(No Model.) 4 Sheets—Sheet 1.

A. STARK.

HARVESTING MACHINE.

No. 385,779. Patented July 10, 1888.

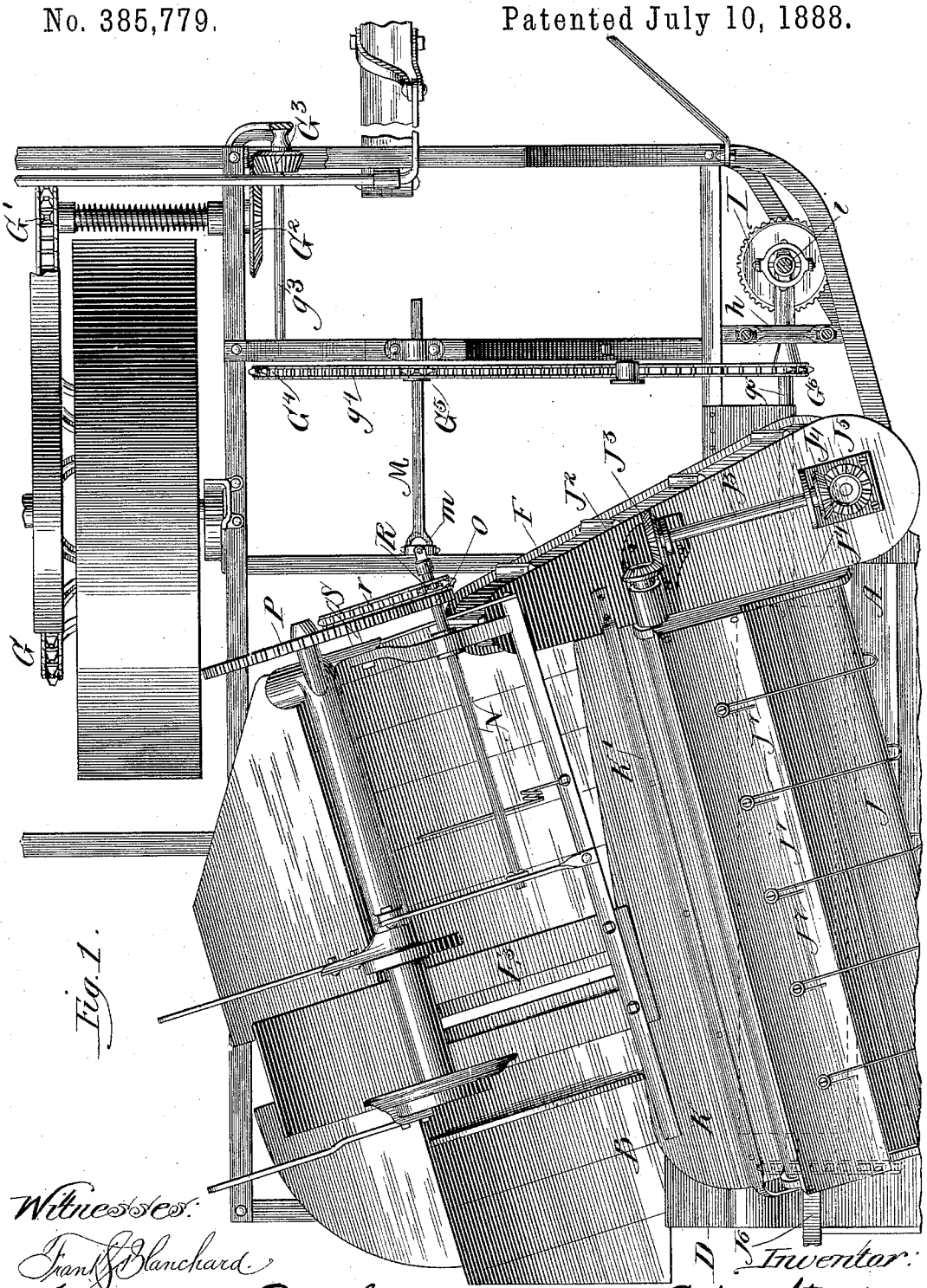

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

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HARVESTING MACHINE.

No. 385,779. Fig. 2. Patented July 10, 1888.

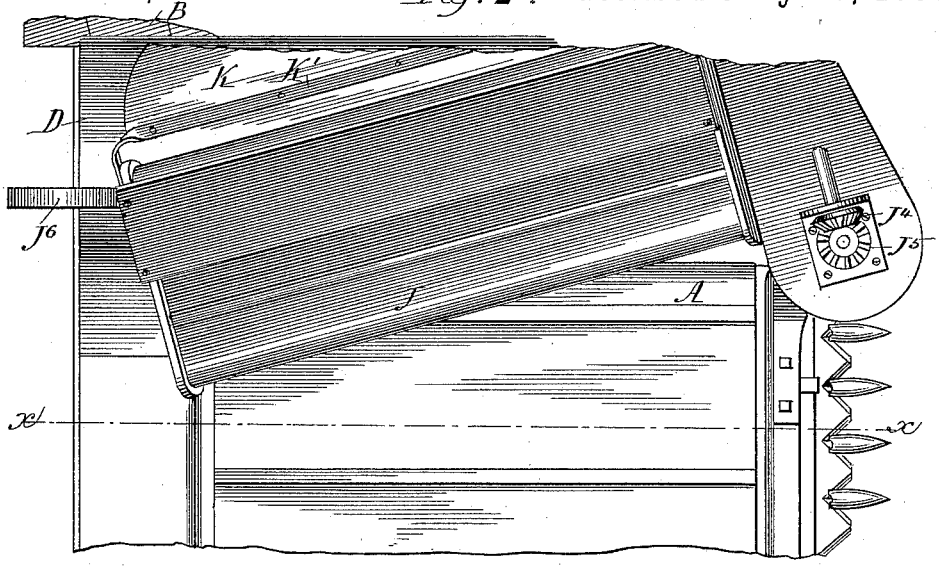
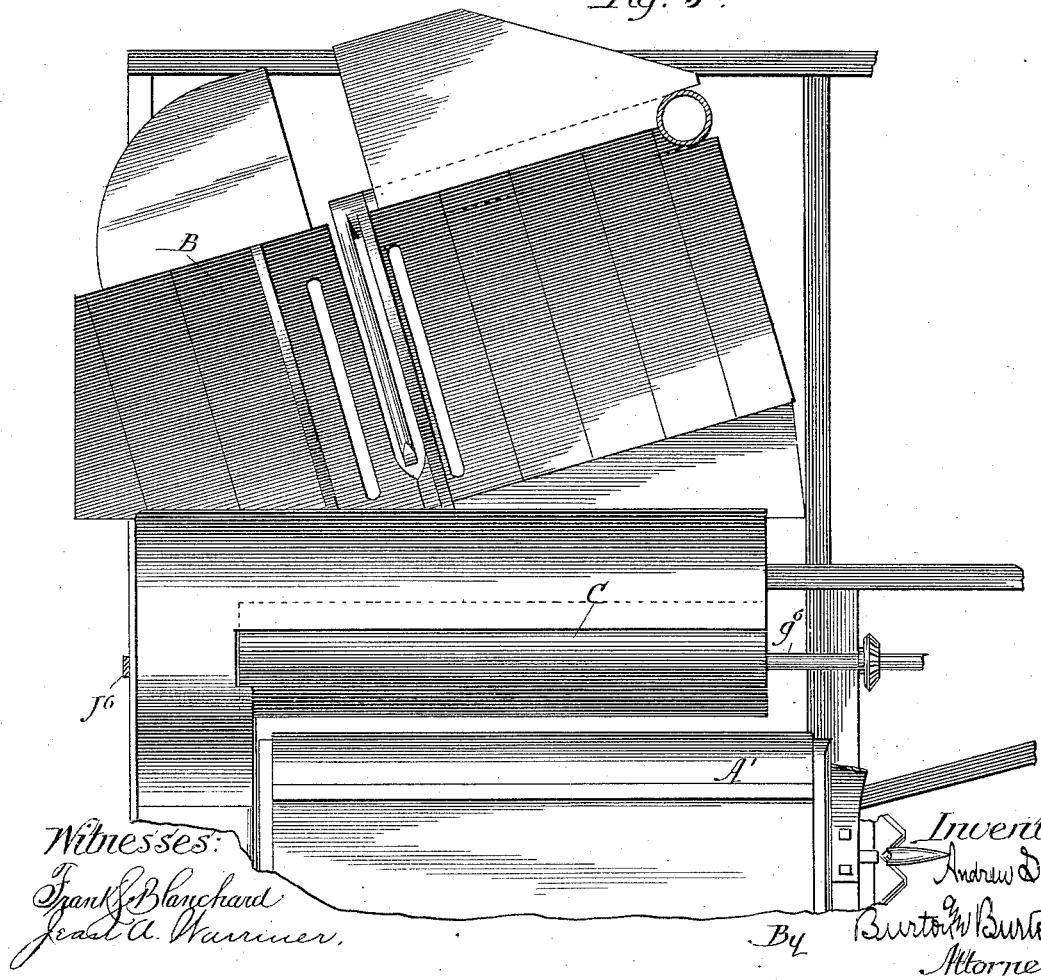


Fig. 5.



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(No Model.) 4 Sheets—Sheet 3.

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HARVESTING MACHINE.

No. 385,779. Patented July 10, 1888.

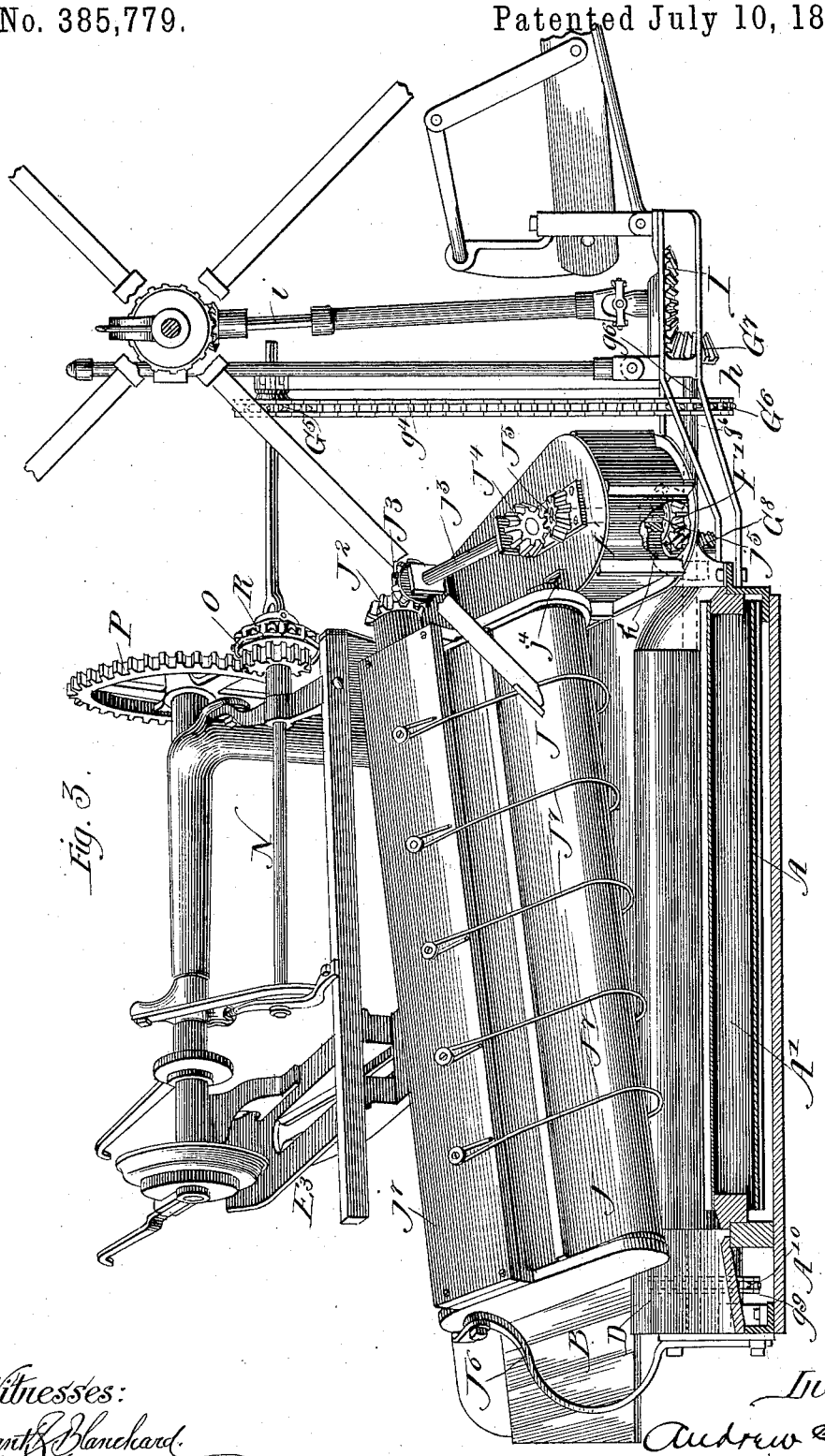

Fig. 3.

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(No Model.) 4 Sheets—Sheet 4.

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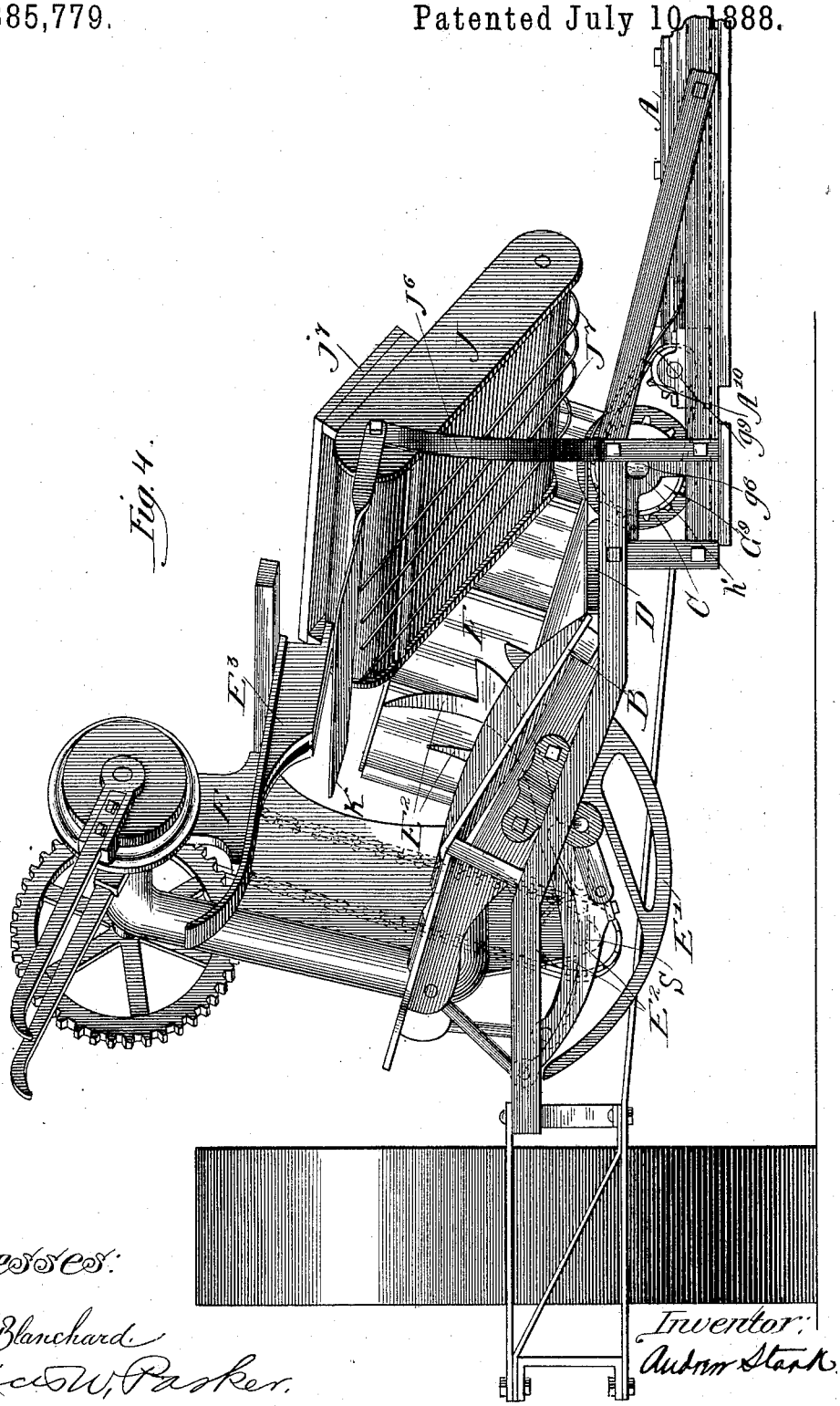
HARVESTING MACHINE.

No. 385,779. Patented July 10, 1888.

Fig. 4.



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UNITED STATES PATENT OFFICE.

ANDREW STARK, OF CHICAGO, ILLINOIS.

HARVESTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 385,779, dated July 10, 1888.

Application filed October 14, 1887. Serial No. 252,362. (No model.)

To all whom it may concern:

Be it known that I, ANDREW STARK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Harvesting-Machines, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming part thereof, wherein—

Figure 1 is a plan of a part of a harvesting-machine embodying my invention. Fig. 2 is a continuation of same plan, showing part of the same and other parts grainward from what is seen in Fig. 1. Fig. 3 is a sectional elevation taken at the line *x x*, Fig. 2. Fig. 4 is a rear elevation of the same parts. Fig. 5 is a detail plan of a deck located intermediately with respect to the platform conveyer and binder-deck, and showing, also, part of said conveyer and binder-deck.

A is the platform-conveyer.

B is the binder-deck.

C is the clearing-roller at the delivery side of the conveyer.

D is the intermediate platform between the roller C and the binder deck B.

E is the binder, which is shown in the familiar form, having the needle E′ and the packers E^2 E^2, operating from beneath the deck and striking upward through it to perform their respective offices.

F is the butting-canvas or butt-adjuster.

J is a device peculiar to my invention, which for convenience of reference I call a "binder-feeder."

The conveyer A is of the most usual form—an endless belt carried upon parallel rollers or drums, the drum or roller A′ at the delivery side being the driver.

The roller C is preferably of considerable size, and smooth. It is parallel to the conveyer-roller A′ and as close to the delivery side of the conveyer as it can safely be placed without being in danger of contact with the slats on the conveyer-canvas.

The intermediate platform or deck, D, is horizontal at the level of the upper surface of the roller C, and consequently, when a large roller is employed, somewhat higher than the surface of the conveyer-platform A. It is wider at the front than at the rear, so that its stubbleward side is oblique to its grainward or receiving side.

The binder-deck rests upon the intermediate platform at the stubbleward side of the latter. Its length is oblique to the line of travel and to the direction of movement of the platform-conveyer, being parallel to the stubbleward edge of the intermediate platform. From that platform it slopes upward in direction obliquely rearward and stubbleward—that is, at right angles to the described oblique direction of its lengthwise extent—and is sustained in the usual manner on the binder-frame. In general the structure of the intermediate platform and the binder-deck does not differ materially from that of the same parts as shown in my patent, No. 360,061, dated March 29, 1887. The driving-train to actuate these parts commences with the master-wheel G, from which a chain passes over the sprocket-wheel G′, at the grain end of whose shaft the bevel gear-wheel G^2 is fast, and meshes with the pinion G^3 on the forward end of the shaft g^3, at whose rear end is fastened the sprocket-wheel G^4, around which a chain, g^4, passes around the sprocket-wheel G^5, which drives the binder, and the sprocket-wheel G^6 on the shaft g^6. This shaft is journaled in the bracket *h*, which is secured to the harvester-frame a little forward of the wheel G^6, and also in the bracket *h*′, secured to the rear sill and rear frame-bars of the harvester-frame. The bracket *h* has bearings for the lower end of the reel-driving shaft *i*, on the lower end of which the bevel gear-wheel I is fastened, and is driven by the bevel-pinion G^7 fixed on the forward end of the shaft g^6. A little farther rearward the bevel-gear G^8, fast on the shaft g^6, meshes with the bevel-gear F′ on the shaft of the driving-drum of the butting-canvas, and so drives the butting-canvas. At the rear the sprocket-wheel G^9, fast on the shaft g^6, by means of the chain g^9, drives the driving-roller of the platform-conveyer by passing around the sprocket-wheel A^{10}, fast on the shaft of said driving-roller A′. Between the bevel-gear G^8 and the sprocket-wheel G^9 the shaft g^6 has fast upon it the clearing-roller C.

The binder-feeder J comprises a frame in which are journaled two parallel rollers, around which passes the endless canvas belt, the con-

struction being similar to the well-known forms of endless conveyers. The driving-roller of this device has its shaft extended through the forward end of the frame and journaled in a bracket which is secured upon the top of the frame of the butting-canvas F, and has pinned fast to it a bevel gear-wheel, J^2, which is driven by the bevel gear-wheel J^3 on the stubbleward end of the shaft j^3, which is journaled in suitable brackets upon the top of the butting-canvas frame, and has pinned fast to it at the grainward end the beveled gear-wheel J^4, which is driven by the beveled gear-wheel J^5, fast on the upper end of the shaft j^5 of the driving-drum of the butting-canvas F. The rear end of the binder-feeder frame is supported by the bracket J^6, which is secured to the rear sill and other frame-bars of the harvester-frame, and has a pivotal connection at its upper end with the feeder frame, said pivot being in line with the axis of the driving-roller of the feeder, and the shaft of said roller may constitute said pivot. The driving-roller of the feeder is stubbleward of its two rollers, and the entire device is thus pivoted upon the shaft of its driving-roller at the stubble side and has its grainward side free to oscillate up and down. The rollers of the feeder are located in vertical planes oblique to the vertical plane of the conveyer-roller and substantially parallel to the vertical plane through the stubbleward edge of the intermediate platform, or the receiving edge of the binder-deck, so that the feeder-canvas moves in direction substantially as much oblique to that of the conveyer A as the lengthwise direction of the binder-deck is oblique to that of the conveyer-rollers and the roller C and the intermediate platform, D, at its receiving edge.

As seen in Fig. 3, the binder-feeder J is a little lower at the rear than in front, which is incidental to the fact that the feeder being oblique to the roller C, as seen in plan, and also being in all ordinary operative positions inclined upward from its grainward to its stubble side, a vertical plane through the axis of the roller C would intersect the feeder-surface farther from its receiving side at the rear end than at the forward end, and hence, if its rollers were horizontal, higher at that rear end than at the forward end—that is to say, if the feeder-rollers were horizontal, the space between the roller C and the feeder overhanging it would be wider at the rear end. This space may be termed the "binder-mouth." It is not desirable that it should be materially wider at one end than at the other, and for that reason the feeder J is preferably depressed somewhat at the rear end.

As indicated in the foregoing description, the feeder at its grainward or receiving side overhangs the roller C. It also extends grainward far enough so that it overhangs also the platform-conveyer, its oblique position causing it to overhang considerably farther at the rear end than at the front, and, as shown, at the front end the delivery side of the platform-conveyer and the receiving side of the binder-feeder are about in the same vertical plane; but I do not lay stress upon the exact relative positions of these two elements.

In order to prevent straw from being carried over by the feeder J, (though there is very little liability to that, except in the case of branching weeds which may be among the grain,) I employ the stripping-wires J^7, secured to the cross-board j^7 of the feeder-frame and bent down around the grainward roller outside the canvas, and extending thence up along the under side of the same beyond the delivery side of the feeder. These wires should be so light and lie so close to the canvas as not materially to prevent the latter from having its full feeding action upon the straw beneath it.

At the delivery side of the feeder J is located the guide plate or lip K, which is upheld by being fastened to the bar K′, secured to the upper side of the butting-canvas frame at the forward end, and to the upper end of the bracket J^6 at the rear end. This lip K has its grainward edge nearly touching the slats of the feeder J, and the ends of the wires J^7 extend stubbleward beyond that edge of the plate, so that it is rendered practically impossible for straw to be carried up and over by the feeder. The stubbleward edge of the lip K extends under the breast-plate E^3.

The needle E′ and the packers E^2 E^2 operate upwardly through the binder-deck in vertical planes substantially parallel to the direction of action of the feeder J—that is, at right angles to the lengthwise extent of the binder-deck—and the delivery side of the feeder J approximately overhangs the point at which the needle and packers penetrate the deck in their upward movement, preferably extending a little stubbleward beyond that point, so that its action overlaps slightly that of the packers. The packers strike up toward the lip K, which affords the needful resistance to enable the packers to penetrate and compact the grain as they feed it forward under the breast-plate. In general the action of this combination of devices will be obvious without further detailed description; but the effect and operation of the feeder J are somewhat peculiar, and the purpose it serves is not entirely obvious from mere inspection of the mechanism itself without witnessing it in actual operation in the field, and I will therefore describe its action and purpose specifically. When the straw is heavy, whether bulky or not, its weight as it rests upon the conveying and feeding devices, which operate upon it from beneath, gives these devices good grasp upon it, so that even the smooth roller C will be effective to feed it on from the conveyer A, and notwithstanding that in so doing it must elevate it several inches it will force it onto the intermediate platform, and even more effectually will the packers, operating upward from beneath the deck, engage and feed the grain forward to

the proper position for binding; but when the straw is very light, on account of being very ripe, and especially if it is so tangled that it does not lie so compactly as straight straw would lie, feeding devices operating upon it from beneath, even when they are of the most positive sort, as rakes having long teeth to engage it, or the packers, whose teeth are calculated to penetrate it, fail often to get any effective grasp upon it, but, instead of feeding it onward, will merely toss it up and down or operate impotently underneath it while it accumulates on the conveyer-platform, and especially at the delivery side thereof, until its bulk defeats all possibility of the desired operation. This defective action is not particularly in the horizontal platform-conveyer; but as soon as any impediment is encountered—as an upward slope or the necessity of a change of direction—it is manifested.

In machines of the class to which this invention belongs, wherein the grain is deflected rearward after leaving the platform, there is also the necessity for devices to effect this deflection, and also means for straightening the grain, which often falls upon the platform in all directions, and all these purposes must be accomplished in the short interval between the conveyer and the binder-deck. I find that the overhanging binder-feeder J will accomplish these results when located in the oblique position shown, and extending the entire width of the platform-conveyer and overhanging it, as shown, and operating in conjunction with the clearing-roller C, for the grain, however light, will be engaged positively by it at its grainward end, which floats upon the grain, so that its weight, and not the weight of the straw, gives it grasp; but in order that it may not fall down so far as to actually rest upon the roller C, I provide a little stop, j^4, on the forward end of the frame, which stops upon the upper head of the butting canvas frame, and allows the feeder J to approach only within an inch or two of the roller C. Its oblique position and direction of action, taken in conjunction with the similarly-oblique extent of the upward-sloping binder-deck, causes it to tend to bring all the grain under its action into similar oblique position, and this action comprises two separate processes, deflecting the grain from the position in which it is delivered off the platform-conveyer and rendering it parallel.

I am aware that the deflecting of the grain has been attempted, and may be accomplished, by a belt similarly located, except that it was of slight width and operated only upon the butts or forward part of the straw; and to some extent such a device tends also to render the straw under its action parallel, but frequently the straw falls upon the platform almost butts foremost—that is, so that it travels on the conveyer toward the binder butts foremost—and such straw, when engaged by any device which acts only over a small part of the width of the platform and deck, will not have its position corrected, but will be fed almost endwise into the binder, whereas with my binder-feeder extending across the whole width of the platform such straw is turned to proper position parallel with the rollers of said feeder in time to enter the binder properly. When the grain is thin, the feeder J falls and leaves only sufficient space between itself and the roller C for the small quantity of grain to pass, but still engages and feeds that small quantity. When it is very bulky, it rises upon the straw as it gathers it under itself and affords ample room for it to enter, but meanwhile by its weight tends to compact it, thus assisting the packers.

Since in ordinary conditions of grain, and even in cases of extraordinary bulk, the stubbleward side of the feeder is farther from the deck than the grainward side, there exists space into which the stream of grain fed in under the receiving edge of the feeder accumulates to greater depth than that of the stream as it passed under the said receiving edge, and in the intervals while the needle is up, and forms a barrier at the stubble side, the grain fed in this space is rolled over and over by the overhanging feeder, and in that process is thoroughly straightened and rendered parallel, and even if very much tangled and confused is rendered somewhat uniform and adapted to make regular bundles. The action of the butting-belt F and its co operation with the other devices to deflect the grain and render the butts even are well understood, and are fully set forth, also, in my patent, No. 360,061, above mentioned. It does, however, co-operate more effectively with the feeder J than with any deflecting or straightening device which does not extend across the entire width of the platform. The speed of the two belts—that of the butter and that of the binder-feeder—should be approximately the same.

In order that the bracket J^6 may not impede the heads of extra long grain, I bow it out rearward between the level of the platform D and the feeder J at the point where it is secured thereto.

The binder mechanism receives power from the shaft M N, the forward part of which, M, is square and slides through its driving sprocket-wheel G^5, which is journaled on the harvester-frame, and the rear part, N, of which is journaled in the binder-frame and connected to the forward part, M, by a universal joint at *m*. This construction and the purpose of it are the same as in my patent, No. 360,061, dated March 29, 1887. On the rear part, N, of this shaft are two wheels; O a gear-wheel which meshes with and drives the main binder gear-wheel P, and R a sprocket-wheel which, by means of a chain, *r*, drives the packer-shaft S, which is located below the deck.

The tripping and clutching mechanisms may be as usual, and are not herein shown or described.

I claim—

1. In combination with the sidewise-delivering platform-conveyer and the obliquely-situ-

ated upward-sloping binder-deck, the binder-feeder J, having its shafts situated and its surface operating obliquely with respect to the conveyer, and of substantially the full width of the latter, and having its receiving side overhanging the conveyer and its delivery side overhanging the binder-deck, substantially as set forth.

2. In combination with the sidewise delivering platform-conveyer and the obliquely-situated binder-deck, the packers operating in vertical planes oblique to the vertical plane of the conveyer's movement, and the binder-feeder J, situated obliquely with respect to the conveyer, and operating in vertical planes substantially parallel to those of the packer's movement, said binder-feeder being of substantially the full width of the conveyer, and having its receiving side overhanging the platform-conveyer at the rear and its delivery side overhanging the binder-deck, and having its grain-actuating surface sloping upward from its receiving to its delivery side, substantially as set forth.

3. In combination with the sidewise delivering platform-conveyer and the obliquely-situated binder-deck, the packers operating from beneath the deck upward through the same in vertical planes oblique to the vertical planes of the conveyer's movement, and the binder-feeder J, having its grain-actuating surface sloping upward from its receiving to its delivery side, and operating in vertical planes substantially parallel to the packer's movement and overhanging the binder-deck, and extending stubbleward to a point beyond the grainward sweep of the packers, and overhanging their points of emergence through the deck, substantially as set forth.

4. In combination with the sidewise-delivering platform-conveyer and the obliquely-situated binder-deck, the packers operating from beneath the deck upward through the same in vertical planes oblique to the planes of the conveyer's movement, and the binder-feeder J, having its receiving side overhanging the conveyer at the rear and its delivery side overhanging the points of emergence of the packers through the deck, said binder-feeder having its rollers oblique to the conveyer-rollers and its grain-feeding surface moving in directions substantially parallel to the vertical planes of the packers, and inclined upward from its receiving to its delivery side, substantially as set forth.

5. In combination with the sidewise-delivery platform-conveyer, the clearing-roller at its delivery side, the binder-deck situated obliquely with respect to the conveyer and clearing-roller, the packers operating in vertical planes oblique to the conveyer's movement, and the binder-feeder J, consisting of an endless belt whose shafts are situated obliquely with respect to the conveyer and clearing-roller and operating in direction substantially parallel to the vertical planes of the packer's movement, overhanging at its receiving side substantially the whole length of the clearing-roller, and at its delivery side overhanging the binder-deck, substantially as set forth.

6. In combination with the sidewise-delivery platform-conveyer and the obliquely-situated binder-deck, the clearing roller at the delivery side of the conveyer, the packers operating from beneath the binder-deck upward through the same in vertical planes oblique to the vertical planes of the conveyer's movement, and the binder-feeder J, operating in vertical planes substantially parallel to the packer's movement, overhanging at its receiving side substantially the entire length of the clearing-roller, and at its delivery side overhanging the points of emergence of the packers through the binder-deck, substantially as set forth.

7. In combination with the sidewise delivering platform-conveyer and the deck or platform located stubbleward therefrom, the binder-feeder J, having its rollers oblique to the vertical plane of the conveyer-rollers and its grain-actuating surface inclined upward from its receiving to its delivery side and having its receiving side overhanging substantially the entire width of the conveyer, substantially as set forth.

8. In combination with the sidewise-delivering platform-conveyer and the deck or platform toward which it moves the grain, the binder-feeder J, having its rollers oblique to the vertical plane of the conveyer-rollers, and pivoted about the axis of the roller at the discharge side, and having the receiving side free to oscillate up and down and overhanging substantially the entire width of the platform-conveyer, substantially as set forth.

9. In combination with the sidewise-delivering platform-conveyer and the binder-deck located obliquely thereto, the packers operating in vertical planes oblique to the movement of the conveyer, and the binder-feeder J, having the vertical plane of its movement substantially parallel to that of the packers, pivotally supported at its discharge side, and having its receiving side free to oscillate up and down and overhanging substantially the entire width of the platform-conveyer.

10. In combination with the sidewise-delivering platform-conveyer and the clearing-roller at its discharge side, the platform or deck toward which it discharges, and the binder-feeder J, having its rollers oblique to the clearing-roller and pivoted near its discharge side, and having its receiving side overhanging substantially the entire length of the clearing-roller and free to oscillate up and down, substantially as set forth.

11. In combination with the sidewise-delivering platform-conveyer and the clearing-roller at the discharge side thereof, the binder-deck located obliquely with respect to the conveyer, the packers operating in vertical planes oblique to the movement of the conveyer, and the binder-feeder J, the vertical plane of whose movement is substantially parallel to that of

the packers, pivotally supported near its discharge side and free to oscillate up and down at its receiving side, which overhangs substantially the entire length of the clearing-roller, substantially as set forth.

12. In combination with the conveyer-platform and the clearing-roller at the delivery side thereof, the binder-feeder J, oblique to the conveyer and sloping upward from the receiving to the discharge side and overhanging substantially the whole width of the platform and the whole length of the clearing-roller, said clearing-roller having its upper surface higher than the carrying-surface of the conveyer, whereby the binder-feeder is enabled to hang close down to the roller without striking the platform-conveyer, notwithstanding its oblique position and its slope, substantially as set forth.

13. In combination with the binder-deck and the packers operating upward from beneath the same, the overhanging binder-feeder J, consisting of an endless belt carried upon parallel rollers extending substantially across the entire width of the deck and free to oscillate up and down at its receiving end, and the guide sheet or lip K, located at the discharge side of the binder-feeder and extending thence stubbleward under the breast-plate, said feeder and lip together overhanging the entire course of the packers, substantially as set forth.

14. In combination with binder-deck and underneath packers, the binder-feeder J, and the guide sheet or lip K at its discharge side, and the stripping-wires J', secured to the feeder-frame and passing around its receiving side and along its under face and lapping under the lip K at the discharge side of the feeder, substantially as set forth.

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