(No Model.) 4 Sheets—Sheet 1.

A. STARK.

BUNDLE CARRIER FOR GRAIN BINDERS.

No. 479,677. Patented July 26, 1892.

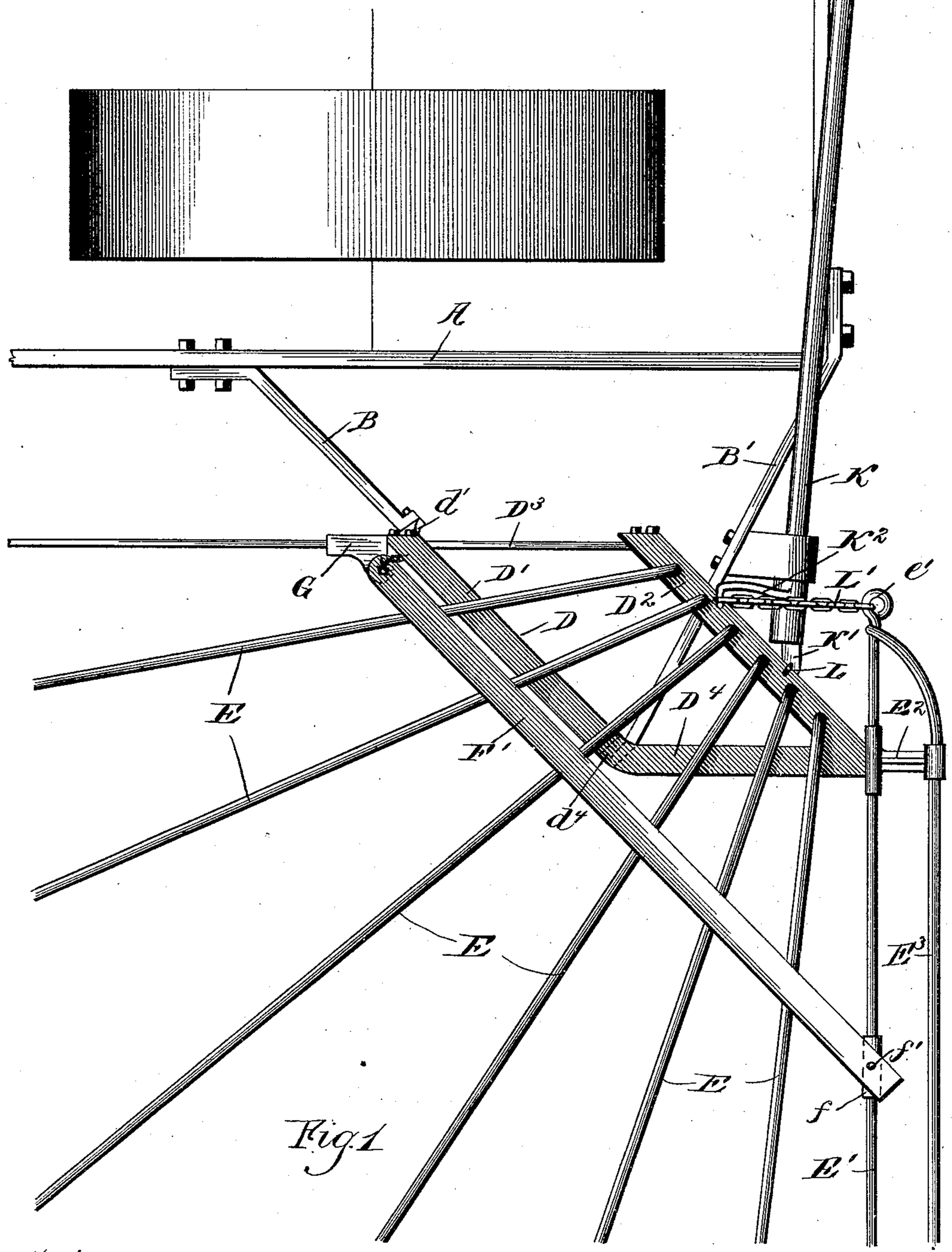

Fig. 1

Witnesses.
J. L. Junison.
Jean Elliott

Inventor:
Andrew Stark
By Burton & Burton his Attys

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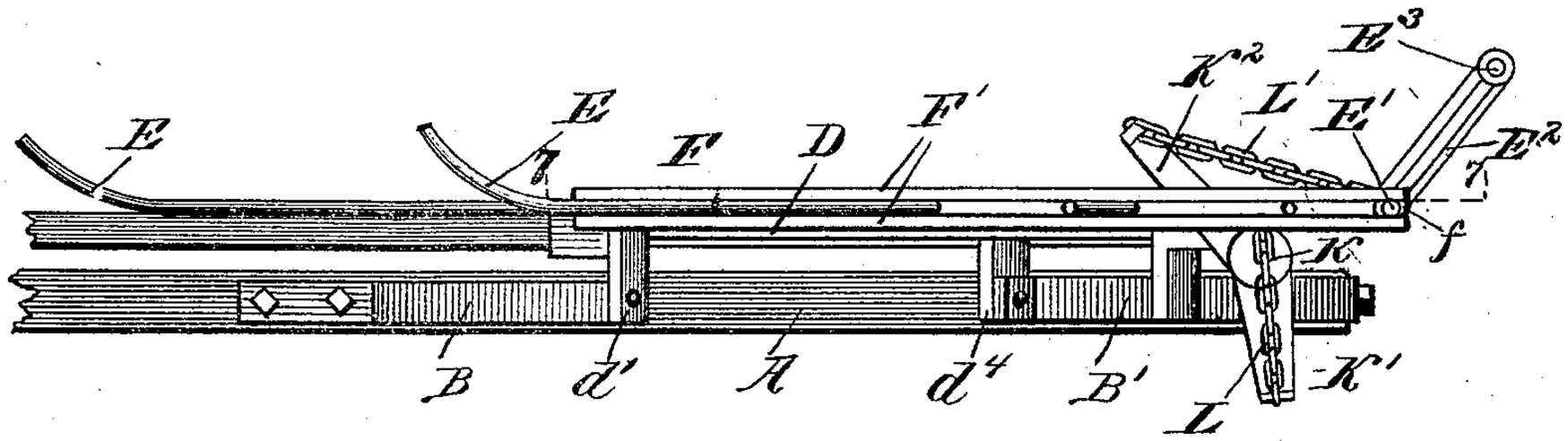
Fig 2



Witnesses.
J. L. Tunison.
Jean Elliott

Fig 3

Inventor:
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his attys

(No Model.) 4 Sheets—Sheet 3.

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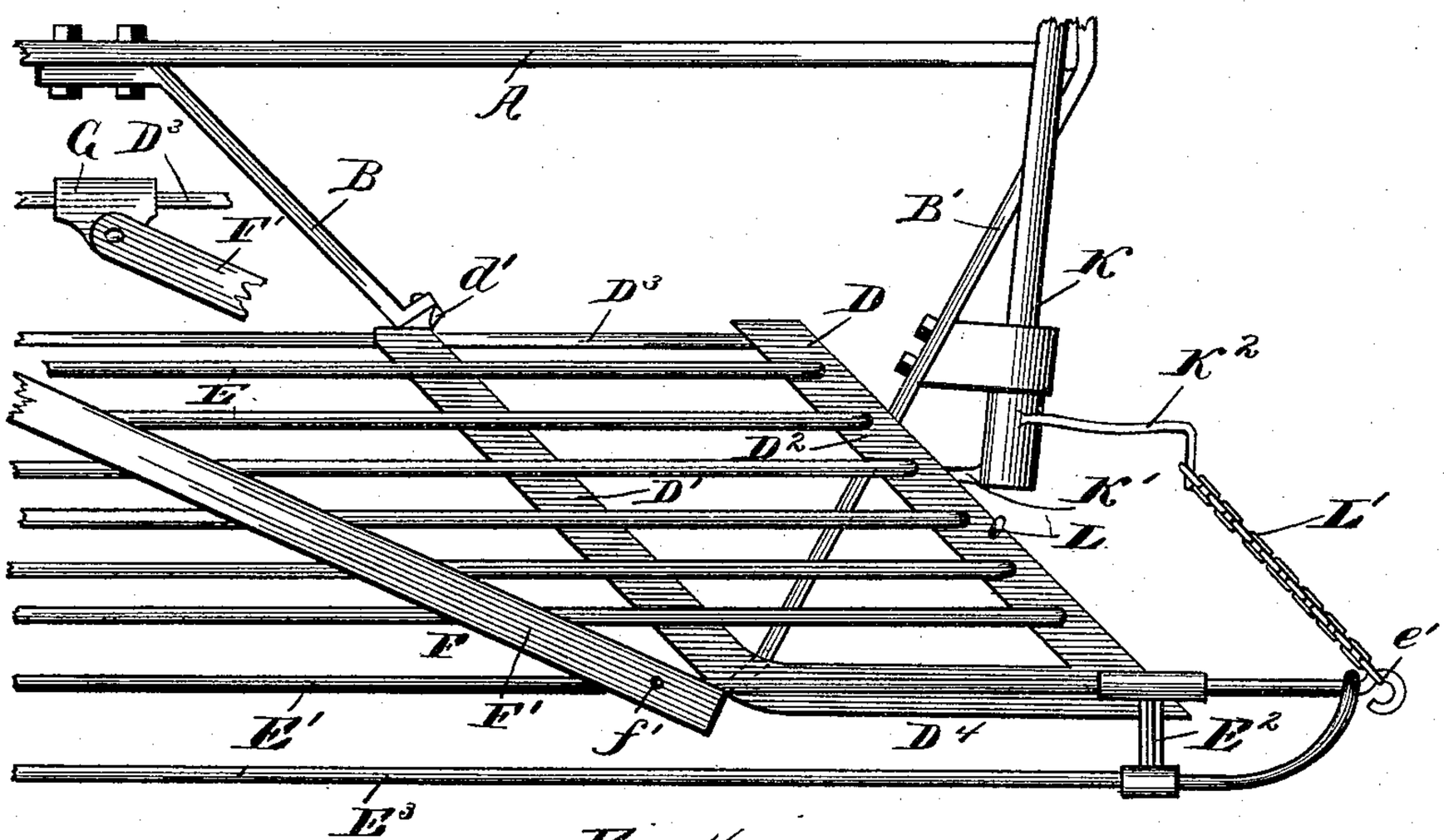

Fig 4

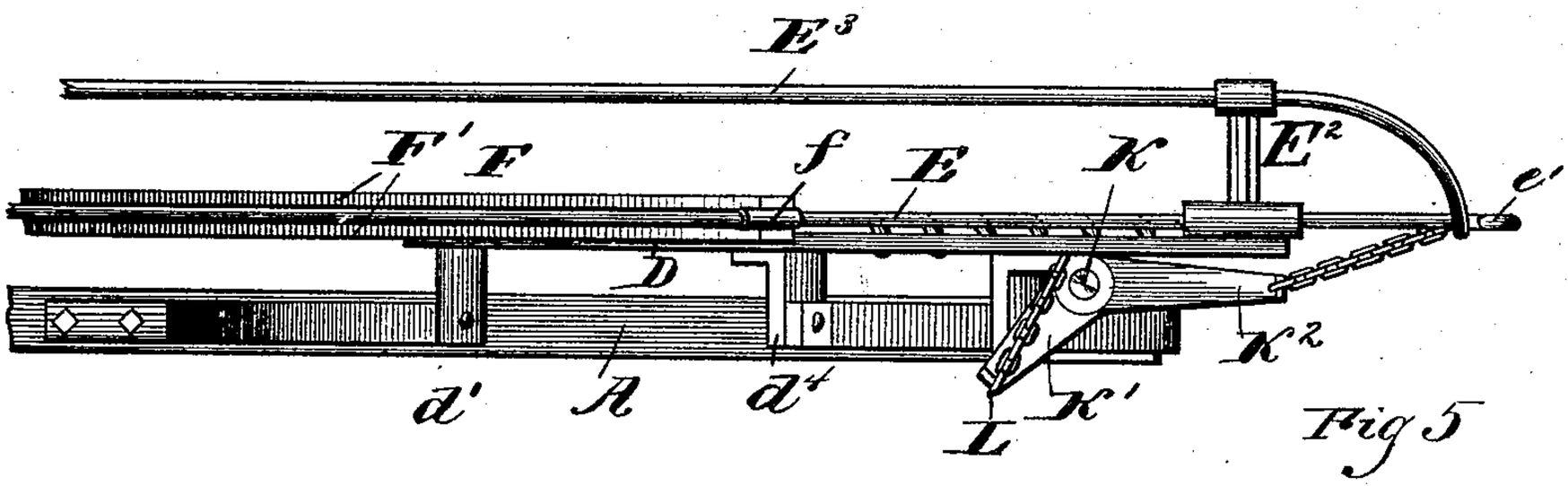

Fig 5

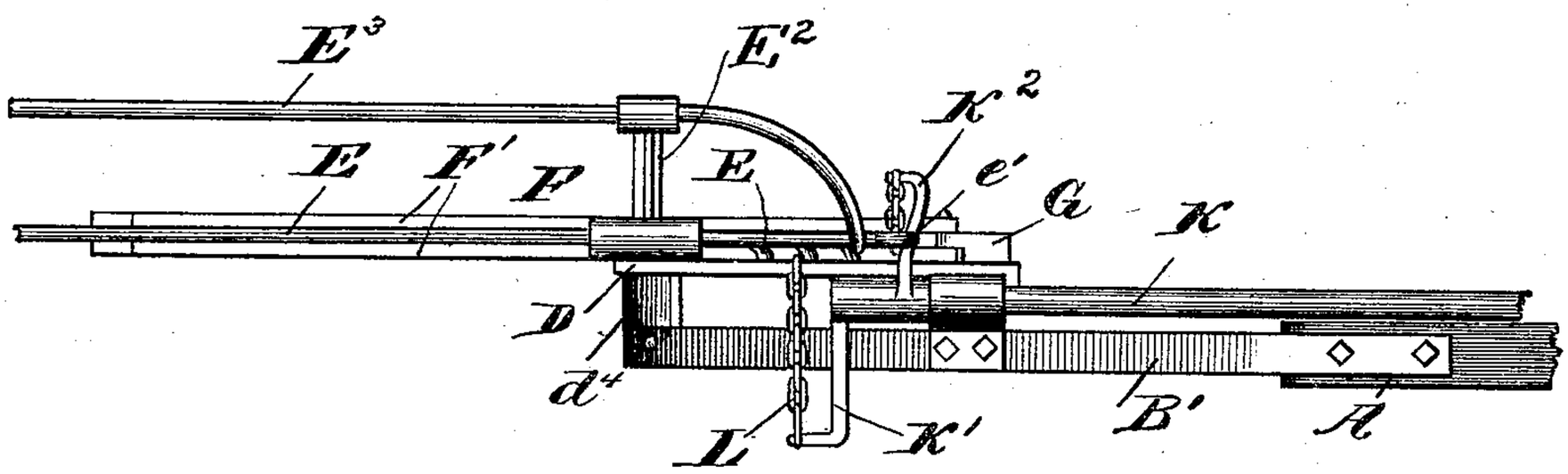

Fig. 6

Witnesses.
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Jean Elliott

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(No Model.) 4 Sheets—Sheet 4.

A. STARK.

BUNDLE CARRIER FOR GRAIN BINDERS.

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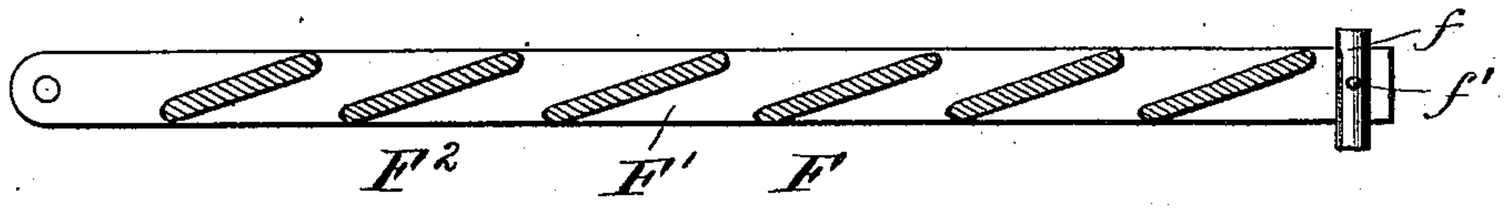
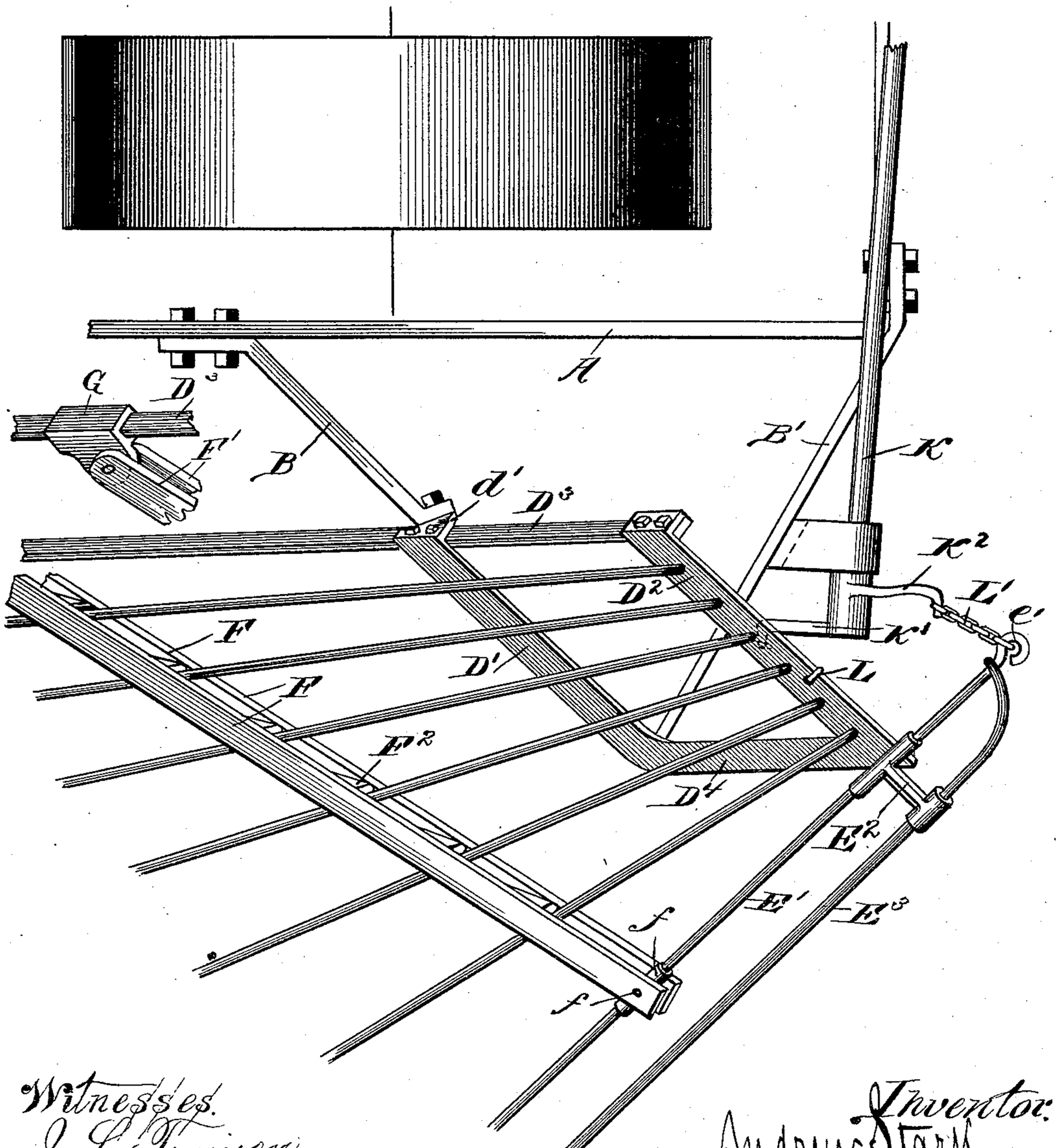


Fig 7



Witnesses.
J. L. Tunison.
Jean Elliott

Fig. 8

Inventor:
Andrew Stark
By Burton & Burton
Their attys.

UNITED STATES PATENT OFFICE.

ANDREW STARK, OF CHICAGO, ILLINOIS.

BUNDLE-CARRIER FOR GRAIN-BINDERS.

SPECIFICATION forming part of Letters Patent No. 479,677, dated July 26, 1892.

Application filed January 18, 1892. Serial No. 418,424. (No model.)

To all whom it may concern:

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

Figure 1 is a plan of my improved carrier, shown in connection with the parts of a harvester-frame to which it is immediately attached, the remainder of the harvester being broken away and omitted, the carrier being shown expanded and protruded in position to receive the bundle. Fig. 2 is a stubbleward side elevation of the carrier in the same position in which it is shown in Fig. 1. Fig. 3 is an elevation from the same point of view, showing the carrier tilted down as when the bundle is to be discharged. Fig. 4 is a plan showing the carrier collapsed, as when folded out of use or to avoid an obstruction in driving. Fig. 5 is a stubbleward side elevation of the same. Fig. 6 is a front elevation of the carrier in the position shown in Fig. 1. Fig. 7 is a section at the line 7 7 on Fig. 2. Fig. 8 is a plan showing the carrier tilted down and partly collapsed, as is usually the case at the instant of discharge of its load.

A represents the stubbleward bar of the frame of the harvester.

B and B′ are two arms, which project rigidly from said frame and constitute the supports to which the carrier is pivoted and over which it tilts. The construction illustrated in this respect is a preferred one only, and not an essential one in detail, said construction being that the bar B′ is bolted to the frame A at the forward stubbleward corner and extends obliquely rearward and stubbleward in a horizontal plane, while the bar B, which is bolted to the stubbleward side of the frame, extends thence in the same horizontal plane with the bar B′, stubbleward and obliquely forward, said bars B and B′ having, respectively, their stubbleward ends in a line at an angle of substantially forty-five degrees to the line of travel, which is the direction of the bar A—that is to say, said line containing the ends of the bars B and B′, being the pivotal line of the carrier, as hereinafter explained, extends obliquely forward and at an angle of forty-five degrees, and the direction of the bar B is approximately in the same line, which is substantially the line of the chord of an arc which would be struck by a radius of the length of the bar B′ from the stubbleward and forward corner of the frame to the point at which the carrier is pivoted to said bar. The specific purpose of thus arranging and proportioning these parts is to afford the greatest possible resistance to bending of said bars B and B′ and distorting the carrier from its true position by encountering an obstacle as the machine advances. In such event, in order that the bar B′ should be bent rearward by the force of the arrested movement of the machine, since it would bend, if at all, first and chiefly at the corner of the frame where it is secured, it would permit the force which would bend it to be transmitted substantially in the direction of the chord of the arc which would be described by its outer end. The bar B being placed with its length substantially in that line is opposed in the most effective manner to such bending movement, and the structure is thus given the greatest possible capacity in proportion to the mass of said bars for resisting distortion from such cause.

D is a rigid frame, which is hereinafter referred to as the "carrier-frame." It has two sides D′ and D^2, substantially parallel and at an angle of about forty-five degrees to the other two sides D^3 and D^4, which are substantially parallel with the line of travel when the carrier is in elevated position adapted to receive the bundles. The carrier is pivoted to the bars B and B′, the pivotal line being below and substantially parallel with the side D′ when the carrier is horizontal. The lugs d' and d^4, projecting from said frame, afford ample opportunity for pivoting the carrier to the ends of the bars B and B′, respectively, the pivot-bolts at those points serving, therefore, to secure the carrier to the harvester-frame.

E E E E, &c., are rods, which constitute the carrying-bars or fingers of the carrier. They are pivotally connected at one end to the side D^2 of the frame D, the most convenient and entirely effective mode of so connecting them being to form a hook on the end of each rod and insert such hook down through a hole in

the bar D^2, so that the said rods E have pivotal action in a horizontal plane, or, to speak more generally, in the plane of the frame D about their pivotal connections, respectively, to the side D^2 of said frame D. In such pivotal action the rods may rest upon and be supported by the sides D′ and D^4 of the frame, over which they extend stubbleward and rearward divergently. F is a bar, which I prefer to cast of malleable iron, though it may be otherwise formed, through which the rods E extend. This bar is connected to the side bar D^3 of the frame D, said side bar extending beyond the bar D′ of said frame, such connection being made by the sleeve G, which slides on the bar D^3, the bar F being pivoted to said sleeve in such manner that it has movement about its pivot in the plane of the rods E.

E′ is an additional rod, which, besides serving the same purpose as the rods E, has other functions, which will hereinafter appear. It has rigid with it the upstanding arm E^2, which serves to support and maintain at a position higher than and in rigid relation to said rod E′ the rod E^3, which is rigidly secured to the upper end of the arm E^2. Said arm E^2 is pivoted to the foremost corner of the frame D, a downwardly-projecting stud from said arm E^2 passing through the frame D to effect such pivotal connection thereto. The rod E′ extends grainward beyond the arm E^2, and at its grainward end has the eye *e′* for the purpose of a connection hereinafter described, and the rod E^3 extends grainward and is bent downward beyond the arm E^2 and finished with an eye, which encircles the rod E′ back of the eye *e′*. The rod E′ passes through the bar F and is connected thereto by a vertical pivot, a sleeve *f*, with opposite vertical studs, being made fast to the rod E′ for the purpose of effecting such pivotal connection, the studs *f′* on said sleeve having suitable bearings in the bar F. Said bar F comprises upper and lower members F′ F′, connected by short vertical webs F^2 F^2, &c., said webs being oblique to the length of the bar, the proximate ends of consecutive webs being so situated that the rods E may extend between them and be stopped by them in proper position when the carrier is fully spread. The obliquity of said webs with respect to the length of the bar F is determined by the direction of the rods E with respect to said bar when the carrier is collapsed, as seen in Fig. 4, the rods E and the webs F^2 being in that position of the carrier substantially parallel.

Considering the structure thus far described, it will be seen, in the first place, that it is capable of being rocked over the line of the pivots of the frame D to the bars B and B′, being a line substantially at forty-five degrees to the direction of travel, so that the carrier rocking over such pivots will tilt downward at the rear end and obliquely stubbleward and rearward, so that anything thereon would be dumped rearward and away from the machine; second, it will appear that the carrier is capable of being collapsed by force directed rearward, applied at the forward side—as, for example, against either of the foremost rods E′ or E^3, stubbleward from the connection of said rods to the frame D—that is, at any point stubbleward of the vertical plane of the side bar D^4 of the frame D and the arm E^2, which is in the same vertical plane when the carrier is horizontal—and that in such collapsing movement the rod E′ swings rearward at its pivotal connection with the bar F, and pushing said bar rearward will cause the sleeve G at the other end of that bar to slide on the frame-bar D^3, and in so doing to carry the rods E each around rearward until they reach positions parallel with the bar D^3, as seen in Fig. 4, and that when that position is reached the entire carrier is substantially within the compass, stubbleward, of the frame D. It is a matter of preference only, not of necessity, that the upper rod E^3 stands not directly above but slightly outward from the rod E′—that is to say, forward from a vertical plane of the latter rod when the carrier is spread. It will be understood without more particular illustration that the carrier in this collapsed condition does not extend farther stubbleward than the usual stubbleward line of the binder-deck, under which it would swing in thus collapsing. The mechanism for producing and controlling the movements of which this carrier is capable comprises a rock-shaft K, suitably journaled on the harvester-frame and extending transversely to the direction of travel at the forward side and provided at the stubbleward end with two cranks K′ and K^2. These cranks are about one hundred and thirty-five degrees apart. The crank K′, when the carrier is in elevated and expanded position, extends about vertically downward from the shaft K, and from the end of the crank a chain L extends to the bar D^2 of the frame D, said chain being substantially in or a little past the plane of the shaft K and crank K′ when the crank is in the position described, the carrier being horizontal and expanded. This relation of the parts prevents the weight of the carrier's load, which is located mainly stubbleward from the line of its tilting axis, from dumping the carrier, as it otherwise might, the stress of the chain L, caused by the load, operating upon the crank at or a little past the center, on the side, where its tendency to rock the shaft is resisted by the chain L′ pulling on the crank K^2, as hereinafter explained. When, however, the shaft K is rocked, (connections for that purpose being provided at its grainward end,) the crank K′, being thrown rearward and upward, permits the carrier to be tilted by the weight of its load, which is thereby dumped rearward and stubbleward to the ground. The crank K^2, extending, as stated, at an angle of about one hundred and thirty-five degrees from the crank K′, projects rearward and upward when the carrier is horizontal and expanded, as seen in Fig. 2, and from

its end the chain L′ extends downward and forward to the eye *e′* at the rear end of the rod E′. When the shaft K is rocked for the purpose of permitting the carrier to tilt, the crank K^2 passes to the position shown in Fig. 3, where it extends upward and forward, and the carrier tilting over its axis, which is at an angle of forty-five degrees to the line of travel, carries the eye *e′* of the rod E′ upward and rearward to the position shown in Fig. 3. The lengths of the chains L and L′ are such that they are brought taut by the time the carrier has tilted to the proper position for discharging its load, so that no effect is produced by the crank K^2 and the chain L′ in such ordinary tilting action of the carrier, except to arrest the tilting by checking the rocking movement of the shaft caused by the pull of the chain L on the crank K′, and when the shaft K is rocked in the reverse direction to throw the crank K′ down again, and thereby tilt the carrier back to its horizontal position, the crank K^2, rocking back and carrying the chain L′ back to the position shown in Figs. 1 and 2, is without effect. When the ends of the carrier-rods E E, &c., touch the stubble, as seen in Fig. 3, the forward movement of the machine, causing them to drag and also the drag of the bundle as they slide off and rest partly on the stubble, will pull the rods E around rearward and partly collapse the carrier, and it should be noticed, therefore, that the relative position of the eye *e′* and the end of the crank K^2 after the carrier has been tilted, as seen in Fig. 3, is such that the collapse of the rods slacks the chain L′, and is therefore not hindered by such chain until the carrier reaches the position represented in Fig. 8, the rearward collapse of the carrier being at that stage sufficient to permit free and easy delivery of the bundles therefrom. In case any obstruction is encountered by the carrier as the harvester travels forward while the carrier is elevated the rod E′, being forced rearward at its outer end and forward at its inner end, will cause the chain L′ to pull the crank K^2 up and forward from its position seen in Figs. 1 and 2, rocking the shaft K, and permitting the carrier to dump its load, if it has any, so that it may collapse without hinderance by reason of such load resting on the rods E. If the obstruction encountered is sufficient to cause the entire collapse of the carrier to the position shown in Fig. 4, the first portion of such collapsing movement will, by rocking the shaft K in the manner described, by means of the crank K^2 permit the tilting of the carrier simultaneously with its collapse, and its further collapse after the tilting is stopped by the rods E reaching the stubble until the slack of the chain L′ is taken up, the position being then about the same as that shown in Fig. 8. After this point is passed the further collapsing movement of the carrier, if forced by the obstruction, will tend to carry the eye *e′* still farther forward and outward, and such movement being checked by the chain L′ after it can rock the crank K^2 no farther, will cause the frame D to be depressed at its inner end in order to permit farther stubbleward and forward movement of the eye *e′*, and thereby the carrier will be tilted up to its horizontal position, and when fully collapsed will be in such horizontal position, as seen in Fig. 4. When the operator desires to restore the carrier to receiving position—that is, to expand it—the shaft K being rocked back to the position shown in Figs. 1 and 2, the chain L′ will draw the eye *e′* rearward, operating the rod E′ as a lever over pivotal connection at the corner of the frame D, and will cause it to restore the bar F to the position shown in Fig. 1, thereby expanding the carrier, as desired. The same movement of the rock-shaft K will have caused the crank K′ to take up the slack of the chain L, and if the carrier has tilted downward during the first portion of the expanding movement (as it could do) before the slack of the chain L was fully taken up it will be restored by the crank K′ before the carrier is expanded to any degree greater than that which is illustrated in Fig. 8, and the remainder of the expanding movement will be effected while the crank K′ is passing the center of the shaft K, and having scarcely any effect upon the position of the carrier, but merely holding it substantially horizontal, since during that portion of the rocking movement of the shaft the crank K^2 is performing that portion of its movement which is most effective in expanding the carrier. When the rocking movement is completed, both cranks will have taken up completely the slack in their respective chains, and the carrier will thereby be held positively in proper receiving position, and the crank K′ having passed the center of the shaft, the weight of the load, if it tends to rock it at all, will tend to rock it in a direction which will be resisted by the chain L′, as heretofore stated.

In order that the carrier may be free to tilt upward at its outer end higher than the position to which it is drawn and at which it is held by the crank K′, as is desirable in order to avoid strain upon the carrier and damage thereto by the harvester-wheel running on lower ground than that under the ends of the carrier-arms, I locate the carrier-frame above the arm B′ and at a sufficient interval, so that it may rock over its pivotal support downward at the grainward and forward side the desired distance before being arrested by said arm B′. This is conveniently effected in the manner shown in the drawings by extending lugs *d′* and d^4 from the frame D down to the arms B and B′ for the purpose of making pivotal connection to said arms. Both the oblique position of the axis over which the carrier tilts and the collapsibility of the carrier facilitate the lifting of the outer ends of the carrier-arms as they run onto high ground as the machine advances, because, although in their normal position the foremost of said arms is slightly oblique to the direction of

travel, the first pressure upon them caused by the high ground as an obstruction swings them obliquely rearward and causes them to slide up easily over the elevation while they thus tilt the carrier, as described.

The arm E^3 is designed to serve as a guard to keep the bundles from sliding off from the carrier to the forward side, as they otherwise might do when the machine is tilted forward or traveling downhill. A bundle thus dropped by the carrier in front of the advancing machine, besides being liable to be torn to pieces by the carrier dragging over it, would collapse the carrier and cause other bundles to be discharged irregularly; hence the importance of preventing such accidental forward discharge of a bundle. By securing this arm rigidly to the arm E′, the foremost of the carrying-arms proper, such connection being made at a point back of—that is, forward and grainward from—the bar F, which controls the collapse of the arms E, said arm E^3 is caused to be carried with the arm E′, and similarly to the arm E as the carrier collapses.

I claim—

1. In a bundle-carrier, a frame having a plurality of carrying-arms pivoted to it and extending rearward and stubbleward, the pivotal connections of said arms to the frame being in a line which extends forward and stubbleward oblique to the direction of travel.

2. In combination with a harvester-frame, a bundle-carrier supported thereon, comprising a tilting frame and a plurality of bundle-carrying arms severally pivoted at one end to such tilting frame near the outer forward corner of the harvester-frame and radiating rearward and stubbleward therefrom, substantially as set forth.

3. In combination with a harvester-frame, a bundle-carrier comprising a frame tilting on the harvester-frame over an axis approximately forty-five degrees divergent forwardly and outwardly from the line of travel, and a plurality of bundle-carrying arms pivoted to such tilting frame near the outer forward corner of the harvester-frame and radiating therefrom when the carrier is in position to receive its load, substantially as set forth.

4. In combination with a carrier-frame and the bundle-carrying arms severally pivoted thereto, a bar pivotally connected to one of said arms and having sliding connection with the remainder and with the carrier-frame, and suitable means for swinging the first-mentioned arm about its pivot on the carrier-frame, whereby the carrier consisting of said arms may be collapsed, substantially as set forth.

5. In combination with the harvester, a carrier comprising a plurality of arms severally pivoted at one end, a lever-arm E′, having its pivot fixed with respect to the pivots of the carrier-arms, the bar F, having a pivot fixed with respect to its distance from the pivot of the lever-arm E′ and having a sliding support at a distance from said pivot, and sliding connections with the carrier-arms, substantially as set forth.

6. In combination with the harvester, a carrier comprising a plurality of arms severally pivoted at one end, a lever-arm E′, having its pivot fixed with respect to the pivots of the carrier-arms, the bar F, having a pivot fixed with respect to its distance from the pivot of the lever-arm E′ and a sliding support at a distance from said pivot, and sliding connections with the carrier-arms, and a shaft K, journaled on the harvester-frame, having the crank K^2 and a link connection from said crank to the lever-arm E′, whereby the rocking of the shaft is adapted to expand the carrier, substantially as set forth.

7. In combination with the carrier-frame having pivotal support upon the harvester-frame and adapted to tilt over such support and comprising the arms adapted to be collapsed by rearward pressure and expanded by the reverse action, the shaft K, journaled on the harvester-frame and having the crank-arm K^2, and the link connections to one of the collapsible carrier-arms, the position of said shaft relatively to the link connection made from its crank to the said carrier-arms being substantially as shown and described, whereby the complete collapse of the carrier causes it to be tilted up, substantially as set forth.

8. In combination with the tilting carrier-frame having collapsible carrier-arms, the shaft K, journaled upon the harvester-frame and having the cranks K′ and K^2, connected, respectively, to the carrier-frame and to one of its collapsible arms, the latter connection being flexible and the position of the cranks relative to their connections to the frame and said carrier-arms, respectively, being such that the rocking of the shaft in the direction necessary to permit the tilting of the frame causes the crank K^2 to approach its connection with said carrier-arms, whereby the frame may tilt without collapsing and may be collapsed by rearward pressure upon its arms without regard to its position with respect to tilting, substantially as set forth.

9. In combination with the harvester-frame, the carrier-frame D, pivoted thereto at a line extending forward and stubbleward oblique to the line of travel and adapted to tilt over such pivotal connection, the carrier-arms pivoted to such frame and normally diverging, the bar F, pivotally connected to one of said arms and having sliding connection with the other and with the frame D, the shaft K, journaled on the harvester-frame and having cranks K′ and K^2, and the draft-chains L and L′, extending from said cranks, respectively, the former to the frame D and the latter to one of said carrier-rods, substantially as set forth.

10. In combination with the collapsible arms of the carrier, the bar F, comprising the upper and lower members, and the oblique webs F^2, connecting them and spaced, as described, to permit the carrier-arms to pass

through the bar and swing therein, substantially as set forth.

11. In a bundle-carrier, in combination with the collapsing arms, the front guard-arm E^3, attached to and moving with the foremost of said collapsing carrier-arms, substantially as set forth.

In testimony whereof I have hereunto set my hand, at Chicago, Illinois, in the presence of two witnesses, this 8th day of January, 1892.

ANDREW STARK.

Witnesses:

CHAS. S. BURTON,

JEAN ELLIOTT.