(No Model.) 2 Sheets—Sheet 1.

A. STARK.

HARVESTER ELEVATOR.

No. 526,166. Patented Sept. 18, 1894.

Fig. 1.

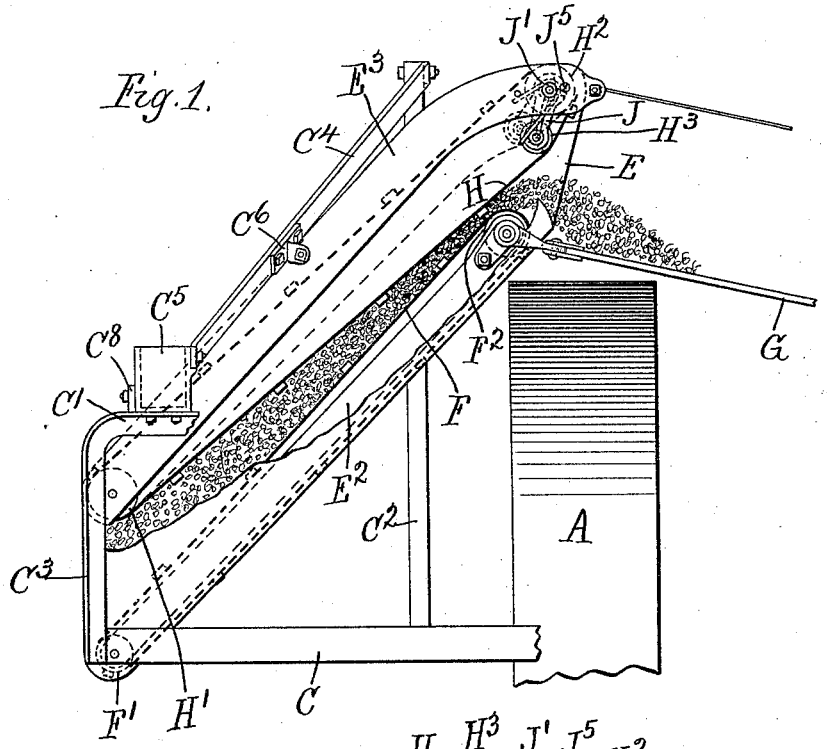
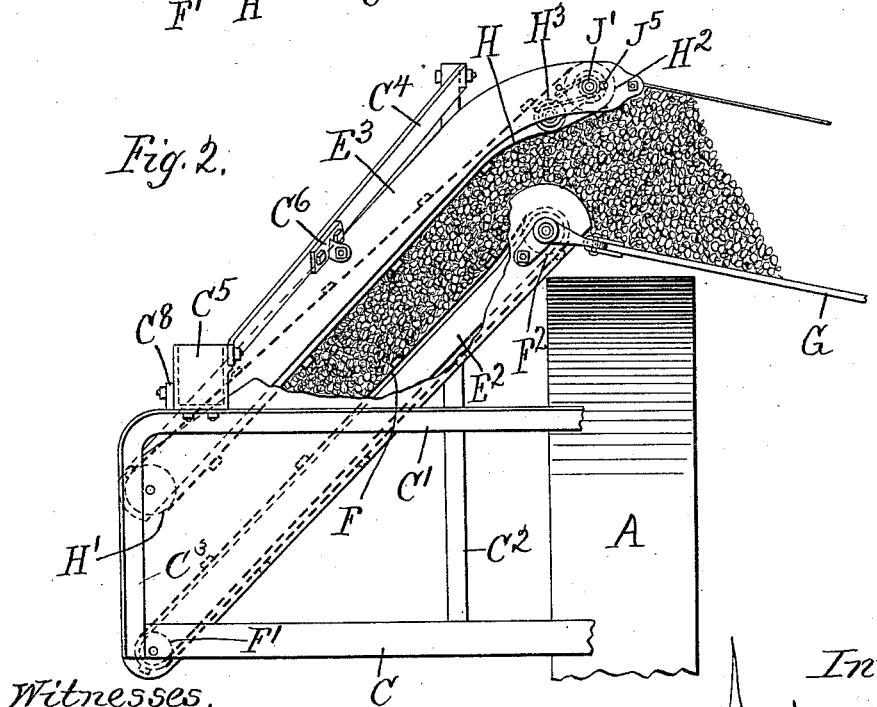


Fig. 2.



Witnesses.
E. T. Wray.
Jean Elliott.

Inventor.
Andrew Stark
By Burton & Burton
his Attys

(No Model.) 2 Sheets—Sheet 2.

A. STARK.

HARVESTER ELEVATOR.

No. 526,166. Patented Sept. 18, 1894.

Fig. 3.

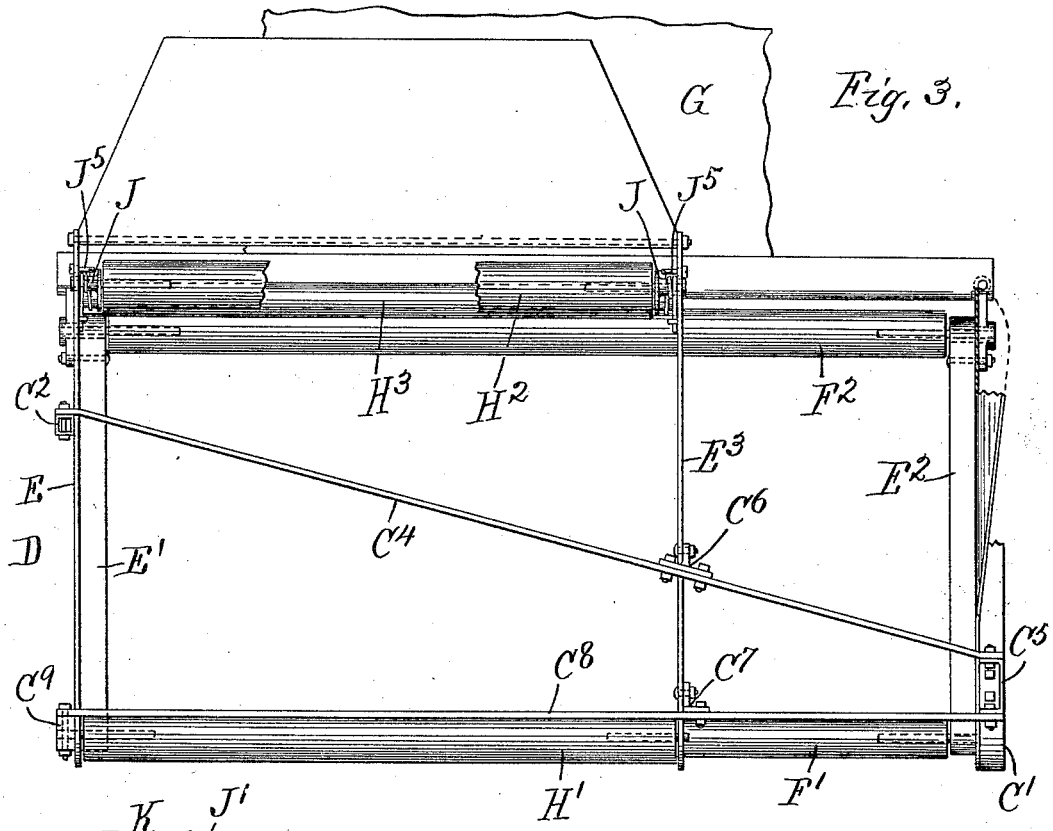


Fig. 5.

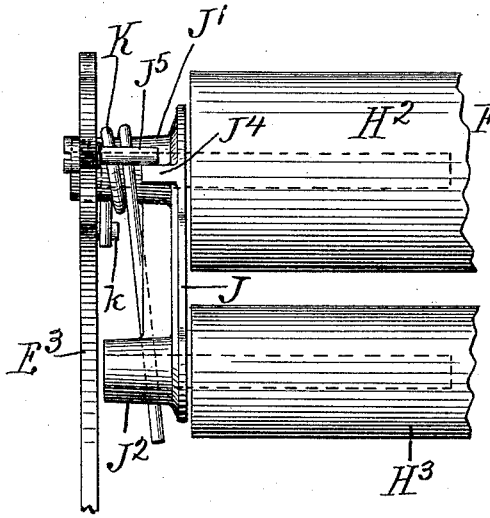
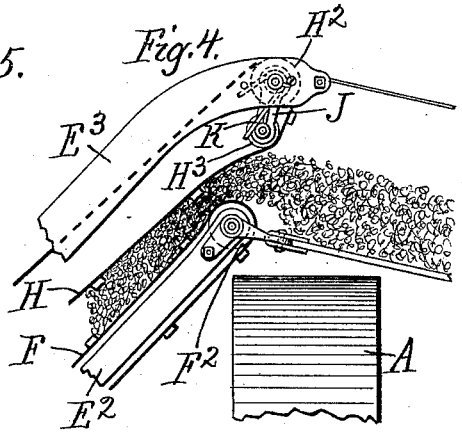


Fig. 4.



Witnesses.
E. T. Wray.
Jean Elliott

Inventor.
Andrew Stark
by Burton & Burton
his attys.

UNITED STATES PATENT OFFICE.

ANDREW STARK, OF CHICAGO, ILLINOIS.

HARVESTER-ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 526,166, dated September 18, 1894.

Application filed July 9, 1894. Serial No. 516,901. (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 Harvester-Elevators, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

In the drawings:—Figure 1 is a rear elevation with a part of the rear guard broken away to disclose the structure more perfectly, the elevator being shown empty of grain. Fig. 2 is a similar view, the elevator being shown full of grain. Fig. 3 is a plan of the parts shown in Fig. 1, one of the rollers of the upper carrier being partly broken away to show a third roller below it, and the aprons being removed from both the upper and lower carriers. Fig. 4 is a detail side elevation, showing a stubbleward portion of the elevator in a condition occupied by a small quantity of grain. Fig. 5 is a detail outer side elevation of the rear end of one portion of the guide rollers of the upper elevator endless carrier with the canvas removed, showing their connection and relation, and the spring which operates upon one of them.

A is the drive wheel, over which it is the function of the elevator to lift the grain and deliver it onto the binder-deck G.

C and C′ represent horizontal bars of the main frame. C^2 and C^3 are upright posts pertaining to the same rigid frame.

D is the forward side of the elevator; E′, the forward canvas guide of the lower elevator; E^2, the rear canvas guide of the same. The upper elevator has no canvas guides. The forward side is formed by the plate E, and the rear side by the plate E^3. These parts constitute the rigid elevator frame, and are supported by the parts C C′ C^2 and C^3. A diagonal bar C^4, which extends from the upper end of the post C^2, obliquely rearward, downward and grainward to a junction bracket C^5, which serves to connect it rigidly to the bar C above the rear grainward corner of the elevator, affords a support by means of the connecting brackets C^6 for the rear side E^3 of the upper elevator, which is further supported by a connection made by the bracket C^7 to the fore-and-aft bar C^8, which is made rigid at the rear end with the post C^3 and bar C′, by means of the same bracket C^5, which affords the fastening for the diagonal bar C^4, and at the forward end is rigidly supported by the post C^9, which supports the forward bearings of the grainward rollers of both the upper and the lower carrier of the elevator. This general arrangement of the supporting parts is the same as that shown in my pending application, Serial No. 467,505, filed March 24, 1893, and in respect thereto no claims are made in the present case.

The lower or grain-supporting element of the elevator is an endless carrier F, carried around the rollers F′, at the lower end, and F^2 at the upper end. The upper or delivery side of this lower element of the elevator overhangs the grainward edge of the drive wheel, and the binder-deck G extends up from the opposite side at a slight inclination, overhanging the stubbleward edge of the drive-wheel, and terminating a little grainward of the delivery side of the carrier F, and a little lower than the highest point of said carrier. In this respect, also, the structure is as shown in my said pending application, Serial No. 467,505.

The upper element of the elevator is an endless carrier H, whose receiving side roller H′ is suitably located above the receiving side the lower carrier, while the discharge side of roller H^2 is located a little farther stubbleward than the discharge side roller of the lower element, and very nearly or slightly overhangs the receiving side of the binder deck. The bearings of both the rollers of the upper carrier are obtained at fixed locations in the elevator sides. In addition to these two rollers, the upper carrier of the elevator has a third roller H^3 located between the ply of the carrier and near the discharge side roller H^2. The bearings of this third roller are obtained in brackets J J, which are pivoted about the axis of the discharge side roller H^2. A very convenient construction is that which is illustrated in detail in Fig. 5, in which said brackets have each the cylindrical bosses J′ and J^2, which constitute the bearings respectively for the rollers H^2 and H^3, the boss J′ being longer than the boss J^2, and reaching into the elevator side, and thereby obtaining its pivotal support in said

side, and virtually journaling the roller H^2 therein, the boss being merely the journal box for the shaft of said roller. About the boss J′ is coiled a spring K, one end of which is stopped against a stud *k*, which projects from the elevator side, while the other end bears against the outer side of the boss J^2, thereby tending to swing the brackets and the roller H^3 stubbleward; and to arrest or limit such movement, I provide each of the brackets with a stop lug J^4, which collides against a stop pin or screw J^5, which is set through the elevator side, and protrudes past the plane of the lug, arresting it and thereby stopping the bracket as shown in Fig. 4. The position to which the roller H^3 is thus forced, and at which it is stopped, as described, is such that the lower or grain-actuating ply of the upper carrier is deflected by said roller when at the position to which it is forced by the springs, out of the normal straight course between the extreme rollers H′ and H^2, down toward the lower carrier or grain-supporting element of the elevator, and the grain space between the upper and lower elements is thus rendered tapering from the lower receiving mouth between the rollers H′ and F′, where it is widest, to the throat or point of egress for the grain from between the two elements,—that is to say, at the delivery side of the lower carrier, where said carriers may be close enough to cause their ribs to touch as they pass, virtually narrowing the throat to zero when the elevator is empty, so that when the grain is very light, it will nevertheless be carried through the throat and delivered properly onto the binder-deck. As the quantity of grain increases, the lower or grain-actuating ply of the upper carrier will be deflected by it upward, thus opening the throat, and before the pressure of the grain is sufficient to do more than take up the slack, if any, of the canvas, and before the strain upon the canvas due to the pressure of the grain is sufficient to cause the springs K to yield to permit the third roller H^3 to yield grainward, the lower ply will be deflected as shown in Fig. 4; and thus, even with a small quantity of grain, the upper ply being an active carrier, tends to give the grain a distinctly outward movement as it delivers it over the top of the lower carrier onto the binder deck. As the quantity of grain increases and demands more space, the grain-actuating ply of the upper carrier being forced up to open the throat more widely, will force backward the third roller H^3, the springs yielding under the pressure, and by the time the roller E^3 has been forced back so that it is tangent to the plane of the normally straight course of the lower ply between the extreme rollers, the full excess of length of that lower ply above that necessary to extend in its normal straight course and due to its having been deflected outward from its straight course by the third roller, will be yielded and bellied inward to give space to the grain at the throat. This position of the third roller and the grain-actuating ply of the upper carrier is shown in dotted line in Fig. 1. As the quantity of grain further increases, the throat may open a little wider only by forcing the third roller back to the position shown in Fig. 2, where it is all but in contact with the upper or return ply of the carrier apron. The lower ply in this position, may also be forced back almost into contact with the upper ply, as shown in Fig. 2. At this extreme grainward position of the third roller, it is as far from the position which would correspond to a straight lower ply,—the dotted line position shown in Fig. 1,—as it is in the full line position shown in Fig. 2, when it is at the outermost limit, and the lower ply is deflected to the utmost permitted by the location of the stops J^4 and J^5. The length of the canvas, therefore, which encompasses the three rollers when the full line position shown in Fig. 2 is occupied, will not permit the third roller or the upper ply to be forced any farther back than shown in Fig. 2, and a rule which may govern the location of the stops J^4 and J^5, and which may determine the length of the apron, is that the stops should be so located, and the apron made of such length, that the roller H^3 can swing no farther outward from a plane tangent to the under side of the rollers H′ and H^2, than it can swing to the other side of such plane without contact with the upper or return ply. It will be obvious that this rule need not be followed with mathematical strictness, but it indicates the structure which should be approximated in order to get the best results from the use of a third roller in the general relation to the other parts herein described. The advantage of this construction over others which have the same general purpose of producing a yielding throat in the elevator to adapt it to carry and deliver with equal facility a light and a heavy body of grain, are first, that the upper "lip," as it may be termed, of the discharge mouth of the elevator fluctuates with the fluctuation of the throat. When the grain is very light and the lower or grain-actuating ply of the upper carrier is but slightly deflected and the pressure is not sufficient to overcome the tension of the springs K, the grain is delivered from between two lips, the lower of which is the upper side of the lower carrier, and the upper of which is the lower side of the roller H^3. As the quantity of grain increases, and until the roller H^3 is forced back of the plane tangent to the extreme rollers H′ and H^2 (the dotted position shown in Fig. 1), the same roller may be considered as the upper lip of the mouth, but this lip is itself changing position,—that is to say, the mouth is opening by the yielding of the canvas, so that all the varying quantities of grain experience the same positive outward and approximately horizontal push of the upper carrier as the delivery out of the mouth is effected. When the roller H^3 passes this plane, and as it approaches the position

shown in Fig. 2, the upper lip may be considered as consisting of the portion of the grain-actuating ply which extends tangent from the roller H^2 to the roller H^3; and, at the last position, the lip is at the lower side of the roller H^3, and the mouth at this position is widest, extending from the upper side of the delivery roller of the lower carrier to the lower side of the roller H^2 of the upper carrier. In all other structures with which I am familiar, in which any attempt has been made to produce a yielding throat, no attention has been paid to the importance of varying the upper limit of the mouth to make it correspond somewhat to the opening of the throat. It will be observed that this result in the present structure is obtained by producing the space into which the grain-actuating ply can yield to widen the throat by primarily deflecting that grain-actuating ply away from its normal straight course down toward the grain-supporting element, thus making it longer than it would otherwise be, and permitting the deflecting element,—to-wit, the third roller,—to yield back as the excess of length is drawn up by the pressure of the grain, thus making the apron, as it experiences the pressure which opens the throat, serve as the mechanical expedient for opening the mouth at the same time, the roller which holds the apron in its deflected position when the slack is not required being more than a mere deflecting element, and being, in fact, a fluctuating upper lip for the discharge mouth.

I claim—

1. In a harvester elevator, in combination with the lower or grain-supporting element, the upper element consisting of an endless carrier having its lower or grain-actuating ply yieldingly deflected out of its normal straight course down toward the lower or grain-supporting element: substantially as set forth.

2. In a harvester elevator, in combination with the lower or grain-supporting element, the upper element consisting of an endless carrier and the two extreme rollers thereof, and a third guide operating against the inner side of the lower or grain-actuating ply, and yieldingly deflecting said ply out of its normal straight course down toward the grain-supporting element: substantially as set forth.

3. In a harvester elevator, in combination with the lower or grain-supporting element, the upper element consisting of an endless carrier whose lower or grain-actuating ply is deflected yieldingly out of its normal straight course down toward the grain-supporting element, such deflection being produced stubbleward of the line of nearest approach of said ply to the said grain-supporting element: substantially as set forth.

4. In a harvester elevator, in combination with the lower endless carrier, an upper endless carrier and the extreme guide rollers thereof, said upper carrier being provided with a third guide operating yieldingly against the inner surface of the lower or grain-actuating ply at a point beyond the delivery side of the lower carrier, and deflecting said ply down toward said delivery side of the lower carrier: substantially as set forth.

5. In a harvester elevator, in combination with the lower or grain supporting element, the upper element consisting of the endless carrier and its extreme rollers having fixed bearings; a third roller located between the actuating and return ply of said carrier having its bearings pivoted and adapted to oscillate about the bearings of one of the extreme rollers, and a spring which operates against said pivoted bearings tending to force such intermediate roller yieldingly against the lower or grain-actuating ply of said carrier, and to force said ply outward toward the grain-supporting element: substantially as set forth.

6. In a harvester elevator, in combination with the lower or grain-supporting element, an upper element consisting of an endless carrier and its extreme rollers, and a third roller having its bearings pivoted and adapted to oscillate about the axis of the discharge side roller, and springs which operate against said pivoted bearings tending to force the roller yieldingly against the lower or grain-actuating ply of said upper carrier, at a point stubbleward of the point of nearest approach of said ply to the grain-supporting element: substantially as set forth.

7. In a harvester elevator, in combination with the lower or grain-supporting element, the upper element consisting of an endless carrier and its extreme rollers, a third roller located between the two plies of the carrier and having its bearings movable in a direction transverse to the normal straight course of the lower or grain-actuating ply, and springs operating against said bearings, tending to force the roller outward against said lower ply to deflect the same out of said normal straight course.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 6th day of June, 1894.

ANDREW STARK.

Witnesses:
CHAS. S. BURTON,
JEAN ELLIOTT.