconnected from the sections 22 and 23, or only the series of links for one section may be disconnected, after which the section or sections may swing downwardly on the connection of its upper end with the crank-shaft, thus permitting the section or sections to be lowered away from the primary machine-casing and assume the position indicated by dotted lines in Fig. 2, whereby the transfer mechanism or a part thereof may be disposed out of the way of the operator to enable him to gain unobstructed access to the cylinder or interior of the primary machine. The crank-shaft 26 is provided with a pulley 33, around which passes a belt 35, that is driven from a pulley 34 on the main driving-shaft 11.

In order to loosen the grain and deliver the same in a condition proper for action thereon by the cylinder of the primary machine, I provide a rotary beater which is operatively arranged relatively to the transfer mechanism, so as to act on the grain as it is carried by the said transfer mechanism to the feed throat or mouth 2. This rotary beater consists of a shaft 36, which is journaled in suitable bearings 36ª, secured to the arms 3 of the primary machine, and this beater-shaft is sustained in an elevated position above the transfer mechanism, so that its blades will act on the grain to separate or loosen the same. To one end of the rotary beater-shaft 36 is secured a pulley 37, which is driven by a belt 37ª from a pulley on the main driving-shaft 11. This rotary shaft 36 carries a series of heads or disks 38, which are secured at proper intervals on the shaft, and to the heads or disks 38 are fastened the series of radial blades or beaters 39, each blade being preferably curved to facilitate its withdrawal from the grain on the rotation of the shaft.

The rotary beater, which is arranged above the transfer mechanism, is designed to be driven at a slower speed than that of the transfer mechanism, and this end is attained by proportioning the gearing which connects the beater-shaft with the driving-shaft and the crank-shaft 26 with said driving-shaft. As shown by Fig. 1, the pulleys for the beater mechanism are of uniform diameter and they are secured on the driving-shaft and the beater-shaft in line with each other, so as to be connected by the endless belt 37ª. The pulleys for driving the crank-shaft of the transfer mechanism are of different diameters, however, the large pulley 34 being secured to the driving-shaft and the small pulley 33 attached to the crank-shaft 26, in alinement with each other, so as to be connected by the endless belt 34. The small pulley on the crank-shaft is driven at a higher speed than the large pulley 34 on the driving-shaft, and the belt-gearing for the transfer mechanism is thus adapted to operate said mechanism at a faster speed than the rotation of the beater.

40 designates the feeder-frame, which is arranged transversely across the line of travel of the endless elevator and at the lower receiving end thereof, and this transverse feeder-frame is equipped with hoppers into which the grain may be pitched or dumped, with pusher devices which are actuated alternately to move the grain positively from one hopper or the other hopper to the elevator mechanism, with packer devices by which the grain is depressed previous to the action of the band-knives thereon, and with beater devices for separating or loosening the grain before it is delivered to the elevator mechanism. This transverse feeder-frame is constructed with the middle uprights 41, the end uprights 42, the horizontal longitudinal sills 43, which join the middle and end uprights firmly together, the floor 44, and the side and

end walls 45, which form an inclosing casing around the feeder-frame. The floor 44 does not extend across the space between the middle uprights 41, but it is in two sections, which are arranged on opposite sides of the elevator-frame between the uprights 41 and 42. A large central opening is thus provided in the bottom of the feeder-frame, and the uprights 41 of said frame embrace the sides of the elevator-frame and are rigidly secured thereto, whereby the feeder-frame is mounted upon or carried by the elevator-frame and is arranged to have the two side compartments empty into the elevator at its receiving end.

46 47 designate the primary receiving-hoppers, which are arranged on opposite sides of the elevator-frame and are rigidly secured to the respective ends of the feeder-frame, and these hoppers are arranged to discharge their contents upon the bottoms or floors of the compartments in said feeder-frame. These hoppers are supported on the feeder-frame in elevated positions above the floors thereof, and beneath the hoppers are arranged the reciprocating pushers 48 and 49, the pusher 48 being operatively fitted beneath the hopper 46 and the pusher 49 lying below the hopper 47. The pushers are actuated simultaneously in the same direction beneath the hoppers and within the compartments of the feeder-frame, and as one pusher is receding the other pusher advances, so that the pushers move the grain alternately from one hopper and then the other hopper to the centrally-disposed endless elevator. Each pusher extends across the bottom of the hopper and the compartment of the feeder-frame in which the pusher operates, and it consists of a vertical head 50 and a horizontal cut-off 51, arranged at right angles to the pusher-head and rigidly united thereto in any suitable way. As shown by Fig. 8, each pusher-head and cut-off consists of two members arranged at right angles to each other. The pusher-head may be made from a board or plate which occupies a horizontal position transversely across the feeder-frame, and this board or plate constituting the pusher-head is arranged to present its edge to the bottom of the feeder-frame. The cut-off 51 also consists of a board or plate arranged at right angles to the pusher-head and in a horizontal plane above the upper edge of said pusher-head, so that the cut-off lies in a position at right angles to the vertical plane of the pusher-head. The pusher-head and the cut-off are united firmly together, and they are actuated by the driving connections with the beater-shaft. The pusher-head and cut-off extend transversely across the beater-frame to reciprocate in a rectilinear path when actuated by the driving connections, and this horizontal cut-off is arranged to close the bottom of the hopper when the pusher is moved inwardly toward a centrally-disposed elevator, whereby the cut-off supports the weight of the contents of the hopper. The pusher-head operates close to the bottom of the compartment forming a part of the feeder-frame and the cut-off 51 travels close to the lower edges of the hopper, so that when the pusher is drawn inward to advance the grain into the compartment of the feeder-frame the cut-off closes the bottom of the hopper and prevents the further ingress of grain into the feeder-frame on the inward movement of the pusher. The pushers are actuated simultaneously to travel in the same direction; but the driving devices for said pushers are arranged to move one pusher inwardly and at the same time move the other pusher outwardly, and thus the two pushers are operated to move the grain alternately from the hoppers into the compartments of the feeder-frame. Each pusher is furthermore provided with a horizontal draw-bar 53, the ends of which protrude beyond the pusher-head 50, upon or to which the draw-bar is united, and to the protruding ends of the draw-bar are secured the carrying rods or bars 54, which extend lengthwise of the compartment of the feeder-frame in which the pusher operates. These carrying-bars serve to sustain the pusher in proper operative position on or above the floor of the feeder-frame, and the carrying-bars are slidably supported at opposite sides of the feeder-frame by means of the guides or brackets 55[a]. These brackets are secured rigidly in pairs to the feeder-frame and they sustain the grooved rollers 56[a], which are loosely journaled in the brackets and are properly spaced apart to accommodate the carrying-bars between said rollers. I preferably employ a pair of the carrying-bars, which are arranged at the ends of each pusher and are suitably secured to the draw-bar thereof, and each carrying-bar 54 is supported in two or more of the brackets or guides 55, the pairs of rollers in which guides are in alinement with each other for properly receiving the carrying-bar. It will thus be seen that the carrying-bars are mounted to travel freely in the roller-supporting brackets, and the pusher-head is thus caused to move easily beneath the hopper.

It will be understood that each pusher travels a certain length in the transverse frame, according to the throw of the crank, and this movement is sufficient on the inward travel of the pusher to cause the cut-off plate 49 to close the bottom of the hopper against the continued feed of the grain. The outer edge of the cut-off is beyond the outer wall of the hopper, as shown by Fig. 5, when the pusher-head is at the limit of its inward travel in order to prevent the grain from passing in rear of the pusher-head and from being forced out of the frame on the outward stroke of the pusher. In the operation of transferring the grain from the hopper to the beater and knife mechanism two or more strokes or movements of the pusher may be necessary to feed the proper quantity of grain to the beater, and this end is attained by the pusher moving

one quantity or charge of grain a certain distance, then on the next stroke of the pusher it feeds another charge of grain, which advances the first charge of grain a proper distance to be reached by the beater, and the operation is continued. The described operation is carried out by the pusher and cut-off at each end of the transverse frame.

55 56 designate the beater-shafts, which are arranged transversely across the feeder-frame and on opposite sides of the conveyer-frame 5. These beater-shafts are journaled in bearings 57, secured rigidly to the upper edges of the feeder-frame, so that the shafts lie above the path of travel of the grain as it is advanced through the feeder-frame by the pushers, and these shafts are positively driven by power connections with the longitudinal inclined shafts 16 17, supported on the sides of the elevator-frame. The inner ends of the beater-shafts 55 56, which overhang the elevator-frame, are provided with the sprocket-wheels 59, around which pass the endless sprocket-chains 60, that are driven by the sprocket-pinions 61, secured rigidly on the lower ends of the inclined shafts 16 17. It will thus be seen that the power-shaft 11 drives the beater-shafts through the longitudinal inclined counter-shafts 16 17, the intermeshing bevel-gears 18 18ª, and the sprocket-gearing 59, 60, and 61, and each beater-shaft is driven independently of the other beater-shaft through the counter-shaft and the gearing associated with said counter-shaft, driving-shaft, and beater-shaft. The beater-shafts each carry a series of heads or disks 62, which are secured rigidly and at suitable intervals to said shaft, and these disks or heads extend in series across the upper part of the feeder-frame. To each head or disk on the beater-shaft is secured a series of blades or arms 63, which extend outwardly from the disk on curved lines, and as a series of disks or heads is provided on each shaft the beater is equipped with a large number of the blades or arms for action on the grain to loosen the same as it passes through the feeder-frame and before it is delivered to the endless elevator.

The pusher for each side of the feeder-frame is operatively connected with the beater on the same side of the frame, and this driving connection from the beater to the pusher associated therewith is effected by the employment of cranks 64 or 65 on the beater-shaft, the wrist-pins 66 on said cranks, and the pitmen 67ª, loosely connected to the wrist-pins and to the draw-bar of the pusher-head. As the beater-shaft is rotated by its driving connection with one of the longitudinal inclined counter-shafts the cranks on said beater-shaft rotate therewith to cause the wrist-pins to describe a circle of rotation, and these wrist-pins actuate the pitmen 67ª to reciprocate the pusher. The cranks 64 on the beater-shaft 55 extend therefrom opposite to the cranks 65 on the beater-shaft 56, and as the two pushers are operatively connected by the pitmen with the cranks on said shafts the pushers are actuated to properly advance the grain from the hoppers alternately into the feeder-frame.

As the grain is moved from each hopper into one compartment of the feeder-frame by the pusher the grain is packed or depressed by a vibrating packer mechanism. Two of these packer devices 68 and 69 are provided for the compartments of the feeder-frame, and each packer device is adjacent to the hopper and above the path of the pusher. Each packer consists of a shaft 70, which is arranged transversely across the beater-frame and is journaled in suitable bearings 71 thereon, and to the shaft 70 is secured a series of quadrant-shaped arms 72, which are arranged at proper intervals along the length of the shaft. The ends of the rocking packer-shaft are provided with the cranks 73, to which are pivoted the pitmen 74, arranged at the sides of the feeder-frame and extended to the wrist-pins 66 on the cranks of the beater-shafts. The beater-shafts are operatively connected through their cranks and the pitmen 67ª and 74 with the pushers and the packer-shafts, so that the beater-shafts operate the devices in the feeder-frame by which the grain is advanced and depressed therein.

If desired, the cranks 64 and 65 on the beater-shafts may be provided with independent wrist-pins for the pitmen of the pushers and packer devices; but this arrangement is optional.

76 77 designate vibrating sickle-carrying frames, which are arranged between the packer devices and the rotary beaters, and each sickle-carrying frame is supported above the path of the grain and is adapted to be depressed positively by the arms or blades 63 of the rotary beaters impinging against said frames. Each vibrating frame is preferably in the form of a bail having its arms arranged parallel to the sides of the feeder-frame and with its cross-bar transversely across the feeder-frame, so as to lie in the path of the beater-arms 63 on the rotary shaft of the beater, and said arms of the bail-shaped frame are pivotally supported, as at 78, on the hopper or a part of the feeder-frame. Normally the vibrating frame is sustained in a raised position by the action of lifting-springs 79, suitably connected with the feeder-frame and said vibrating frame, and below the vibrating frame is a horizontal sickle-bar 80. This sickle-bar carries a series of band-cutting knives 81, adapted to be forced into the grain at suitable intervals by the action of the beater-arms on the cross-bar at the free end of the vibrating frame, and this sickle-bar is rigidly secured to the vibrating frame by the vertical arms 82, which are rigidly secured to the ends of the sickle-bar and to the side bars of the vibrating frame at points between the free and pivoted ends thereof.

The operation may be described as follows:

The driving-shaft 11 is rotated by the belt connections with the cylinder-shaft 4, and it propels the longitudinal inclined counter-shafts, which in turn rotate the beater-shafts. These beater-shafts actuate the pushers and the vibrating packer devices, and as the arms or blades on the beater-shafts rotate therewith the vibrating band-knife frames are depressed at suitable intervals into the grain for the purpose of cutting the bands which bind the shocks of grain. The grain is pitched or dumped into the hoppers at either side of the feeder-frame, and it is forced from each hopper on the reciprocating movement of the pusher, which on its inward movement closes the bottom of the hopper against the passage of grain, thus obviating any tendency of the hopper to become clogged or choked on the outward movement of the pusher. As the grain is forced from the hopper the packer-shaft is rocked, so as to bring its arms upon the grain and depress or pack the latter for the grain to properly pass beneath the vibrating sickle-carrying frame, the band-knives of which sever the bands, so as to place the grain in a condition to be loosened or separated by the blades or arms of the rotary beater, which is driven in a direction to assist the pusher in advancing the grain. The beater-shafts are driven in opposite directions and the pushers act alternately, so as to feed the grain from opposite sides of the feeder-frame continuously to the centrally-disposed elevator, which is driven positively by the roller on the driving-shaft 11, and this elevator carries the grain in an upward and rearward direction from the feeder-frame to the transfer mechanism 21. The sections 22 23 of this transfer mechanism are actuated positively by the cranks of the rotary shaft 26, and said sectional transfer mechanism is driven at a relatively-higher speed than the rotary beater 36 above the vibrating transfer mechanism. This beater and the sectional transfer mechanism are actuated from the driving-shaft 11 through the described gear connections, and the grain is thus fed and loosened in its travel from the elevator to the mouth or throat of the separator or threshing-machine.

Changes may be made in the form of some of the parts, while their essential features are retained and the spirit of the invention embodied. Hence I do not desire to be limited to the precise form of all the parts as shown, reserving the right to vary therefrom.

To prevent the rotary beaters on the feeder-frame from lifting the grain as it passes from the feeder-frame to the elevator, I provide the guard bars or rails 83, which are arranged in series over the open space in the center of the bottom of the feeder-frame. These guard rails or bars are preferably curved, as shown by the drawings, and they are fastened at their ends to the feeder-frame. The guard-rails are in alternate relation to the blades or beaters on the rotary shafts, and said blades are thus adapted to sweep in the intervals between said rails, so that the latter will serve to detain or arrest the grain from any tendency to move upwardly with the blades or arms, and thus overcome wrapping of the grain around the beater-shafts.

In order to maintain the endless apron of the elevator in a taut condition and secure a maximum efficiency of operation, the lower idler-roll may be supported in the elevator-frame by slidable boxes, which may be controlled by a suitable tension device, as shown by Figs. 2 and 3 of the drawings.

Having thus described the invention, what I claim is—

1. In a band-cutter and feeder, the combination with a feeder-frame, and an elevator mechanism, of primary hoppers situated at opposite ends of said feeder-frame, pushers having cut-offs arranged to travel beneath the hoppers, and mechanism for reciprocating said pushers and cut-offs, whereby the cut-offs close the bottoms of the hoppers on the inward travel of the pushers to advance the grain into the feeder-frame, substantially as described.

2. In a band-cutter and feeder, the combination with a feeder-frame, and an elevator, of the bottomless receiving-hoppers situated at opposite ends of said feeder-frame, vertical pusher-heads arranged transversely across the feeder-frame to travel beneath said hoppers, cut-offs lying at right angles to the pusher-heads, at the upper edges thereof, and fast with said pushers to reciprocate therewith, and means for actuating the pushers to travel beneath the hoppers and present the cut-offs in positions to close the bottoms of said hoppers, substantially as described.

3. In a band-cutter and feeder, the combination with a feeder-frame, and a centrally-arranged elevator lying at right angles to said frame, of hoppers at opposite ends of the feeder-frame, pusher devices arranged transversely on the feeder-frame on opposite sides of the elevator and arranged to travel beneath the hoppers, carrying-bars slidably supported on the feeder-frame to have rectilinear reciprocating play in a horizontal plane and operatively connected with the pushers to cause the latter to travel with said bars, beater devices situated between the hoppers and the elevator mechanism, and driving connections from the beater devices to the pusher-carrying bars, substantially as described.

4. In a band-cutter and feeder, the combination with a feeder-frame and an elevator mechanism, of the hoppers situated at opposite ends of the feeder-frame, beater devices on the feeder-frame between said hoppers and the points of discharge to the elevator mechanism, horizontal carrying-bars arranged longitudinally of the frame and between the hoppers and the beaters, means for slidably supporting the carrier-bars to guide the latter in a rectilinear path longitudinally of the feeder-frame, vertical pusher-heads

arranged transversely across the feeder-frame to travel beneath the hoppers and secured to the carrying-bars for reciprocation therewith, and driving connections between the carrying-bars and the beaters, substantially as described.

5. In a band-cutter and feeder, the combination with an elevator and a feeder-frame arranged transversely across the elevator and provided at its ends with receiving-hoppers, of the pushers slidably fitted to the frame to travel beneath the hoppers thereof and each provided with a cut-off adapted to close the bottom of the hopper on the inward movement of the pusher, and driving connections for reciprocating said pusher, substantially as described.

6. In a band-cutter and feeder, the combination with an elevator and a transversely-arranged feeder-frame provided with receiving-hoppers at its ends, of the reciprocating pushers slidably fitted to the feeder-frame to travel beneath the hoppers thereof, cut-offs connected to the pushers and arranged at right angles thereto to close the bottoms of the hoppers on the inward travel of the pushers carrying-bars attached to each pusher, supporting-brackets in which the carrying-bars are slidably mounted, and driving connections for actuating the pushers, substantially as described.

7. In a band-cutter and feeder, the combination with an elevator and a feeder-frame provided with the receiving-hoppers, of the fixed brackets within the feeder-frame and supporting-rollers arranged in pairs, carrying-bars slidably fitted in the brackets and between the rollers therein, pushers having draw-bars to which the carrying-bars are fastened, rotary beaters supported on the beater-frame, and driving connections between the beater-shafts and the pushers, substantially as described.

8. In a band-cutter and feeder, the combination with an elevator and a transverse feeder-frame provided with the receiving-hoppers, of rotary beaters situated on opposite sides of the elevator, means for advancing the grain from the hoppers into the feeder-frame, vibrating frames pivotally supported between the rotary beaters and said hoppers and arranged in the path of the beater-blades to be actuated thereby, band-cutting devices carried by said vibrating frames and packer devices between the sickles and the hoppers, substantially as described.

9. In a band-cutter and feeder, the combination with a feeder-frame having the receiving-hoppers, of rotary beaters supported on said frame, pushers slidably fitted to travel beneath the hoppers, vibrating frames supported within the feeder-frame above the path of the grain as it traverses the feeder-frame from the hoppers to the rotary beaters, band-cutting knives carried by said vibrating frames to be depressed thereby into the grain at suitable intervals, and packer devices situated adjacent to the hoppers to depress the grain as it is advanced by the pushers from the hoppers to the band-cutting devices, substantially as described.

10. In a band-cutter and feeder, the combination with a feeder-frame having receiving-hoppers, of rotary beaters supported on said frame, pusher devices slidably fitted below the hoppers, vibrating frames pivotally supported within the feeder-frame and arranged in the path of the beaters to be depressed positively thereby, band-cutting knives carried by said vibrating frames, and devices connected with the vibrating frames for lifting the latter into the path of the beater-blades, whereby the band-cutting knives are reciprocated vertically, substantially as described.

11. In a band-cutter and feeder, the combination with a feeder-frame provided with receiving-hoppers and rotary beaters supported on said frame, of band-cutting devices within the feeder-frame, rocking packer devices situated adjacent to the hoppers and above the path of feed of the grain as it travels from the hoppers to the band-cutting devices, and means for advancing the grain from the hoppers beneath the packer devices and the band-cutting mechanisms, substantially as described.

12. In a band-cutter and feeder, the combination with a feeder-frame and rotary beaters supported thereon, of pusher devices linked to the rotary beaters to be reciprocated by its connections therewith, packer devices supported above the path of the pushers and also having driving connections with the rotary beaters, vibrating frames supported within the feeder-frame above the path of the pushers and lying in the path of the rotary beaters to be actuated thereby, band-cutting knives carried by said vibrating frames, and means for returning the vibrating frames and band-cutting knives to normal positions for the purpose described, substantially as set forth.

13. In a band-cutter and feeder, the combination with a feeder-frame, hoppers supported thereon, and an elevator, of rotary beaters mounted on said frame contiguous to the elevator, packer devices mounted on the feeder-frame adjacent to the hoppers and each arranged to rock in a vertical plane within one of said hoppers, pusher devices supported to travel below the hoppers and the packer devices, driving connections from the beaters to said packer devices, and other driving connections from the beaters to the pusher devices, each packer device being operated on the outward stroke of the pusher to force the grain contained in a hopper into the path of said pusher, substantially as described.

14. In a band-cutter and feeder, the combination with a feeder-frame, hoppers thereon, and an elevator, of rotary beaters driven by said elevator, vibrating frames hung between the hoppers and beaters and arranged

in the path of the beater-arms to be depressed thereby, band-cutting knives carried by said arms, horizontally-reciprocating pushers situated in the feeder-frame to travel beneath the hoppers, packer devices mounted adjacent to the hoppers, above the pushers, and arranged to rock in a vertical plane, and driving connections from the beaters to the pushers and the packer devices, substantially as described.

15. In a band-cutter and feeder, the combination with a feeder-frame, the hoppers thereon, and rotary beaters, of the pusher devices arranged to travel below the hoppers, a rocking packer-shaft mounted adjacent to each hopper above the path of the pusher and having packer-arms arranged to rock in the hopper, and driving connections from the beaters to the packer devices for depressing the packer-arms on the outward movement of the pusher, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

AUGUSTUS JOHNSON.

Witnesses:

L. LAGERSTROM,

S. M. CARLSON.