(No Model.) 3 Sheets—Sheet 1.

# A. STARK.

## GRAIN HARVESTER.

No. 387,569. Patented Aug. 7, 1888.

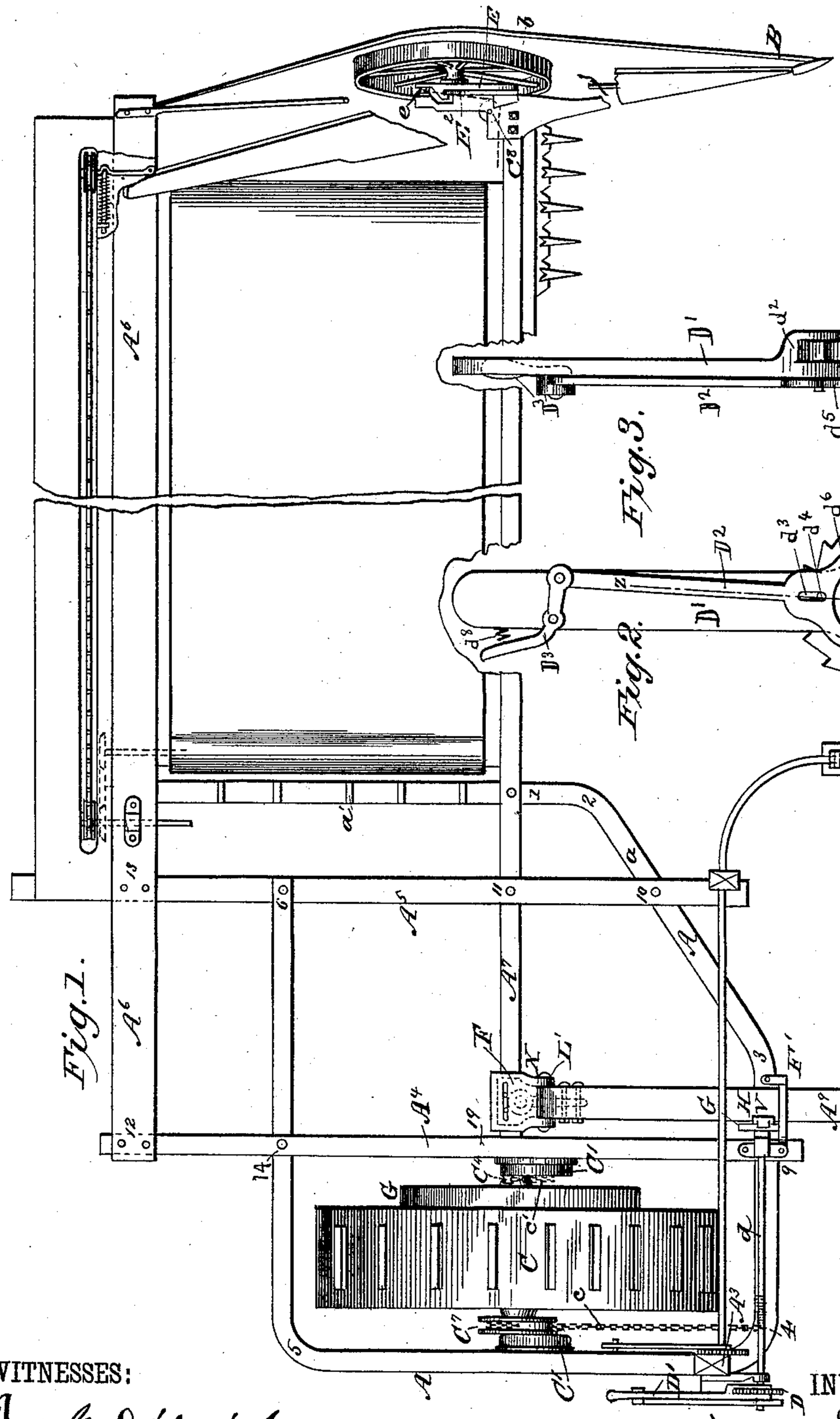

Fig. 1.



Fig. 2.



Fig. 3.

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## GRAIN HARVESTER.

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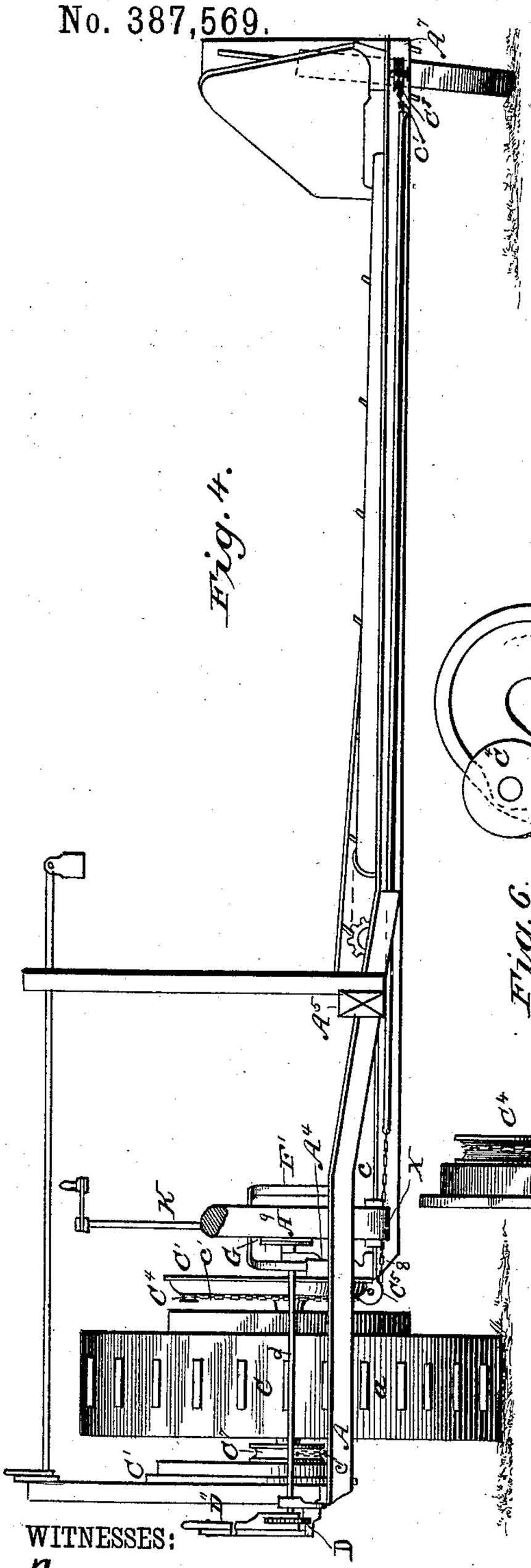

Fig. 4.

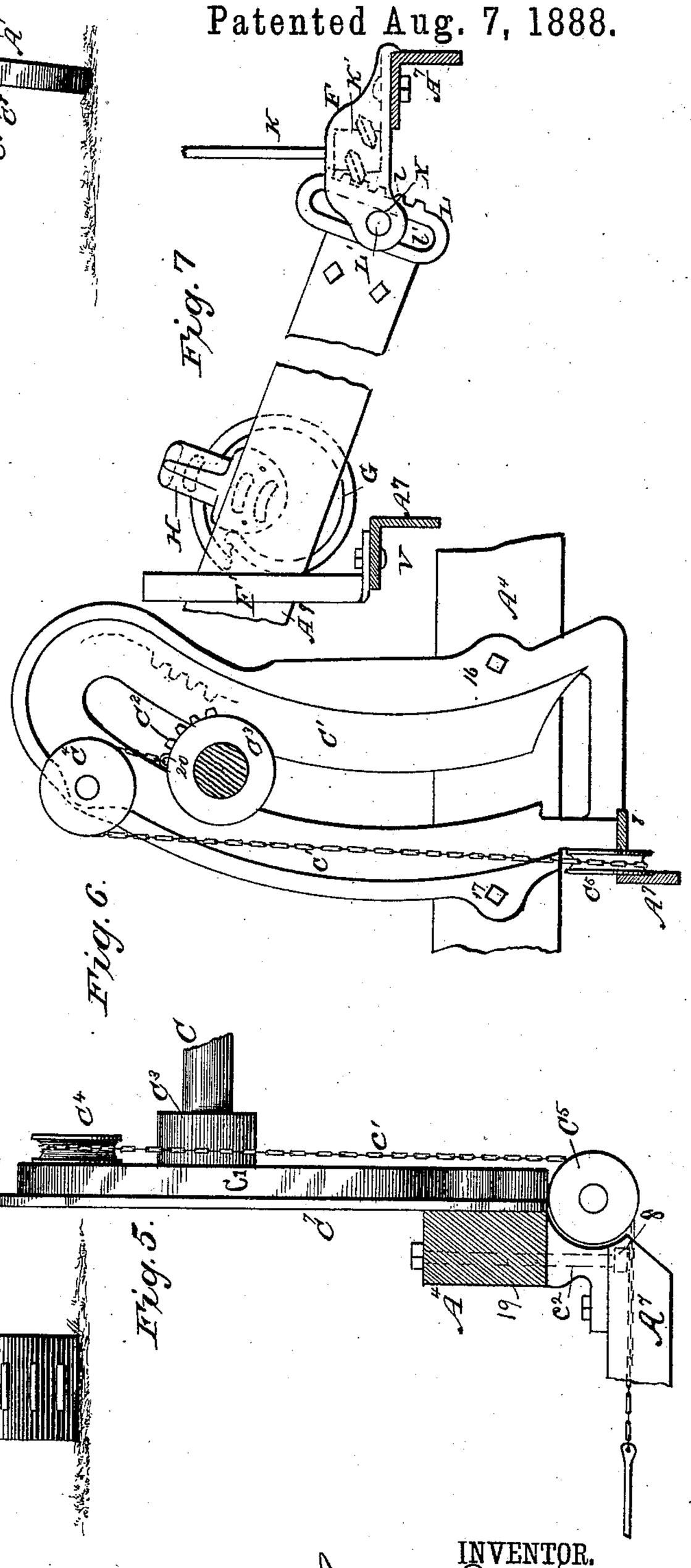

Fig. 6.



Fig. 5.

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## GRAIN HARVESTER.

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*Fig. 8.*

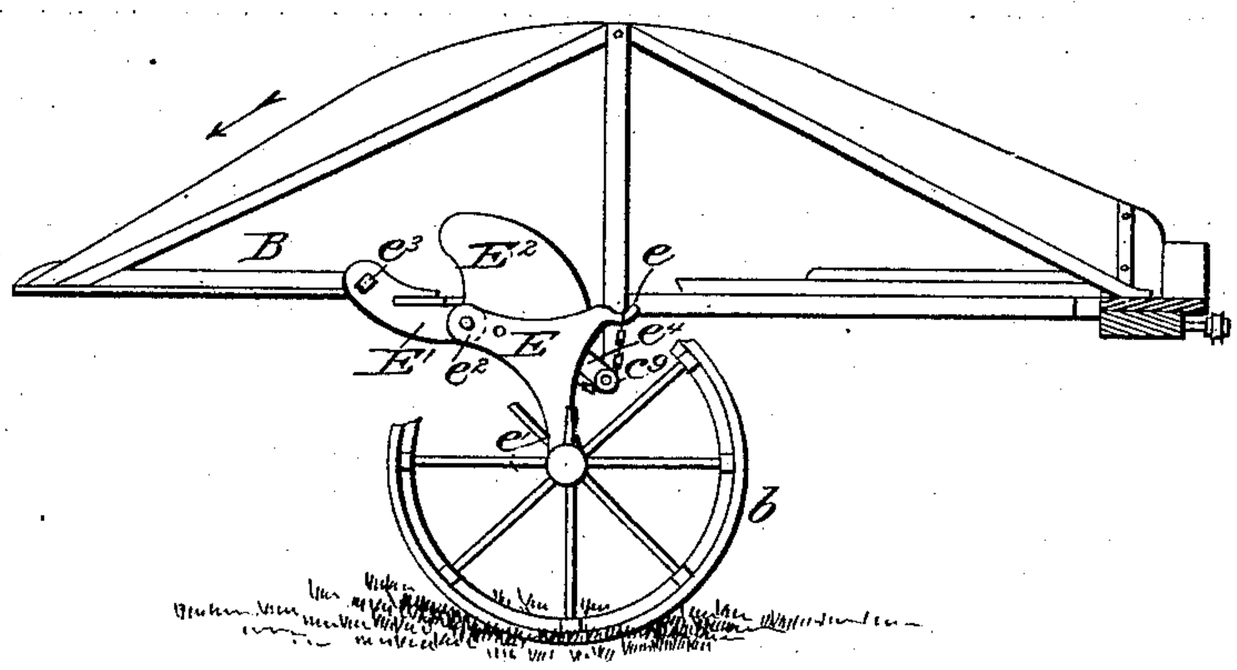


*Fig. 10.*

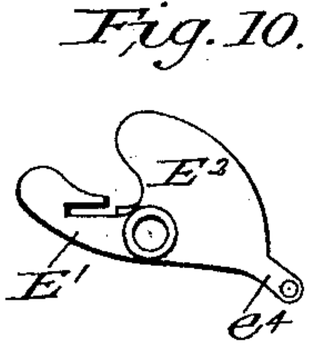





*Fig. 9.*




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# UNITED STATES PATENT OFFICE.

ANDREW STARK, OF CHICAGO, ILLINOIS.

## GRAIN-HARVESTER.

SPECIFICATION forming part of Letters Patent No. 387,569, dated August 7, 1888.

Application filed August 4, 1883. Serial No. 102,762. (No model.)

*To all whom it may concern:*

Be it known that I, ANDREW STARK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Platform Adjustments for Grain-Harvesters, which are fully set forth in the annexed specification and the drawings thereunto appertaining, from which any one familiar with the art to which the said invention pertains can make and use the same.

This invention consists, first, in certain devices, described hereinafter, and set forth in the claims, for raising and lowering the entire frame on the driving-wheel and grain-wheel. It consists, secondly, of means for connecting the tongue or pole to the frame, by which, although it is secured to the frame and not to the axle of the driving-wheel, and though rigidly connected to the frame so as to steady it on the supporting-wheels, it nevertheless permits the raising and lowering of the frame without either giving it a pitch or disturbing the connection of the pole with the neck-yoke or other connection with the draying-power.

Figure 1 is a plan of my machine. Fig. 2 is a side elevation of the pawl, the ratchet-wheel, and the hand-lever employed in raising and lowering the machine. Fig. 3 is a front elevation of the same. Fig. 4 is a front elevation of the frame. Fig. 5 is a rear elevation, and Fig. 6 an outside elevation, of one of the segments and the axle, chain, and pulleys, by means of which the stubble end of the frame, being raised and lowered on the driving-wheel, communicates the same motion to the grain end. Fig. 7 is an inside elevation of the pole and the means by which it is connected with the frame, and by which the tilting of the machine and the adjustment of the pole according to the height of the machines are effected. Fig. 8 is a side elevation of the grain-wheel and its bearings, the divider, and mechanism by means of which the height of the grain end of the machine, sustained by the grain-wheel, is adjusted simultaneously with the stubble end, which is sustained by the driving-wheel. Fig. 9 is a section through *z z*, Fig. 2, extending also to the end of the windlass-shaft for raising and lowering, and showing a helical plate on the inner end of said shaft for correcting the tilt automatically in the process of raising and lowering. Fig. 10 is a grain-side elevation of a bracket at the grain end of the finger-bar.

A is a main frame-bar, formed, preferably, of angle-iron extending in a single continuous piece partly around the driving-wheel from the point 1, by way of the angles 2, 3, 4, and 5, to the point 6. The finger-bar $A^7$, also preferably formed of angle-iron, crosses the frame-bar A, and is firmly bolted to it at 1, being rigidly secured also at 8 to a suitable bracket formed on the segment C'. The bar $A^4$ is bolted to the frame-bar A at the points 14 and 9, and to the segment C' at 16 and 17, and at 19 to the said bracket at the end of the segment, the bolt at this point also passing through the finger-bar $A^7$, thus further securing the latter to the bracket. The bar $A^5$ is bolted to the frame-bar A at 10 and at 6, and to the finger-bar $A^7$ at 11. The rear sill, $A^6$, crosses and is bolted to the cross-bar $A^4$ at 12, and to the cross-bar $A^5$ at 13. The frame thus constructed is adapted to carry the usual driving, cutting, and conveying mechanisms. This frame is sustained upon the driving-wheel C and the grain-wheel *b*, the design being as nearly as possible to balance the frame on these wheels. The pole upheld by the horses constitutes a third support.

The main frame is sustained upon the driving-wheel C in the usual manner by means of the segments C', secured to the frame and the pinions $C^2$ on the axle of the driving-wheel engaging with the racks on said segments, the outer segment being fastened to the frame-bar A and the inner segment to the end of the finger-bar, as described, and also to the cross-bar $A^4$. The connection of the frame to the grain-wheel *b* is by means of a lever, E, pivoted to some point at the grain end of the grain-platform, to which lever the grain-wheel *b* is journaled.

The frame is raised and lowered and secured at any height by the following means: On the outer end of the axle of the driving-wheel C, between it and the outer segment, C', is fixed the pulley $C^7$, on which is wound the chain *c*. This chain extends thence to, and is wound around, the shaft *d*, which is journaled in bearings on the frame. Keyed fast to the shaft *d* is the ratchet-wheel D, adapted to be actuated by a pawl-and-lever arm, D', more fully described hereinafter.

The winding up of the chain *c* around the

shaft *d* unwinds it from the pulley $C^7$, and in so doing rotates the pulley and the driving-wheel axle, to which the pulley is rigidly attached, and the pinions $C^2$, which are also rigidly attached to the axle, engage in the segment-racks and raise the driving end of the frame.

On the inner side of the driving-wheel, between it and the inner segment, C', is a loose collar, $C^6$, to which, at 20, is fastened the chain *c'*, which passes thence up over the small guide-pulley $C^4$ at the upper end of the segment, thence down around the guide-pulley $C^5$, so placed at the lower end of the segment that its lower edge is a little lower than the under side of the finger-bar, and that the chain running from the groove of the pulley can lie under the finger-bar, preferably in the angle of the angle-iron of which the finger-bar is preferably made, as shown. After passing under the guide-pulley $C^5$, the chain *c'* extends thence to the grain end of the finger-bar, where it passes around the guide-pulley $c^8$ on the finger-bar; thence it passes under the guide-pulley $c^9$ on the arm $c^4$ of the bracket E', and thence extends to the lever E, and is made fast to it at *e*. The lever E is pivoted at $c^2$ in line with the finger-bar to the bracket E', which is rigidly secured to the finger-bar, and is provided with the sector-guide $E^2$, the center of whose arc is coincident with the axis of the pivot $c^2$ of the lever E. The lever E bears against the sector $E^2$, and has on its inner face a hooked flange embracing the sector $E^2$, as shown in Fig. 1. By this construction the pivot $c^2$ is relieved of strain, and firmness is given to the joint and the wheel *b* prevented from wabbling.

When by the winding up of the chain *c* on the shaft *d* the segments are raised, carrying up the stubble end of the frame, the pulley $C^4$ on the inner segment draws up with it chain *c'*, thereby drawing up the pulley $c^9$ toward the point *e*, and lifting the grain end of the machine equally and simultaneously with the stubble end.

The lever D', for actuating the ratchet-wheel D, and the shaft *d* is bifurcated at the lower end and strides the ratchet-wheel D, the neck or shoulder $d^2$, which connects the two branches of the fork, serving as the pawl to engage the ratchet-teeth. Each branch of the fork is made with an oblong opening, *d'*, as shown in Fig. 9, and by the dotted lines in Fig. 2, so that the lever has a longitudinal play on the shaft, as is necessary to allow the neck $d^2$ to engage with and slip off from the ratchet-teeth. The weight of the lever is sufficient to throw it into engagement without the aid of any spring for that purpose.

$D^2$ is a rod connected by the bell-crank lever $D^3$ to the side of the main handle D'. It is provided with a slot, $d^3$, in which plays the guide-pin $d^4$, and is expanded below into the blade $d^5$, which, for convenience of reference, I shall call the "pawl-trip." It has the oblong opening $d^6$ for the hub $d^7$ of the ratchet-wheel D, and at the lower end is shaped in the arc of a circle, whose radius is equal to or slightly greater than the radius of the ratchet-wheel D to the point of its teeth. Under the end of the bell-crank lever $D^3$ is a spring, $d^8$, tending to throw it out from the arm D', and so to hold up the pawl-trip out of the way of the detaining-pawl $D^1$, which is pivoted on the frame and adapted to engage the ratchet-wheel D, and so to hold the machine at any height at which it may be set.

It will be seen that to raise the machine the lever D' is designed to be pulled toward the driver, and in making this movement the lever $D^3$, being on the side toward the seat, is not pressed in toward the arm D', and so, by the action of the spring $d^8$, the pawl-trip $d^5$ is held up clear of the pawl $D^1$. When it is desired to lower the machine, the necessary motion of the lever-arm D' being from the driver, the lever $D^3$ is, by the same movement of the hand, pressed in against the arm D', and the trip $d^5$, thus forced down upon the point $d^9$ of the pawl $D^1$, which is made wider than the thickness of the ratchet-wheel, so that its point stands over the edge of the wheel, and the pawl is thereby disengaged and the ratchet-wheel allowed to be reversed, thus permitting the chain *c* to unwind from the shaft *d* as the machine descends by its own weight. This descent brings the pulley $C^4$ down toward the axle of the driving-wheel, and so slackens the chain *c'* and permits the grain end of the machine to fall by its own weight. The raising or lowering of both ends of the machine simultaneously is thus effected by the motion of the single lever.

To render the balance of the machine stable, the pole $A^9$ is made to form a third support by being secured to the frame adjustably, but rigidly. The most secure and convenient point of the attachment is at or directly above the stubble end of the finger-bar. I provide a suitable casting, F, by which to hinge it at the point. This casting is bolted fast to the finger-bar, as shown in Fig. 7, and thence the pole extends inclined slightly upward over the frame-bar A, through a loop of iron, F', bolted to the frame-bar at *v*.

Manifestly the lowering of the machine, if it be kept horizontal, would cause the pole, hinged at *x* and unsecured at *v*, to rise at the latter point relatively to the frame a distance which would be to the entire change in elevation of the machine as the distance *x v* is to the entire length of the pole from its hinge *x* to the point of its support on the neck-yoke; also, that if the pole were rigidly and unvaryingly secured both at *x* and *v*, the end of the neck-yoke being unvarying in height, any lowering of the machine would result in tipping it backward, assuming it to have been level at its higher position. In order, therefore, that the pole may be rigidly secured to the machine, as is necessary in order that it may constitute the third support to render it stable, and yet permit it to be raised and lowered

without tilting, I extend the shaft *d* across to the point where the pole crosses the frame-bar A, and there fasten to the end of it the plate G, provided with the helical flange, and on the side of the pole I fix the rack H, adapted to be actuated by the helical flange. I construct the pitch of the helix so that its ratio to the height through which the machine is raised by a single revolution of the shaft *d* is that of the length *x v* to the entire length of the pole. Now, when the shaft *d* is rotated to wind up the chain *c* and elevate the machine, the plate G and its helical flange, rotating with it, carries the rack H and the pole $A^9$, to which it is secured, relatively downward the exact amount necessary to keep the machine level. Thus the pole is rigidly secured to the machine and thereby becomes its third support, and at the same time the machine is maintained in a horizontal position at all heights, and the adjustment is effected automatically by the same movement which raises and lowers the machine, the diagonal portion *a* of the frame-bar A being in substantially a direct line from the junction of said frame-bar with the finger-bar, and its intersection with the pole under the loop F′ enables the machine to be turned with the pole with the least possible tendency to sag the finger-bar backward—as it might otherwise do—wrenching the frame.

Since it may sometimes be desirable to tilt the machine or to adjust the angle of the pole according to the height of the horses, I provide as the hinged connection of the pole with the finger-bar the block F, in which is journaled the vertical shaft K, having on its lower end, working in a cavity provided in the block F, the endless screw K′, and on the end of the pole I provide the casting L, having the slot *l′* and the rack *l*, the casting L being joined to the block F by a pivot-pin, L′, through the slot *l′*. The endless screw K′ engages with the rack *l*, and the shaft K being extended upward to a convenient point in reach of the driver and provided with a crank, this entire adjustment is under the driver's control from the seat, which is located outside the drive-wheel, being suitably supported on the frame-bar A.

I do not herein claim the general construction of the frame shown and described, for that forms the subject of my application Serial No. 174,698, filed August 18, 1885, being a division of this case. Neither do I claim, broadly, the finger-bar, axle-guide, and sector-guide, all rigidly secured together, as herein shown and described, because such construction is claimed in my application Serial No. 147,143, filed November 3, 1883.

I claim as my invention and desire to secure by Letters Patent—

1. In a harvesting-machine, in combination with a rigid main frame adapted to carry the driving, cutting, and conveying mechanisms, and supported at one end directly upon the main axle, mechanism for raising and lowering the stubble end of said frame on the axle, the finger-bar rigid with the main frame, the grain-wheel lever having its pivot at the end of the finger-bar in line therewith, the grain-wheel journaled to said lever, and a cable or chain loosely connected to the main axle, so as not to be wound with its revolution, and extending thence upward to and over a point on the frame and then downward to the stubble end of the finger-bar, and then along the same to the grain end and thence to the grain-wheel lever and attached thereto, and provided with suitable guides at all the said points where its direction changes, whereby the raising and lowering of the stubble end of the platform relatively to the main axle causes a like change of elevation of the grain end by a longitudinal strain in the line of the rigid finger-bar and by means of the fewest guide-pulleys, substantially as set forth.

2. In a harvesting-machine, the combination of the main axle, the main frame, the axle-guide, the finger-bar secured to the main frame in the vertical plane of the lower end of the axle-guide, the sector-guide $E^2$, attached rigidly to the finger-bar, the lever E, pivoted at the end of the finger-bar, the grain-wheel *b*, journaled to said lever, and the cable *c′*, loosely connected to the main axle and running over suitable guide-pulleys and under the finger-bar to and actuating the free end of the lever E, substantially as and for the purpose set forth.

3. In a grain-harvester, for the purpose of raising and lowering the same on the driving-wheel, the windlass and cable, the ratchet-wheel D, hand-lever D′, having the pawl-shoulder $d^2$, the detaining-pawl $D^4$, the pawl-trip $d^5$, and the bell-crank lever $D^6$, all combined and arranged to operate substantially as set forth.

4. In a grain-harvester, in combination with the rigid main frame, and a draft-pole connected thereto at two points of its length, a windlass and cable for raising and lowering the frame, the helical plate G, secured to said windlass, and the rack H, secured to the pole, substantially as and for the purpose set forth.

5. In a grain-harvester, the combination, with the rigid main frame, of a draft-pole rigidly connected to such frame at two points, mechanism for adjusting the height of said frame, and mechanism connected to such adjusting mechanism and to one of the draft-pole connections, whereby the angle of said draft-pole is automatically adjusted in the act of raising and lowering the frame.

In testimony that I claim the foregoing as my invention I have hereunto set my hand, at Chicago, Illinois, in the presence of two witnesses, this 11th day of July, A. D. 1883.

ANDREW STARK.

Attest:

L. W. NOYES,

A. S. MOORE.