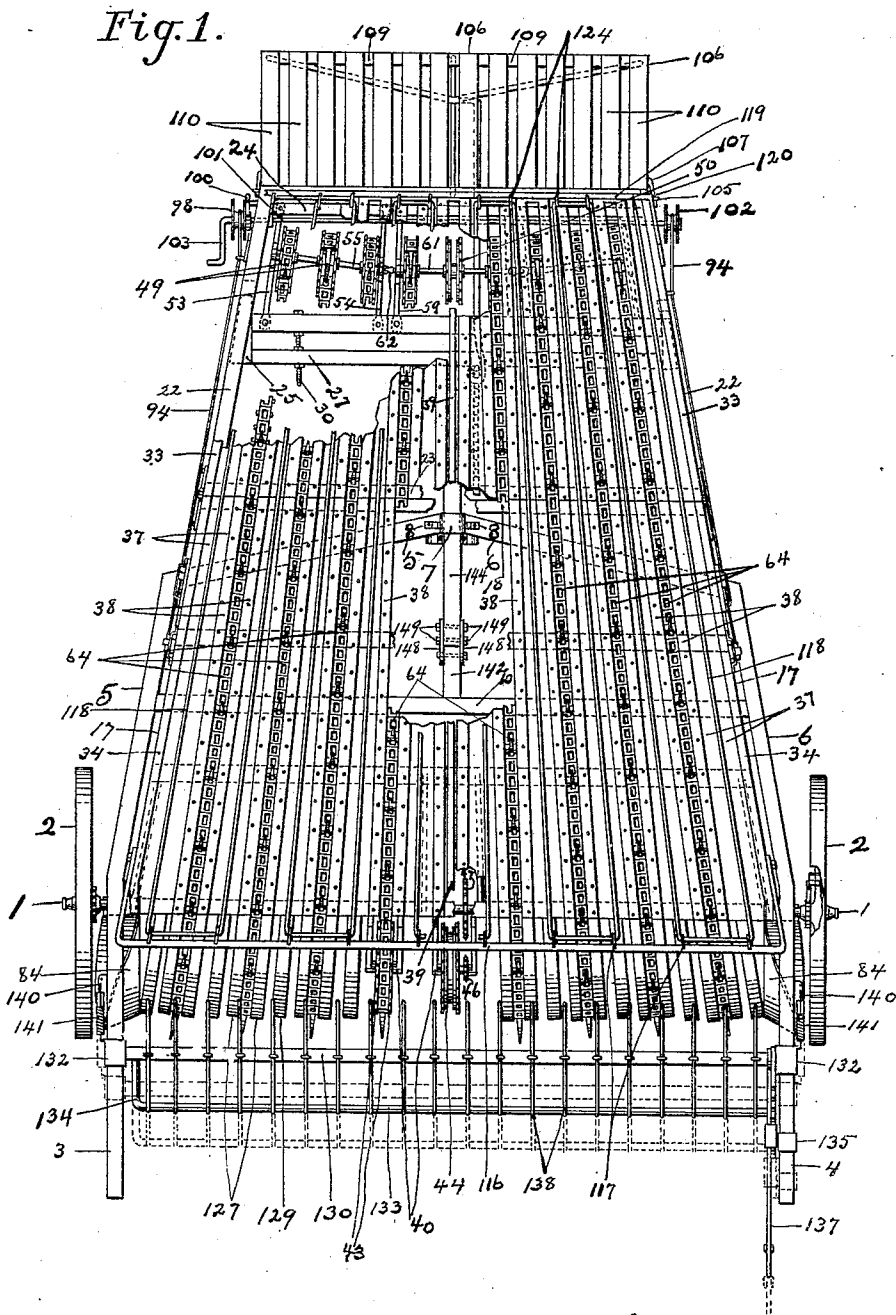


H. I. SMITH.
 COMBINED HAY LOADER AND RAKE.
 APPLICATION FILED SEPT. 30, 1907.

932,185.

Patented Aug. 24, 1909.

4 SHEETS—SHEET 1.



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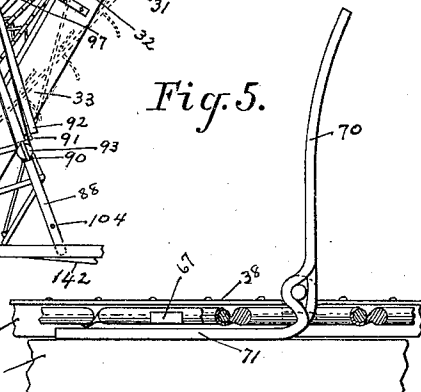
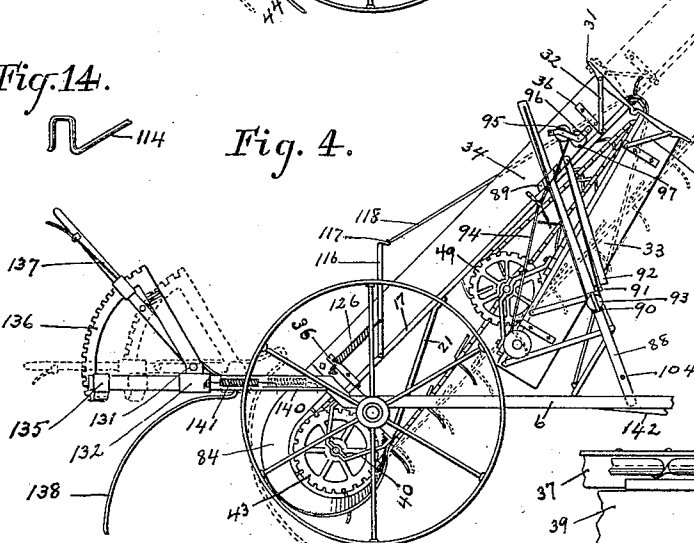
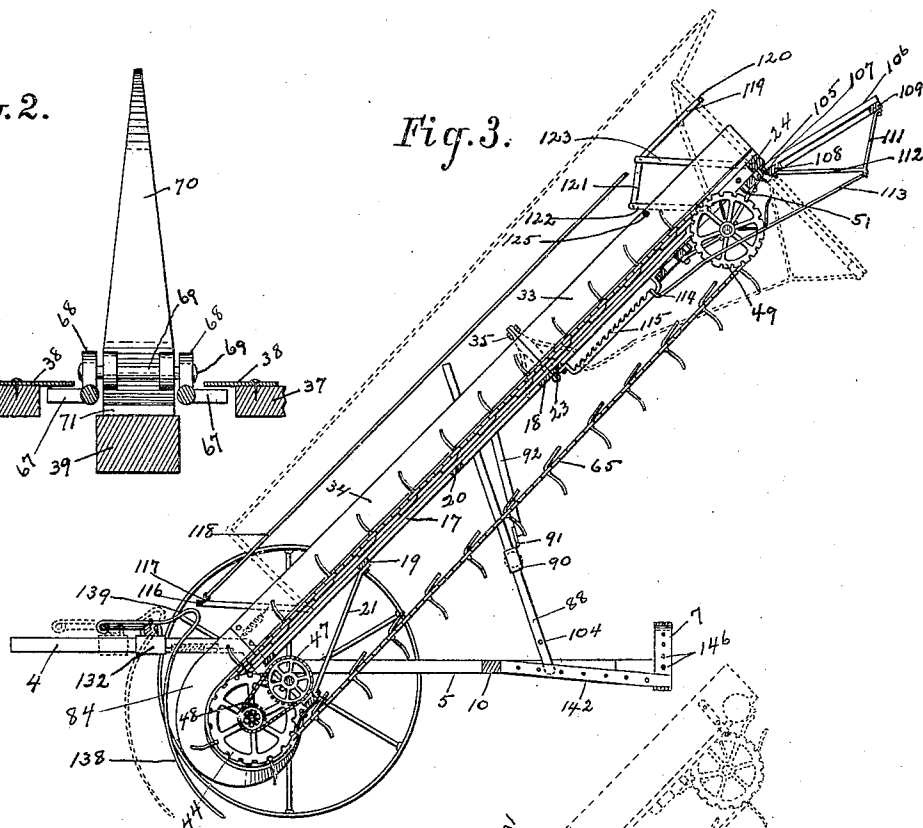
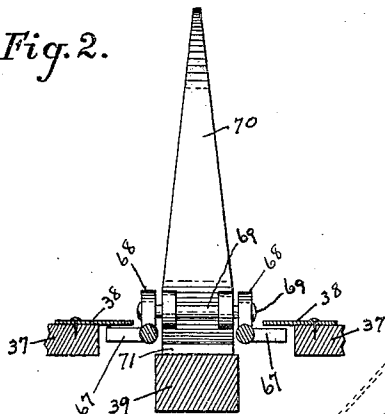
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 6.

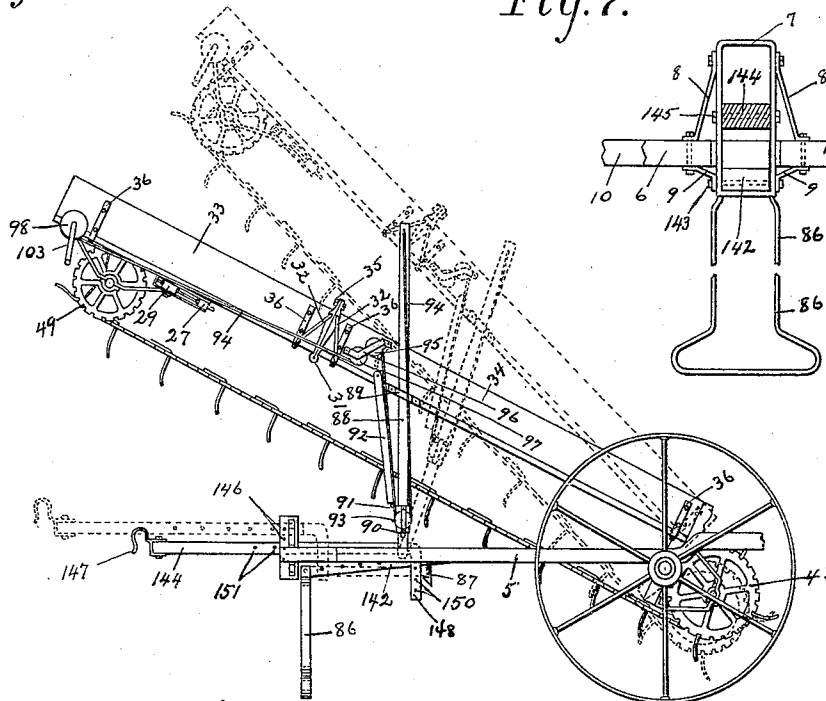


Fig. 7.

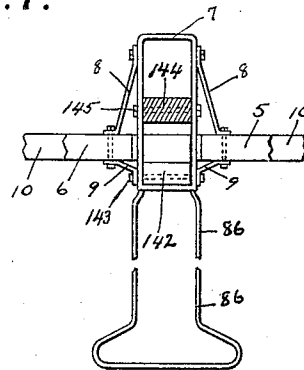


Fig. 8.

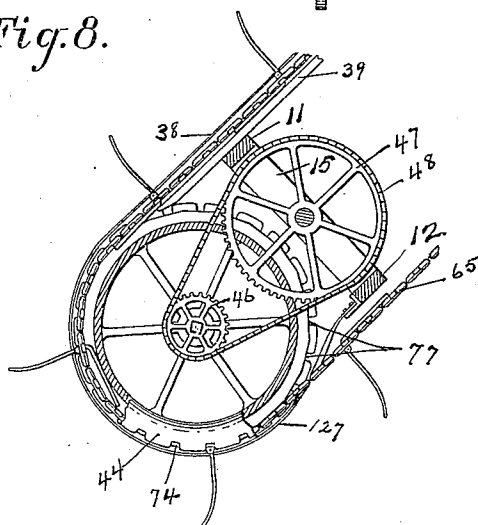
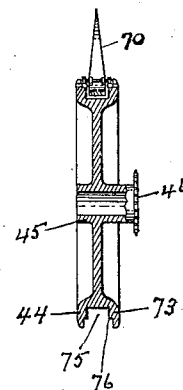


Fig. 9.



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4 SHEETS—SHEET 4.

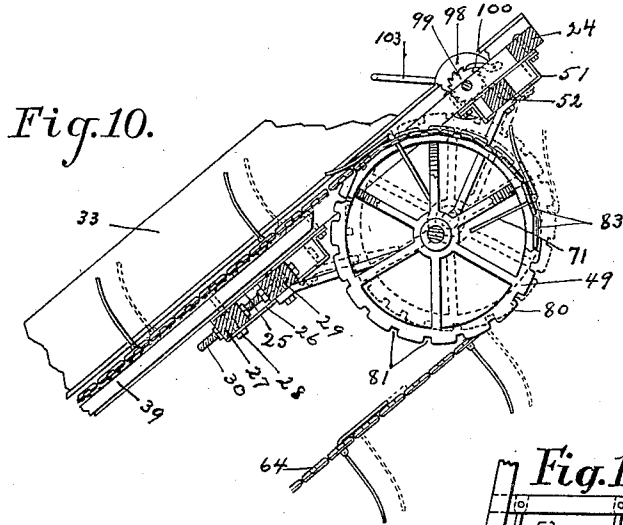


Fig. 11.

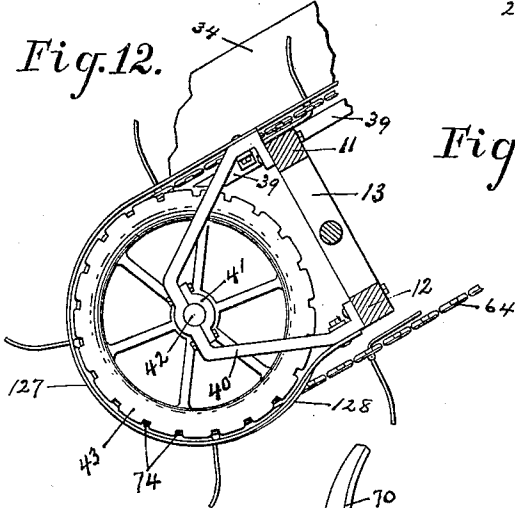
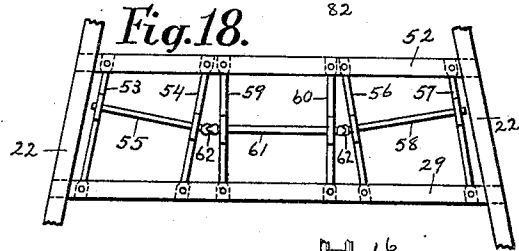
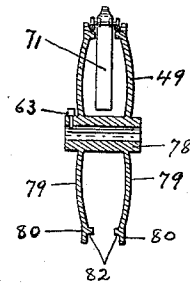


Fig. 15.

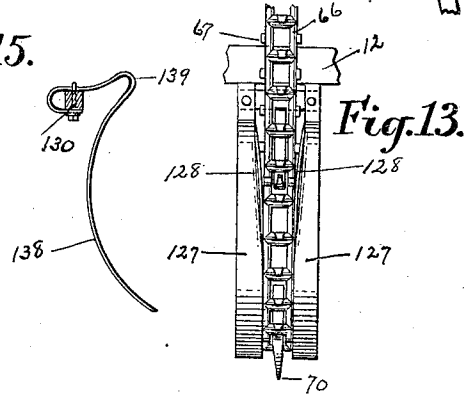


Fig. 16.

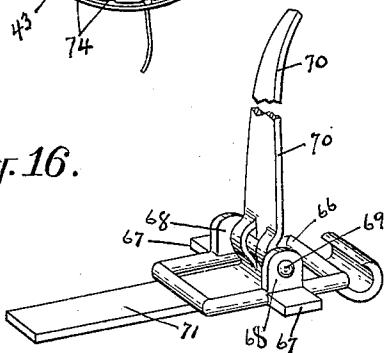
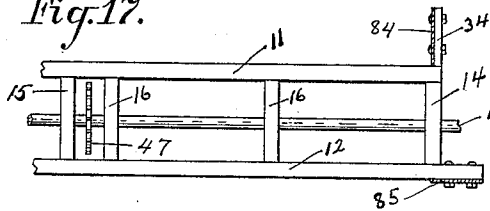


Fig. 17.



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COMBINED HAY LOADER AND RAKE.

932,185.

Specification of Letters Patent.

Patented Aug. 24, 1909.

Application filed September 30, 1907. Serial No. 395,161.

To all whom it may concern:

Be it known that I, HENRY I. SMITH, a citizen of the United States, residing at Fort Wayne, in the county of Allen, in the State of Indiana, have invented certain new and useful Improvements in Combined Hay Loaders and Rakes; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form part of this specification.

My improvement relates to improvements in a combined hay-loader and rake, belonging to that class of hay-loaders adapted in its progress across a field to gather the hay either from the swath or the windrow with equal facility and deliver it onto a preceding vehicle to which it is attached in a continuous operation.

The primary object of my present invention is to provide a combined hay-loader and rake having novel and improved elevating and conveying mechanism in which neither a carrier apron nor elevating rake bars are employed.

Another object of my invention is to provide an improved cooperating rake attachment so constructed and arranged as to automatically respond to the pressure exerted thereon by different sized masses of hay as they are fed to the elevator, and also to accommodate itself to the inequalities of the surface over which it operates.

My invention comprises a forwardly and upwardly inclined carrier frame mounted on carrying wheels, which carrier frame consists of two sections, one forward of the other, and adapted to be longitudinally folded into a compact arrangement for storage and transportation: an automatically adjustable wind-shield overlying said carrier frame, for the purpose of preventing the hay from being dislodged from the carrier by the wind; a detachable extension for the said carrier pivoted to the forward end of the said carrier frame, for the purpose of carrying the hay to the forward portion of the vehicle; a plurality of novel endless traveling carrier chains operatively connecting two series of wheels, one of which series is mounted on the forward end, and the other series on the rearward end of the carrier frame; upright right-angular carrier fingers

mounted, at fixed intervals, upon said traveling carrier chains; means for actuating the said series of wheels and carrier chains from the ground wheels; and an automatically and mechanically adjustable rake in cooperative arrangement with the receiving end of the carrier.

The principal novel features of my invention reside in the elevating carrier mechanism, having a special construction of sprocket-wheels provided with guards or shields; carrier-chains having pivotally mounted carrier-fingers and means for maintaining the fingers in a rigid position while in the act of elevating the hay, the carrier mechanism being adapted to obviate the necessity of a carrier apron, elevating rake bars, carrier drums or gear-wheels; means for gathering the hay from a materially wider area than that of the discharge end of the carrier; means for folding the carrier into a compact form for transportation or storage; means for enabling the operator to adjust the elevating carrier to any desired angle from his position upon the loaded vehicle; an adjustable wind-shield adapted to automatically relieve itself when choked with hay; and a cooperating rake adapted to mechanically and automatically adjust itself to the size of the swath or the windrow to be loaded.

Similar reference numerals indicate like parts in the several views, in which—

Figure 1 is a rear elevation of my invention in operative position partly broken away, and showing the relative arrangement of the operative parts. Fig. 2 is a detail rear view of one of the carrier-fingers showing the manner of mounting the same and also showing in cross-section one of the guide-ways for the carrier-chains, and the means for rigidly maintaining the pivoted carrier-fingers in their operative position during one portion of their travel. Fig. 3 is a longitudinal section of Fig. 1, showing the operative connection of the traveling-carrier with its actuating mechanism, also, showing in dotted outline, the upper and lower limits of the adjustments of the wind-shield and carrier extension, respectively, and the rearward limit of adjustment of the raking attachment. Fig. 4 is a side view looking from the right in Fig. 1, showing the carrier and its supporting frame folded into a compact position, also, showing in dotted

outline the folded portion in an extended position. This view also shows in dotted outline a forward adjustment of the rake mechanism. Fig. 5 is an enlarged detail side view of one of the pivoted fingers in operative position in its guide-way, the carrier chain being partly in cross-section. Fig. 6 is a side view of the loader looking from the left in Fig. 1 partly broken away, showing the means for lowering and raising the carrier and its supporting frame, and also showing in dotted outline the carrier in a raised position, and showing in dotted outline the adjustable tongue in the forward limit of its longitudinal adjustment. Fig. 7 is a front view of the stirrup-like folding leg which aids in supporting the carrier frame and the tongue, the adjustable tongue being shown in cross-section in its supporting bracket. Fig. 8 is an enlarged detail of the middle elevator chain-carrying wheel at the receiving end of the carrier partly in vertical section, in gear with its actuating means, and also showing the relative arrangement of the carrier-chain and pivotally mounted carrier-fingers. Fig. 9 is a vertical central section of the large chain-carrying wheel shown in Fig. 8, showing the integral sprocket gear thereon, and also showing the manner of mounting the carrier chain with fingers in the grooved perimeter thereof. Fig. 10 is an enlarged detail of one of the chain-carrying wheels at the delivery end of the carrier partly in vertical section, showing its relation with the adjustable support, and the means for tightening the surmounted chains, a forward adjustment of the wheel being shown in dotted outline. In this figure is also shown the various positions which the pivoted carrier-fingers assume in passing around the said chain-carrying wheel. Fig. 11 is a diametric cross-section of the last mentioned chain-carrying wheel showing the hollow construction to permit the passage of the base of the carrier-fingers about and through the same. Fig. 12 is an enlarged detail side view of one of the chain-carrying wheels at the receiving end of the carrier, in position with the carrier chain mounted thereon, the adjacent portion of the carrier and supporting frame being shown in part, also a side view of the two-part hay-guard. Fig. 13 is a bottom plan view of Fig. 12, showing the enlarged mouth of the hay-guard forming the opening through which the carrier chain is guided to its engagement with its wheel. Fig. 14 is a detail of the engaging end of the hay carrier extension adjusting rod. Fig. 15 is a detail side view of one of the rake teeth showing a modified form of mounting the same. Fig. 16 is a perspective detail of one of the carrier fingers in operative position in its supporting chain link. Fig. 17 is a fragmentary view of the carrier supporting frame. Fig. 18 is a detail plan view of the

three-part shaft and its supporting hanger brackets.

My invention is mounted upon a horizontal transverse axle 1 having upon its opposite ends the loosely mounted supporting ground-wheels 2 provided upon the inner end of their hubs with any proper clutch mechanism of well understood construction, whereby when the machine runs forwardly the axle 1 will turn with the said ground-wheels, but not so when the machine is run rearwardly. The operating mechanism is mounted upon a supporting frame consisting of the oppositely arranged bars 3 and 4 whose rear ends are in parallel relation and whose forward portions are properly convergent and are provided with the horizontal forwardly inclined integral convergent extensions 5 and 6 respectively, Fig. 1, whose ends are rigidly secured to the opposite sides of the vertically arranged stirrup 7, Fig. 7, by means of braces 8 and 9, which connect the stirrup to the upper and lower faces thereof respectively. By means of an upward bend in the side bars 3 and 4, immediately at the rear of the axle 1, the rear portions of these bars are arranged in a different horizontal plane from that of the forward portion thereof, thereby permitting the employment of longer rake teeth, necessary in operating the elevator at more than one angle, and to increase the capacity of the rake. This supporting frame is arranged immediately above the axle 1, and is pivotally connected thereto by means of any suitable boxing or bearing, not shown, secured to the lower faces of the sides 3 and 4 thereof in the usual or other proper manner, and is laterally braced by means of the cross piece 10.

A rearwardly inclined transverse frame consisting of the opposite parallel sides 11 and 12, and the opposite ends 13 and 14 rigidly connected to the said sides, is pivotally mounted on the axle 1, which passes loosely through the ends thereof. This transverse frame is arranged between the sides 3 and 4 of the main frame, and has two or more fixed cross pieces 15 and 16 substantially parallel with the ends and near the middle of its length. These cross pieces are provided at the middle of their length with openings (not shown) in which the axle 1 forms a suitable bearing.

To the upper face of the transverse frame, the carrier-frame, about to be described, is rigidly secured in any proper manner, at its lower end. The carrier frame preferably consists of two forwardly converging hinged sections. The lower section consisting of two opposite bars 17 whose rear or lower ends are rigidly secured to the side 11 of said transverse frame at or near the opposite ends thereof. The upper ends of the bars 17 are rigidly connected by a trans-

verse bar 18, Fig. 3, and they are further braced by the transverse bars 19 and 20, Fig. 3, to which they are rigidly secured. On the lower faces respectively of the opposite bars 17 near the point at which transverse bar 19 is secured, are fixed the oblique braces 21, whose lower ends are rigidly secured to the lower face of the transverse bar 12 near its ends. In addition this bar 19 has fixed thereon near its center two identical oblique braces 21, whose lower ends are rigidly fixed to the lower face of the bar 12 as shown. The upper section of the hinged carrier frame is formed of two similarly converging bars 22, normally in alignment with the corresponding sides of the lower carrier section. These sides 22 are rigidly connected at their inner ends by a cross piece 23, and are connected at their upper ends by the integral cross-piece 24, Figs. 3 and 10. At suitable points on the lower faces of the sides 22 are arranged the metal plates 25, Fig. 10, to whose upper end are rigidly fixed the metallic brackets 26. Within the open lower end of the brackets 26, is arranged the transverse bar 27, which is rigidly secured near each end to the sides 22 by means of the bolts 28. Within these brackets 26, is slidably mounted the transverse bar 29 in parallel arrangement with the bar 27 and is adjustably connected therewith by means of the screws 30 near each end thereof, whereby the bar 29 is adapted for a lateral adjustment for the purpose hereafter described. The abutting ends of these carrier sections are secured together by a series of proper hinges, not shown, and also by the hinges 31, which are rigidly secured to the bars 17 and bars 22, and by means of the braces 32. These hinges 31 are also secured to the outer faces of the vertical sides 33 and 34 of the carrier sections respectively. The respective carrier sections are held rigidly together by the removable bolts 35, through the upper portion of the hinges 31. These carrier sides 33 and 34 are rigidly fixed to the respective bars 17 and 22 respectively by means of the metal brackets 36, or other proper manner. On the carrier frame sections are rigidly fixed the longitudinal strips 37, which form the floor of the carrier. These strips 37 are properly separated laterally to form a guideway for the carrier-chains about to be described. On the upper face of these strips 37, are rigidly secured the longitudinal metal strips 38 whose adjacent edges overhang the corresponding edges of the floor strips 37, Fig. 2, for the purpose hereafter described. Substantially intermediate of the strips 37, in each of the carrier sections, are arranged a series of longitudinal strips 39. The strips 39 of the lower carrier section are rigidly fixed to, and on a plane with, the upper face of the side 11, and the transverse bars

18, 19 and 20. The identical strips 39 of the upper section are rigidly fixed to, and on a plane with, the upper face of the cross piece 23 and to the upper face of the transverse bar 27. To the rear faces of the sides 11 and 12 of the said transverse frame, are rigidly fixed a series of rearwardly projecting brackets 40, preferably arranged in pairs, Figs. 1 and 12, to the rearward side of which is secured a suitable boxing 41 to form a journal bearing for the shaft 42 of the wheel 43, a series of which wheels are thus rotatably mounted for the purpose about to be described. The central wheel 44 of the series, Figs. 1, 8 and 9, has one extended end of its hub 45 provided with a fixed integral sprocket wheel 46 of comparative small diameter.

On the axle 1 substantially midway of its ends, is rigidly fixed the sprocket wheel 47 in longitudinal alinement with the sprocket wheel 46, and of considerably larger diameter than the wheel 46, which is operatively connected therewith by means of the sprocket chain 48.

In the upper end of the carrier frame is arranged a series of chain carrying wheels 49 and 50, mounted and arranged as follows: To the lower face and outer end of the bars 22 and to the transverse bar 24 near each end thereof, are rigidly secured the hanger brackets 51, Figs. 3 and 10, in which is loosely mounted the transverse bar 52, which is adapted for a slidable adjustment therein.

To the lower faces of the laterally adjustably bars 29 and 52, are rigidly secured a series of hanger brackets, the brackets 53 and 54 being adapted to form a bearing support for the opposite ends of the short shaft 55, and the brackets 56 and 57 being adapted to form a bearing support for the shaft 58, and the brackets 59 and 60 being adapted to form a bearing support for the shaft 61, which is arranged at right angles to a central longitudinal line through the carrier. The shafts 55 and 58 are not in longitudinal alinement with the shaft 61, but are slightly inclined thereto, and are connected to the opposite ends thereof respectively by means of proper universal joints 62, for the purpose hereafter described, these three shaft sections thus connected forming a three-part shaft on which a series of wheels 49 and 50, of special construction, are rigidly mounted by means of set-screws 63, being equal in number to the wheels 43 and 44 before mentioned. Each of these wheels 49 and 50 is connected with a corresponding wheel 43 or 44, by means of endless hay-carrying chains 64 and 65 of special construction hereafter described. The manner of actuating these carrier chains 64 and 65 is as follows: The central wheel 44 of the lower series is actuated by means of the sprocket chain 48 and

sprocket wheel 47 through their connection with the integral sprocket wheel 46. The wheel 44 in turn actuates the said three-part shaft through the medium of the rigidly mounted wheel 50 and the endless carrier-chain 65, which connects these two last named wheels, thereby actuating in the same direction all the remaining carrier chains 64 in a well understood and obvious manner.

The carrier-chains 64 and 65 are formed of a series of sprocket links 66 of the usual form and connection, except that each link is provided at each side at the middle of the link, and in opposite arrangement, with the lateral lugs 67 Fig. 13. At measured or predetermined distances in the chain, a link is employed having in addition to the said lateral lugs 67, a pair of upright apertured ears 68, in which is fixed a rivet 69, Fig. 2, on which is pivotally mounted a carrier finger formed of a forwardly curved upright portion 70 and a substantially right-angular base portion 71, which is arranged directly beneath the said rivet, and when in action forms a bearing or slides upward on the upper face of its corresponding strip 39, which thereby firmly maintains the finger in its upright normal position to engage the hay and transport it upward. The lateral lugs 67 perform two distinct functions; they engage the peripheral notches in the perimeter of the wheels 43, 44, 49 and 50, and by projecting laterally between the strips 37, prevent all danger of displacement of the carrier-chains by any upward strain thereon in use. The wheels 43 and 44 are identical in construction and have a centrally recessed perimeter 73, the circular sides of which recess are provided with oppositely arranged lateral notches 74, Fig. 8, to receive and holdingly engage the said lugs 67 of the carrier-chains. The peripheral recess 75 of the wheels 43 and 44 is provided with opposite ledges 76, which instead of being circular, are formed into a series of plane sections 77, so arranged opposite to the said notches 74 as to receive the full length of each link at the moment of its full engagement with the said notches. The peripheral recess 75 is of sufficient dimensions to loosely receive the base of the carrier fingers 71 without binding therein, as shown in Fig. 9.

The chain wheels 49 and 50 are of special construction, as shown in Figs. 10 and 11, and consist of a central hub 78 having fixed integral radial spokes 79 arranged in pairs as shown, the members of each pair being directly opposite to each other, and an integral perimeter 80. This perimeter is in two identical sections properly separated, and provided with the coincident radial notches 81 to receive and engage said lateral lugs 67 of the carrier-chain. Each section of the perimeter is provided upon its inner face with the opposite circular ledges 82 having

their upper faces provided with a series of plane sections 83, as before described, directly opposite the notches 81. By having the perimeter thus separated into two sections, the base 71 of the carrier fingers readily passes through the annular opening between the sections in making the turn as shown in Figs. 10 and 11.

The said vertical sides 34 of the carrier frame have secured upon their lower ends a curved sheet-metal extension 84 whose lower end 85 is rigidly connected to the lower face of the side 12 of the transverse frame. The function of these curved extensions is to aid in the separation of the ascending hay from the portion left on the ground. It also guides the entering hay inwardly and upwardly to the carrier.

At or near the forward end of the stub-tongue 142 is pivotally mounted a stirrup-like folding leg 86, adapted to support the forward end of the main frame when the machine is not connected to its actuating vehicle. When the machine is in use, this supporting leg is folded backwardly and beneath the stub-tongue and has its free end secured by any suitable means, such as a spring latch 87 of common form.

To the inner faces of the bars 5 and 6 of the main frame, near the forward ends thereof, are pivotally mounted the lower end of the struts 88 respectively, which pass loosely through proper lateral guides 89 upon the outer faces of the bars 17, Figs. 4 and 6. On the lower portion of each of the struts 88 is slidably mounted a sleeve 90 to whose forward side is connected a suitable hinge 91, to which is rigidly fixed an upright lever 92, whose upper end is pivotally mounted to the outer faces of the bars 17, Figs. 4 and 6. Upon said sleeve is also arranged a pulley 93 over which a rope or cable 94 passes, the upper end of which rope or cable is fastened to the upper end of the strut 88, and whose other end passes upward over the fulcrum pulley 95, which is rotatively mounted in the bracket 96, fixed on the adjacent outer faces of the carrier sides 34. The rope or cable 94 then passes downward and beneath the guide pulley 97, which is also mounted in the bracket 96, and is then secured to the winding spool 98 rotatably mounted on the corresponding side of the carrier frame at or near its upper end. This spool is provided upon its end with a peripheral rack 99 which is adapted to be engaged by a cooperating pivoted pawl 100 secured to the side 33 of the carrier frame. This spool is fixed upon the end of a transverse shaft 101 which passes loosely through the sides of the carrier frame and has upon its other end a rigid spool 102 to which the rope or cable 94, upon the opposite side of the carrier, is secured. The spool 98 has a suitable crank 103 to operate the same. Near the lower ends of said

struts 88 are fixed limiting stops 104, which limit the downward movement of said sleeves 90.

To the opposite ends of the cross piece 24 are fixed the eyes 105 to which the carrier extension 106 is detachably secured by means of the hooks 107. These hooks 107 have their inner ends rigidly secured to the lower face and respective ends of the cross piece 108 of the said extension, Fig. 3. This carrier extension 106 is formed of the said cross piece 108 and the parallel, like cross piece 109 rigidly united by means of a series of fixed slats 110, Fig. 1. The means for raising and lowering this extension are as follows: To the opposite ends of the cross piece 109 and to the lower face thereof are rigidly fixed one end of the respective rods 111, whose inner ends are diagonally inclined and rigidly united at a point a proper distance from the lower face of the said carrier extension. A third rod 112 has its inner end fixed to the last mentioned rods at their union, and has its other end rigidly fixed to the cross piece 108 midway of its ends. An adjustable rod 113 has its forward end pivotally connected to the above mentioned rods at their said point of union, and has its other end provided with a special form of hook 114, as shown in Fig. 14. To the lower faces of the transverse bars 27 and 23, is fixed a rack bar 115, Fig. 3, with which the hook 114 is adapted to holdingly engage.

My improved wind-shield for preventing the hay from being dislodged from the carrier by the wind, in use, is constructed as follows: A transverse flattened rod 116 is arranged a few inches above the carrier, and slightly to the rear of the axle 1, and has its opposite ends bent into substantially a right-angular relation thereto, which ends are then pivotally secured to the outer faces of the main frame bars 17, Figs. 1 and 4. This rod 116 is provided upon its upper edge with a series of fixed eyes, with hooks 117 engaging therein, in which a rope 118 is secured in the manner hereafter described. A flattened transverse rod 119 is arranged a few inches above the front end of the carrier, the ends of which rod 119 are first bent rearwardly into a right-angular relation therewith, as shown at 120 in Figs. 1 and 3, and their extremities 121 are then bent downwardly forming an obtuse angle with its said respective adjacent portions, Fig. 3. Said flattened transverse rod 119 is pivotally supported in position as follows: A short flattened rod 122 on each side of the carrier has one end pivotally secured to the outer end of the extremity 119 and has its other end pivotally connected to the bar 22 near its upper end. A second flattened rod 123 in parallel relation with the rod 122 on each side of the carrier has one end pivotally secured to the transverse rod 119 at the said

obtuse angle of bent ends thereof, and has its other end pivotally secured to the adjacent end of the bar 22. This transverse rod 119 is provided upon its upper edge with a series of fixed eyes with hooks 124 engaging therein in measured arrangement and corresponding in number with the said eyes and hooks 117 in the rod 116. At suitable points upon the outer faces of the respective vertical side-boards 33 near the front ends thereof, are arranged the fixed limiting stops 125 to limit the rearward movement of the wind-shield, which is normally held in the position shown in Fig. 3, by the coil-springs 126, one upon each side of the said carrier, and having one end secured to the bent ends of rod 116, and having its other end secured to the outer faces of the respective vertical side-boards 34 by any suitable connection. The wind-shield is completed by the hay-retaining rope 118, which connects the hooks 124 on the forward transverse rod 116 in any suitable manner, but preferably as shown in Fig. 1, in which one end of the rope 118 is secured to that one of the forward hooks 124 which is adjacent to one of the side bars 22, thence passing through the two opposite hooks 117, and thence through the two hooks 124 adjacent to the first mentioned hook, and so continued until the other end of the rope is secured to the remaining hook 124 on the rod 119.

The wheels 43 and the central wheel 44 are each provided with two-part hay-guard 127, consisting of two companion strips of crescent-shaped sheet-metal, encircling the exposed portion of the wheel, as shown in Figs. 1, 12 and 13, being separated sufficiently to permit the free passage of the carrier-chains, the opposite lugs 67 of which pass beneath the inner edges of the said guard. These guard sections 127 have their lower ends fixed to the lower end of the respective brackets 40, and have their upper end secured to the upper ends of the brackets 40, Fig. 12, said guard section 127 being a continuation of the carrier floor. The guard sections 127 are narrowed at their lower ends to widen the space between them at the point where the carrier-chains enter upon its engagement with the wheel. The inner edges of these guards at or near their lower ends are turned outwardly to facilitate the entrance of the carrier-chains within the guards, as shown at 128, Figs. 12 and 13. Spaced between each of the two-part hay-guard 127, and on each side thereof, is rigidly mounted a crescent-shaped companion shield 129, the lower end of which is rigidly secured to the lower face of the transverse frame bar 12, and the upper end thereof is rigidly secured to the upper face of the transverse frame bar 11, said shield 129 being a continuation of the carrier floor.

The raking mechanism is described as follows: A transverse bar 130, Figs. 1 and 3, has its ends journaled and pivotally mounted in suitable bearings in the laterally apertured extension 131 of the upper side of the sleeve 132, which is slidably mounted on the rear ends of the main frame bars 3 and 4, respectively. A second transverse bar 133 in parallel arrangement with the bar 130, and in the rear thereof, has its ends 134 bent and rigidly fixed thereto. On the rear end of the bar 4 is slidably mounted a sleeve 135, to which the rear end of the sector rack 136 is secured, and whose forward end is fixed to the corresponding sleeve 132. On the bar 130 adjacent to the sector rack is fixed the lower end of the hand lever 137, provided with any proper spring pressed pawl to engage the said rack. The rake teeth 138 in proper spaced arrangement have their upper end rigidly secured in any proper manner to the bar 133 and also to the upper face of the bar 130, after which they are formed into an upwardly inclined loop 139, and then given the usual curved form of rake teeth as shown.

Transverse bar 133 may be omitted if desired, and the rake teeth 138 fixed to the bar 130 by securing their rear end to the lower and upper faces thereof respectively, as shown in Fig. 15.

To secure the rake mechanism in its operative position, the sleeves 132 are connected to a plate 140, containing a series of holes therein, which plate is fixed on the lower face of the respective bars 3 and 4, Fig. 1, by means of the coil-springs 141, which are hooked at their front end to suitable holes in the plate 140, and have their rear ends secured to the respective sleeves 132.

In the lower portion of stirrup 7, the forward end of the stub-tongue 142 is fixed by means of the transverse bolt 143, Fig. 7. This stub-tongue is slightly inclined and has its rear end rigidly secured to the cross piece 10 at the middle of its length, Fig. 1. The tongue 144 is arranged in the upper portion of the stirrup 7, and is adapted for a vertical adjustment by means of the bolt 145, which passes transversely through the tongue and has its ends removably secured in the bolt-holes 146, in the opposite sides of the stirrup 7, Fig. 6. The tongue 144 has its forward end provided with a hook 147 by which the loader is detachably secured to the draft vehicle. The rear end of the tongue 144 is adjustably connected to the stub-tongue 142 by means of a pair of right-angular metal straps 148, whose upper ends are rigidly fixed to the rear end of the tongue by proper bolts 149, and whose lower ends have a series of registering bolt-openings 150 by means of which they are secured to the stub-tongue 142 in any desired vertical adjustment, in connection with the

above described adjustment of the tongue in the stirrup 7. The tongue 144 also has longitudinal adjustment by the same means, in an obvious manner, as the tongue also has a series of lateral bolt-openings 151.

The operation and manner of employing my invention thus described is obvious, and, briefly stated, is as follows: The operator first gives the draft tongue a longitudinal and vertical adjustment to suit the height and distance of the draft vehicle, to maintain the loader frame in a horizontal position. The rake operates in the usual manner in collecting the hay from the ground, but it is adapted to automatically adjust itself to the quantity of hay fed to the elevating carrier, through the medium of the flexibility of the rake-teeth and the tension of the coil-springs 141. Also, the raking mechanism may be mechanically adjusted, either rearwardly or forwardly, by detaching the coil-springs 141 at their forward ends, and re-attaching them at any desired point in holes provided in the plates 140. The rake is thrown out of action for transportation or storage by detaching the said coil-springs 141 at their forward end and re-attaching them to the respective plates 140 at a suitable point rearwardly, as shown in Fig. 4, after which the rake-tooth bar 130 is tilted forwardly in its bearings by means of the hand-lever 137, thereby raising the points of the rake teeth from the ground, and they are then firmly secured in such position by the engagement of the hand bar 137 with the sector rack 136. By lowering the hand lever 137 on its sector rack 136, the rake teeth are held to their engagement with the ground with any desired tension.

The operation of the elevating carrier is as follows: As the sprocket wheel 47 is fixed upon the driving axle 1, it will rotate with it forwardly in the same direction, and it will, through the medium of the sprocket wheel 46 and the driving chain 48, the wheel 44, the cooperating carrier-chain 65, and its corresponding wheel 50, simultaneously actuate all the carrier-chains 64 in a forwardly and upward direction. The forward movement of the machine causes the rake teeth to gather the hay and hold it in position where it will be seized by the carrier fingers as they round the upward turn upon the wheels 43 and 44, and then by means of these fingers the hay is carried forward and upward on the upper face of the carrier-frame to the discharge end thereof. Just before the hay reaches the point of discharge, the base 71 of the carrier fingers passes off of the front end of their respective supporting strips 39, Fig. 10, after which they drop downward through the peripheral slot in the wheels 49 and 50, as shown in Figs. 10 and 11, thereby disengaging them from the hay. The fingers assume this po-

sition by gravity and are also forced into such position by the weight of the hay ahead of them. Obviously, as these fingers are carried forward in such position around the wheels 49 and 50, they will be gradually withdrawn from the hay longitudinally, and will thereafter remain idly suspended until they reach the lower face of the wheels 43 and 44, when they will again become rigid and ready for action by the engagement of the base of the fingers with the peripheral recess 75 of the said wheels, as shown in Fig. 8, and their rigidity is maintained as before while in action by their sliding contact with the supporting strips 39. After the carrier teeth thus become disengaged from the hay, it is carried forward and onward to its discharge and over the adjustable extension, when employed, by the continuous pressure of the oncoming hay in an obvious manner. As the hay enters the carrier, it is gradually divided from the hay left upon the ground, and is directed inwardly toward the center of the carrier by the curved sheet-metal extensions 84 of the sides 34 of the carrier, and then passes beneath the ropes 118 of the wind-shield, which is adapted to prevent any derangement of the hay in its ascent, by either a direct or a lateral wind. Should the wind-shield become choked by the bunching of the hay in its ascent, it will automatically assume the elevated position shown in dotted outline in Fig. 3, thereby relieving itself of all congestion, after which it will assume its normal position by the tension of the retractile springs 126.

The adjustable carrier extension 106 has two distinct functions, viz; to prevent the hay from following the carrier-chains on their return movement, and, when the load has been sufficiently formed to require a vertical adjustment of the forward end of the carrier, this extension serves the purpose of carrying the discharging hay farther over onto the load, and to perform this function it is adjusted from the position shown in full lines, in Fig. 3, to the position shown in dotted outline.

To meet the varying height of load, the carrier can be readily and conveniently adjusted from the top of the load by simply turning the crank 103, which thereby winds up the ropes 94 on the spools 98 and 102, and slides the sleeves 90 correspondingly upward on the struts 88, and thus elevates the carrier through the medium of the upright levers 92, whose lower ends are hinged to their respective sleeves 90, and whose upper ends are pivoted to the adjacent side bars 17 of the lower carrier section. As obvious, this elevating mechanism, except the crank 103, is duplicated upon the opposite side of the carrier. The front or delivery end of the carrier is of any suitable width, but is preferably narrower than the load on the

draft vehicle, to prevent the hay from discharging over the sides of the load. The rear or lower end of the carrier is made considerably wider than the front end, to enable the machine to gather the hay from a wider area.

For the purpose of tightening the carrier-chains 64 and 65, the screws 30 are adjusted in an obvious manner to slidably move the transverse bar 29 forwardly, which, through the medium of hanging brackets 53, 54, 56, 57, 59 and 60, slidably moves transverse bar 52 forwardly. When this is done the wheels 49, by set screw 63, are readjusted rigidly to their respective shafts, to bring them in alinement with the guide-way through which their respective carrier-chains 64 pass.

For the purpose of transportation and storage, the hinged front end of the carrier is folded downwardly into compact relation, and adjacent to the lower face of the lower section of the carrier, as shown in Fig. 4. This is done by first lowering the carrier into substantially the position shown in full lines in Fig. 6, in which position the fixed limiting stops 104 will holdingly engage the sleeves 90 near the lower end of the struts 88, whereby the free end of the carrier is rigidly supported. The operator next unwinds a sufficient portion of the rope 94 from the spools 98 and 102, after which the hinges 31 are loosened by removing the bolts 35, and the forward section of the carrier is thereby allowed to turn downwardly upon the lower section. He then folds the forward section of the carrier downward until its forward end rests upon the main frame.

Having thus described my invention and the manner of operating the same, what I desire to secure by Letters Patent is:

1. In a machine of the class specified, an axle supported by carrying wheels; a transverse frame pivotally mounted upon said axle; a conveyer frame fixed upon the said transverse frame and inclined forward and upward, and formed of two hinged sections, one forward of the other; means for vertically adjusting the conveyer; means for rigidly securing the conveyer in any desired adjustment; the forward conveyer section adapted to be folded into compact relation with the rearward section; a series of rotary sprocket wheels in spaced transverse arrangement pivotally mounted upon the rearward end of the said conveyer frame; a series of rotary sprocket wheels at or near the forward end of the carrier frame and beneath the same; a series of sprocket chains engaging and operatively connecting the said series of wheels, and provided with upright carrier fingers; means for securing the said chains against derangement in use; and means for actuating the same.

2. A carrier for a hay loader comprising a transverse frame pivotally mounted upon a

suitable support; a forwardly and upwardly inclined two-part folding frame fixed thereon at its lower end and provided with a suitable support near the middle of its length; a detachable extension pivoted to the forward end of the carrier; means for adjusting the extension; an automatically adjustable wind-shield; means for supporting the wind-shield in normal position; traveling carrier chains having upright fingers in spaced arrangement longitudinally of the carrier; and means for actuating the said chains.

3. A carrier for a hay loader comprising a transverse frame pivotally mounted on a suitable support; a forwardly and upwardly inclined two-part folding frame fixed thereon at its lower end, and provided with a suitable support near the middle of its length; an automatically adjustable wind-shield; means for normally supporting the wind-shield in position; traveling carrier chains having upright fingers in spaced arrangement longitudinally of the carrier; and means for actuating the said chains.

4. In a hay loader, a traveling carrier chain, consisting of sprocket links having oppositely arranged lateral lugs adapted to engage their actuating means, and provided in spaced arrangement with pivotally mounted upright carrier fingers; actuating means for the said lugs; means for securing the chain against lateral and vertical derangement in use; and means for rigidly maintaining the fingers in their operative position.

5. In a hay loader, the combination of an axle supported by carrying wheels; a transverse frame pivotally mounted upon the said axle; a conveyer frame fixed upon the transverse frame and inclined forward and upward; a rotary shaft mounted beneath and near the forward end of the conveyer frame; a series of wheels rigidly mounted on said rotary shaft; a second series of wheels pivotally mounted near the rearward end of the conveyer frame; a series of endless traveling carrier chains operatively connecting said series of wheels, each chain consisting of a series of sprocket links having oppositely arranged lateral lugs adapted to engage said wheels, and provided at intervals with means for pivotally mounting carrier fingers; upright right-angular carrier fingers pivotally mounted to said means; means for rigidly maintaining the fingers in their operative position; means for securing the chains against lateral and vertical derangement in use; and means for actuating the said chains.

6. In a hay loader, the combination of an axle and carrying wheels mounted thereon; a transverse frame pivotally mounted upon said axle; a conveyer frame fixed upon the transverse frame and inclined forward and

upward; a rotary three-part shaft whose sections are united by universal joints, each section being out of alinement with its next adjacent section, and mounted beneath and near the forward end of the conveyer frame; a series of sprocket wheels rigidly mounted on the said shaft; a second series of sprocket wheels pivotally mounted at the rearward end of the said conveyer frame; a forwardly convergent series of endless carrier chains operatively connecting the said two series of sprocket wheels; and means for actuating the said chains.

7. In a hay loader, the combination of an axle supported by carrying wheels; a transverse frame pivotally mounted upon said axle; a conveyer frame fixed upon the transverse frame and inclined forward and upward; a rotary three-part shaft mounted beneath and near the forward end of the conveyer frame; a series of sprocket wheels rigidly mounted on the said shaft and whose spokes and perimeters are divided, their divided perimeter being provided upon the inner faces of its approximately parallel sections with opposite circular ledges, and having spaced transverse peripheral notches in opposite arrangement; a second series of sprocket wheels pivotally mounted upon the rearward end of the said conveyer frame; a forwardly convergent series of endless carrier chains composed of sprocket links having oppositely arranged lateral lugs engaging and operatively connecting said two series of wheels; and means for actuating said chains.

8. In a hay loader, the combination of an axle supported by carrying wheels; a transverse frame pivotally mounted upon said axle; a conveyer frame fixed upon the transverse frame and inclined forward and upward; a rotary three-part shaft arranged beneath and near the delivery end of the conveyer frame; a series of wheels rigidly mounted on said shaft; a second series of wheels pivotally mounted at the rearward end of the said conveyer frame, each wheel having a circumferentially separated perimeter, a peripheral recess adapted to loosely engage the sliding base of upright carrier fingers, and having opposite identical lateral ledges, and each wheel also provided on its said circumferentially separated perimeter with spaced transverse peripheral notches in opposite arrangement; a series of endless traveling carrier chains, composed of sprocket links, operatively connecting said two series of wheels; oppositely arranged lateral lugs upon said links adapted to engage said spaced transverse peripheral notches; upright carrier fingers with sliding bases mounted in spaced arrangement upon said sprocket link; and means for actuating the said chains.

9. In a hay loader, a pivotally mounted

conveyer frame; a wind-shield mounted upon the said conveyer frame and comprising a transverse rod, each end of said rod being right-angularly bent and pivotally connected to the adjacent side of the rearward end of said conveyer frame; a second transverse rod, each end of said second rod being right-angularly and downwardly bent; a pair of rearwardly projecting rods, normally in parallel relation, pivotally supporting in position each end of the said second transverse rod, and pivotally connected to the adjacent side of said conveyer frame; a series of connective ropes, in longitudinal relation relative to the said conveyer frame, uniting the said transverse rods, through which adjustment the said wind-shield is automatically raised from its normal position by an overload on the conveyer frame, thereby relieving itself from the clogging thereof; means for restoring the said wind-shield to its normal position; and means for supporting the said wind-shield in its normal position, all substantially as described.

10. In a hay loader, the combination of an axle supported by carrying wheels; a transverse frame pivotally mounted upon the said axle; a two-piece folding conveyer frame fixed upon the transverse frame and inclined forward and upward; a wind-shield mounted upon the said conveyer frame, consisting of the following instrumentalities; a transverse rod arranged above the rearward end of said conveyer frame, each end of which is right-angularly bent and pivotally connected to the adjacent side of the conveyer frame; a transverse rod arranged above the forward end of said conveyer frame, each end of which is right-angularly and downwardly bent; a pair of horizontally inclined and rearwardly projecting rods, normally in parallel relation, pivotally connecting each end of the said forward transverse rod and the adjacent side of the conveyer frame; a series of ropes, in longitudinal arrangement relative to the conveyer frame, connecting the said rearward and forward transverse rods, whereby the said transverse rods and connecting ropes of the said wind-shield are automatically elevated by an overload on the carrier to relieve the clogging thereof; means for supporting the said wind-shield in its normal position; and means for restoring said wind-shield, after being clogged, to its normal position, all substantially as described.

11. The combination of a driving axle; a carrier pivotally mounted thereon and having a forward hinged section adapted to be folded into compact relation therewith; the said carrier having a materially greater width at its lower than at its upper end; traveling chains in convergent longitudinal arrangement on the carrier, and provided with a plurality of upright fingers pivotally

mounted thereon; means for rigidly maintaining the fingers in their normal position during their ascent on the carrier; means for actuating the traveling chains; and means for connecting the said means with the driving axle.

12. In a hay loader, the combination with the carrier frame, of an overlying wind-shield, consisting of a rearward transverse rod, each end of which is right-angularly bent and pivotally connected to the adjacent side of the carrier frame; a forward transverse rod, each end of which is right-angularly and downwardly bent; a pair of rearwardly projecting rods pivotally supporting in position each end of the said forward transverse rod and pivotally connected to the adjacent side of the carrier frame; a series of ropes connecting the said transverse rods; means for supporting the wind-shield in normal position and for restoring it to such position; said means permitting the automatic enlargement of the space between the said ropes and the carrier frame when clogged by an overload, all substantially as described.

13. In a hay loader, the combination of a series of sprocket wheels whose spokes and perimeters are divided, their perimeters being provided upon the inner faces of their approximately parallel sections with opposite circular ledges, and upon their said circumferentially divided perimeter with spaced transverse peripheral notches in opposite arrangement; a rotary three-part shaft, whose sections are united by universal joints, each section being out of alinement with its next adjacent section, and upon which the said series of sprocket wheels are rigidly mounted; a second series of sprocket wheels, whose peripheries are recessed and provided with opposite identical lateral ledges and each wheel also provided upon its said circumferentially separated perimeter with spaced transverse peripheral notches in opposite arrangement; a series of endless traveling carrier chains, each consisting of a series of sprocket-links having oppositely arranged lateral lugs adapted to engage said sprocket wheels, and provided in spaced arrangement longitudinally of the carrier, with pivotally mounted upright carrier fingers, which chains, by means of said lateral lugs, operatively connect said series of wheels; means for securing the chains against lateral and vertical derangement in use; means for rigidly maintaining the fingers in their operative position; and means for actuating the said chains.

14. In a hay loader, the combination of a rotary three-part shaft, whose sections are united by means of universal joints, each section being out of alinement with its next adjacent section; a series of sprocket wheels rigidly mounted on the shaft, whose spokes

and perimeters are divided, said perimeters being provided upon the inner faces of their approximately parallel sections, with opposite circular ledges and having spaced transverse peripheral notches in opposite arrangement, adapted to engage sprocket links having oppositely arranged lateral lugs; a second series of sprocket wheels, each having a peripheral recess with opposite identical circular lateral ledges and each wheel also provided upon its said circumferentially separated perimeter with spaced transverse peripheral notches in opposite arrangement, adapted to engage sprocket links having oppositely arranged lateral lugs; sprocket links having oppositely arranged lateral lugs adapted to engage said wheels; a forwardly convergent series of endless traveling carrier chains, each consisting of a series of the said sprocket links having oppositely arranged lateral lugs adapted to engage said sprocket wheels and provided in spaced arrangement with pivotally mounted upright right-angular carrier fingers, which chains by means of said lateral lugs, operatively connect the said series of wheels; means for securing the said chains against lateral and vertical derangement in use; means for rigidly maintaining the said fingers in their operative position; and means for actuating the said chains.

15. In a machine of the class specified, an axle supported by carrying wheels; a transverse frame pivotally mounted upon said axle; a conveyor frame fixed upon the said transverse frame and inclined forward and upward, and formed of two hinged sections, one forward of the other; a suitable support for said conveyer near the middle of its length; means for vertically adjusting the conveyer; a detachable extension pivoted to the forward end of the conveyer; means for adjusting the extension; an automatically adjustable wind-shield overlying and pivotally connected to said conveyer frame; means for supporting the said wind-shield

in its normal position; means for automatically restoring said wind-shield to its normal position; a rotary three-part shaft mounted beneath and near the forward end of the conveyer frame; a series of sprocket wheels rigidly mounted on the said shaft, each sprocket wheel comprising divided spokes and perimeter, opposite circular ledges upon the inner faces of the approximately parallel sections of said perimeter and spaced transverse peripheral notches in opposite arrangement upon its said circumferentially divided perimeter; a second series of sprocket wheels pivotally mounted near the rearward end of the conveyer frame, each sprocket wheel comprising a peripheral recess, opposite identical circular lateral ledges upon the opposite sides of said recess, and spaced transverse peripheral notches in opposite arrangement upon its said circumferentially separated perimeter; an endless traveling carrier chain operatively connecting said two series of sprocket wheels, each chain comprising sprocket links having oppositely arranged lateral lugs, and sprocket links in spaced arrangement having oppositely arranged lateral lugs and upwardly projecting ears, said lateral lugs adapted to engage said spaced transverse peripheral notches; an upright right-angular finger pivotally mounted between said ears; means for rigidly maintaining said fingers in their operative position during their ascent on the carrier; means for securing the said chains against lateral and vertical derangement in use; means for actuating the said traveling carrier chains; and means for connecting the said means with the driving axle.

Signed by me at Fort Wayne, Allen county, State of Indiana, this 27 day of September, A. D. 1907.

HENRY I. SMITH.

Witnesses:

AUGUSTA VIBERG,
WATTS P. DENNY.