(No Model.) 3 Sheets—Sheet 1.

A. STARK.

HARVESTER GEARING.

No. 477,077. Patented June 14, 1892.

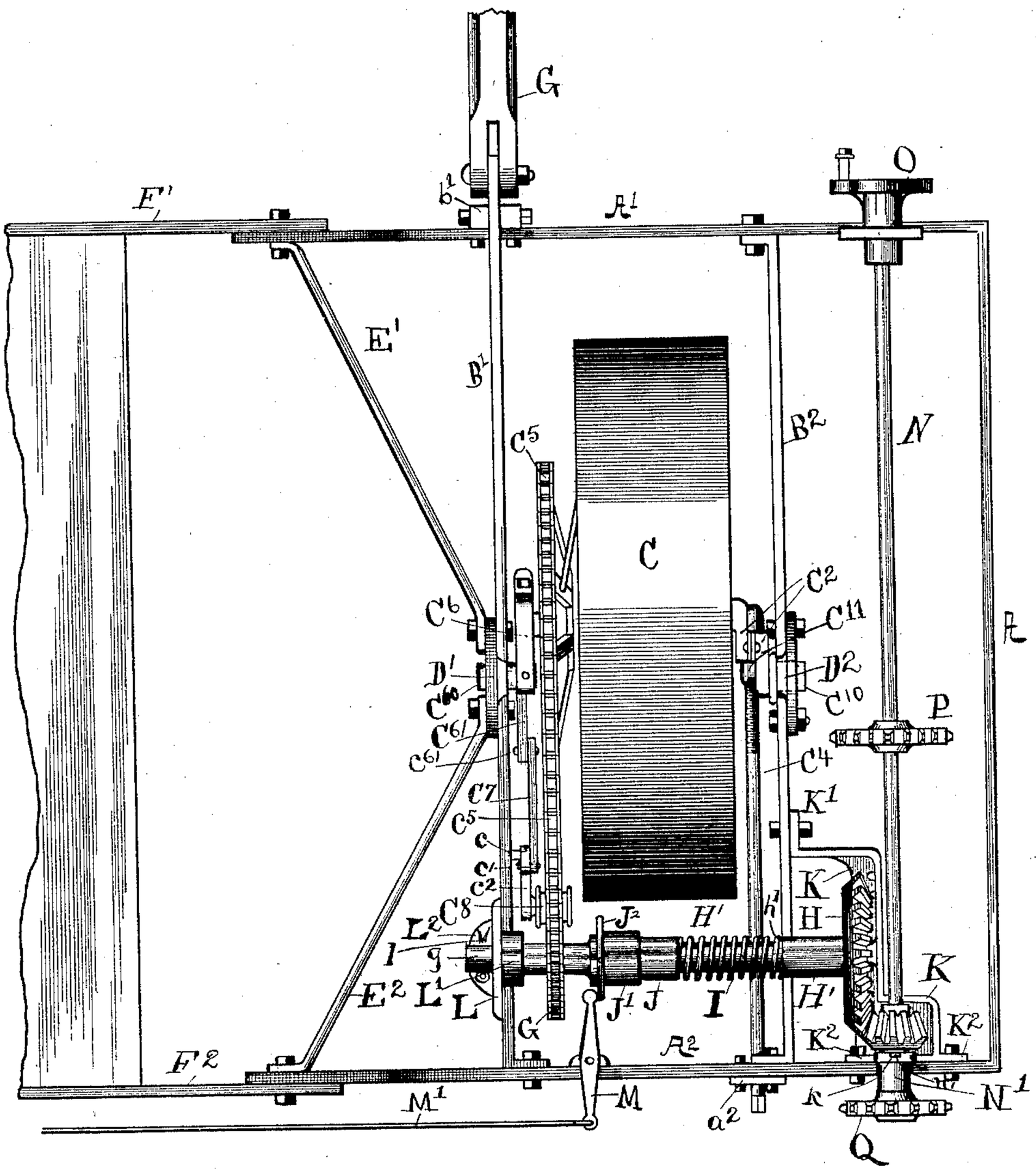

Fig. 1

Witnesses.
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Anna Coburn

Inventor.
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his Attorneys

(No Model.)

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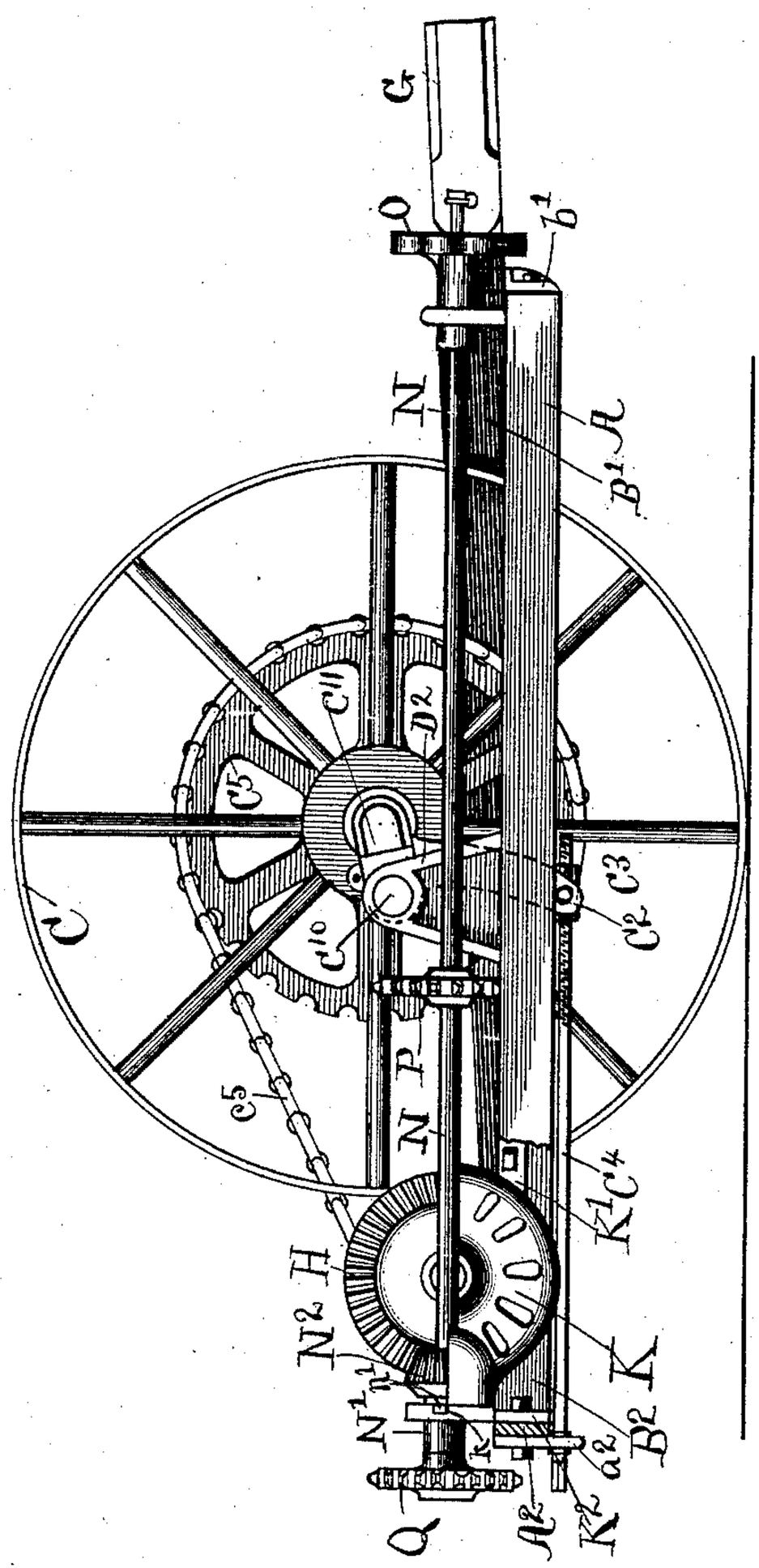

Fig. 2.

Witnesses.

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Fig. 5

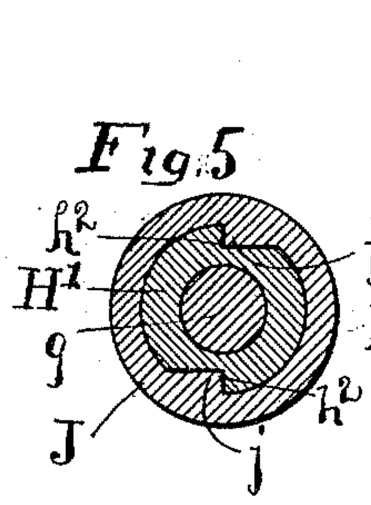
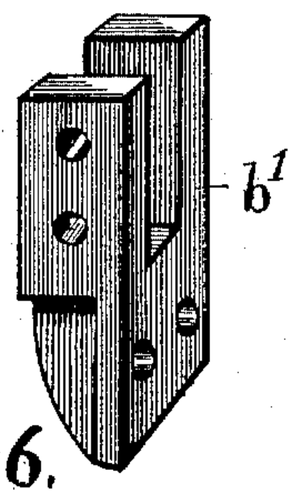


Fig. 3.

Fig 6.



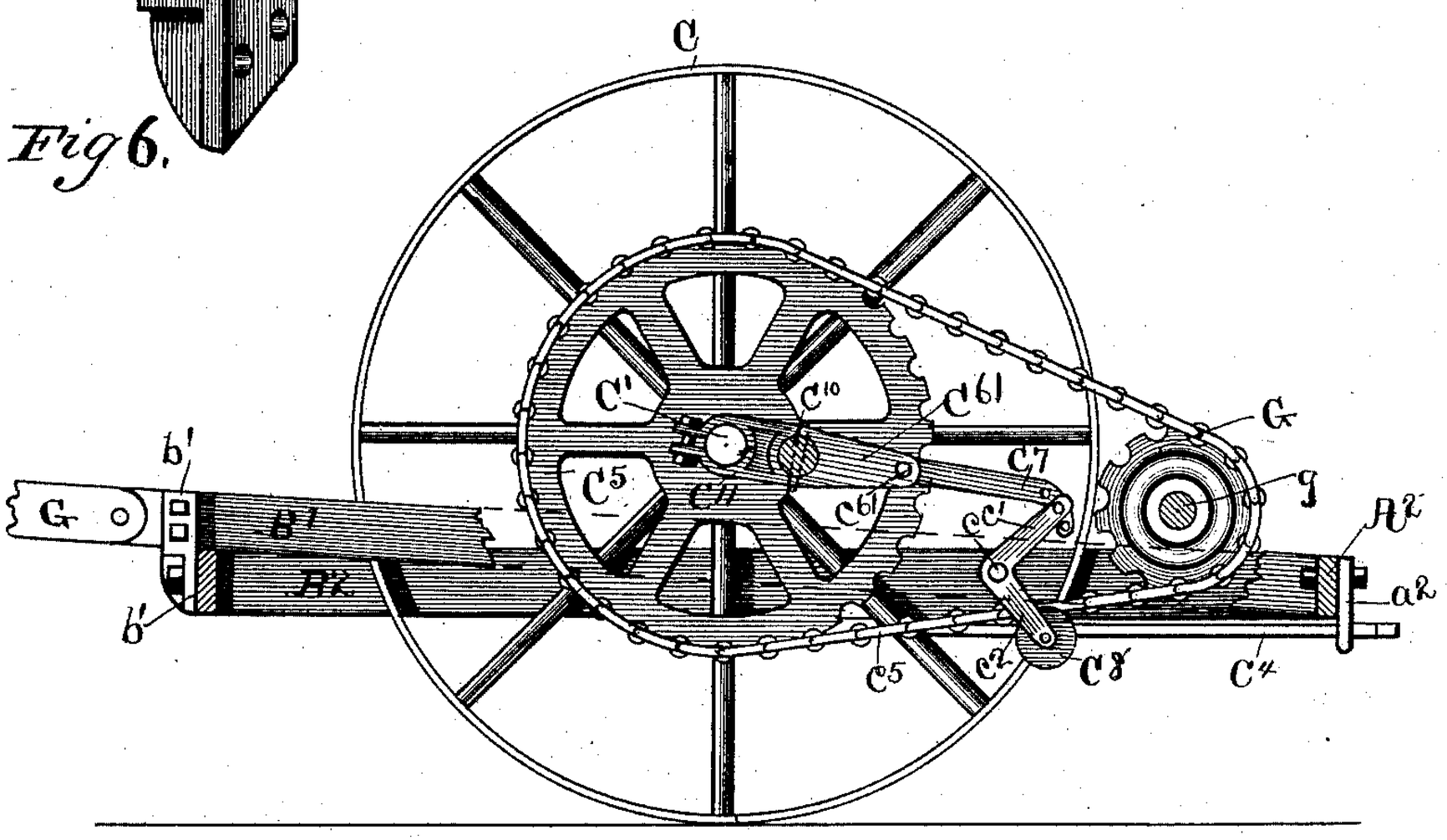


Fig. 4.

Witnesses
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Anna Coburn

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his attys.

UNITED STATES PATENT OFFICE.

ANDREW STARK, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO THE WARDER, BUSHNELL & GLESSNER COMPANY, OF SPRINGFIELD, OHIO.

HARVESTER-GEARING.

SPECIFICATION forming part of Letters Patent No. 477,077, dated June 14, 1892.

Application filed August 27, 1891. Serial No. 403,909. (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-Gearing, 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 plan of a portion of the main frame of a harvester, comprising the drive-wheel and its immediate frame and the main driving-train of the sickle crank-shaft, all upwardly-extending portions of the frame above the main frame and all mechanism pertaining thereto being omitted. Fig. 2 is a stubble-side elevation of the same. Fig. 3 is a horizontal section of the gearing-train axial with respect to the main power-communicating shaft and sickle crank-shaft. Fig. 4 is a grain-side elevation of the drive-wheel raising and lowering mechanism and the chain connection from the drive-wheel to the power-receiving wheel on the power-communicating shaft, the grainward fore-and-aft bar of the wheel-frame and its braces and the bearing of the drive-wheel crank-axle being broken away. Fig. 5 is a section at the line 5 5 on Fig. 3. Fig. 6 is a perspective of the casting which unites the main frame and the grainward fore-and-aft bar.

One feature of this invention relates to the construction of the main frame or frame in which the drive-wheel crank-axle obtains bearings and which constitutes what may be called the "wheel-frame." This construction will now be described.

The main frame comprises the iron bar A A′ A^2, which is set edgewise vertically and bent at right angles at the front and rear stubbleward corners, making a frame which extends around three sides of the drive-wheel, being open at the grainward side. The front and rear portions A′ and A^2 of this frame will be referred to as the "front" and "rear" sills of the main frame.

B′ and B^2 are fore-and-aft iron bars, which extend on opposite sides of the drive-wheel C, being bolted rigidly at their front and rear ends to the front and rear sills A′ and A^2, making, with the portion of said sills intercepted between them, a four-square frame, which encompasses the wheel, and may be hereinafter referred to as the "wheel-frame." The stubbleward bar B^2 of these fore-and-aft bars does not cross the front and rear sills, but is bent at right angles where it meets those sills and secured by bolting through the laterally-bent portions at the ends, respectively, as seen in Fig. 1. The grainward bar B′ is similarly formed at the rear end and bolted to the rear sill A^2; but at the forward end it extends across the sill A′ above the latter and is made rigid with said sill at the point of crossing by iron casting or forging *b′*, which is bolted to the forward side of the sill A′ and has a vertical notch, which receives the bar B′ edgewise, said bar being rigidly secured to the block in said notch.

D′ and D^2 are standards, which are bolted to bars B′ and B^2, respectively, and afford bearings for the drive-wheel crank-axle C′, the wrists C^{10} C^{10} of said crank-axle being journaled in said standards and the frame being raised and lowered by rocking the axle in the hub of the wheel to carry the wrists, and thereby the standards and frame, up and down. The standard D′ is secured to the bar B′ by the same bolts which fasten the oblique braces E′ E^2 to the bar B′, said braces extending grainward from said fastening, the former obliquely forward to the sill A′ and the latter obliquely rearward to the sill A^2. Said braces E′ and E^2 may be made of a single bar bent at the proper angles. The front and rear platform-sills F′ and F^2, the former being the finger-bar, are bolted to the grainward ends of the sills A′ and A^2, respectively, by the same bolts which secure the ends of the braces E′ and E^2 to said sills. The grainward ends of said front and rear sills E′ and E^2 are bent downward after passing the bar B′, so that the braces E′ and E^2 are oblique vertically as well as horizontally.

G is the tongue, which is pivoted to the forward end of the bar B′ forward of the front sill A′. From the construction of the frame as thus far described it will be observed that the draft strain communicated from the tongue has no tendency whatever to distort

the frame, because, the tongue being at the forward end of the directly fore-and-aft bar B′ and said bar being connected to both front and rear sills, the draft strain is applied equally to both sills, and, said bar B′ having one bearing of the crank-axle of the drive-wheel, the draft strain is by it applied as directly as possible to said crank-axle. This construction makes a frame which is practically rigid with the minimum amount of bracing; also, since the platform-sills are braced directly to said bar B′ on which the draft is applied, said draft strain is transmitted to the platform-frame in the most direct manner possible and the tendency to distortion of that frame in draft is made the least possible.

The raising and lowering of the frame on the drive-wheel is accomplished in a manner which in general is familiar, to wit: The stubbleward crank-arm C^{11} of the drive-wheel crank has secured to it the lever-arm C^2, which extends downward and has pivoted to it at its lower end the screw-block C^3, through which the shaft C^4 is screwed, said shaft having a bearing in the bracket a^2, which depends from the rear sill A^2, and being squared rearward of said bracket to receive a key, by which it may be rotated, and thereby move the lower end of the lever-arm C^3 backward or forward, so rocking the crank-shaft on its wrists in the bearings afforded by the standards D′ and D^2. There is combined with this raising and lowering mechanism a device for automatically compensating for the change in distance between the main power-wheel C^5 on the drive-wheel and the power-receiving wheel G on the axle or shaft g to take up and let out the slack of the chain, as is made necessary by this changing distance. This device is located in connection with the grainward crank-arm of the crank-axle. This crank-arm C^6 is preferably made in an independent piece from the crank-axle, being different in this respect from the outer crank-arm, which is forged integrally with the axle. The crank-arm C^6 is arranged to be clamped onto the axle, as seen in Fig. 4, and has the crank-wrist C^{60} pinned fast into it and is extended rearward beyond said crank-wrist, and to said extension C^{61}, at its rear end, there is pivoted the link C^7. To the bar B′ there is pivoted at c a bell-crank lever $c′$ c^2, the arm $c′$ being pivoted to the link C^7 and the arm c^2 carrying the slack-pulley C^8, which extends underneath the lower ply of the chain c^5.

The position and dimensions of the several parts are such that when the crank-axle, its crank-wrist, and the shaft g are in one line—that is, when the distance between the wrist and drive-wheels is greatest and the slack of the chain least—the pivot c^{61} of the link C^7 to the arm C^{61} is in the same line. Now as the crank-axle is rocked either way from that position the pivot c^{61}, being carried out of line with the other axes, will tend to draw the link C^7 toward the vertical plane of the drive-wheel axle, and thereby rock the lever $c′$ c^2 in direction to cause its lower arm c^2 to lift the slack-pulley and take up the slack of the chain. I provide a number of pivot-holes in end of the link C^7, at any one of which the arm C′ of the bell-crank lever may be pivoted, the adjustment from one hole to the other being designed to compensate for the wear of the chain; but at whatever hole the pivoting may be made the automatic compensatory action described will be produced, so that either raising or lowering the frame from the intermediate position shown in Fig. 4, which would slack the chain, will move the bell-crank lever in a direction to cause its slack-pulley to take up the slack.

The shaft g is an axle or fixed bearing for the main communicating power-train or combination of wheels journaled on said axle, for said shaft is rigid with the main frame, the construction being as follows:

K is a malleable-iron corner-bracket, which is secured in the corner formed between the fore-and-aft bar B^2 and the portion of the rear sill A^2 which extends stubbleward beyond said fore-and-aft bar. This bracket is formed with suitable lugs K′ K^2 K^3, through which bolts are passed to secure it to the two bars B^2 and A^2, respectively.

L is a bracket, which is bolted to the bar B′ and has a hub or annular boss L′, through which the shaft or axle g extends, and on the grainward side, just below the aperture for said axle, it has the horizontal flange L^2. In the line with the bearing thus formed for the shaft g in the bracket L the bracket K is horizontally pierced and the aperture threaded, and the shaft g, which is threaded at the stubbleward end, is thereby adapted to be inserted stubbleward from the grainward side through the bracket L and screwed into the bracket K. At proper time of assembling the parts this is performed, and the shaft is prevented from becoming detached by unscrewing from the bracket K by means of the linchpin l, which is inserted through the shaft g grainward from its bearing in the bracket L, the flange L^2 of the bracket being encountered by said linchpin if the shaft turns and so preventing it from becoming unscrewed; but before the shaft is thus put into place the power-communicating parts, of which it is the support and bearing, must be introduced. These consist of the sprocket-wheel G, the beveled gear-wheel H, the sleeve J, and the clutch-operating spring I. The beveled gear-wheel H has a long sleeve H′, which is reduced in diameter to form a shoulder $h′$, which constitutes the stop for one end of the spring I, which is coiled above the sleeve. The clutch-sleeve J has its smaller portion adapted to slip onto the smaller end of the sleeve H′, a feathered connection being made between the two, (which will hereinafter be described in detail,) so that they rotate together, though the clutch-sleeve can slide longitudinally upon the sleeve H′.

$j′$ is a stop-collar pinned onto the shaft g at

the stubbleward end of the sleeve H′, said collar being of such diameter that the clutch-sleeve can be slipped over it onto the sleeve H′. The clutch-sleeve J is enlarged at its grainward end to form a hood or cap J′ to inclose the clutch-teeth, one set of said teeth being formed in said cap—that is, at the grainward end of the smaller portion of the sleeve—and the other set being formed at the stubbleward end of the hub of the wheel G. The cap J′ extends stubbleward far enough to cover the clutch-teeth on the hub of the wheel G when the members of the clutch are farthest apart, and at its stubbleward end said clutch-sleeve has the flange J^2, which is adapted to receive the pressure of the lever M, which is pivoted on the rear sill A^2 and operated by any convenient connection made by the rod M′ to shift the clutch against the pressure of the spring I, which, being stopped at its stubbleward end, as described, by the shoulder *h′* of the sleeve H, reacts at its grainward end against the stubbleward end of the clutch-sleeve J, tending thereby to force the clutch-teeth of said sleeve into engagement with the oppositely-facing clutch-teeth of the wheel G.

The feathered connection of the clutch-sleeve J with the sleeve H′ of the wheel H is seen in Fig. 5 and is made as will now be described for cheapness and ease of assembling. The sleeve H′ is cast with two right-angular longitudinal notches h^2, diametrically opposite, one face of the notch being radial with respect to the axis of the sleeve, said radial faces facing in the same circumferential direction. The sleeve J at its smaller part is provided with two corresponding right-angular ribs *j j*. Both parts may be cast with sufficent accuracy in the form described and the radial shoulders or faces of the notches and projections respectively engaging in the direction of rotation of the parts when in operation, making a positive driving connection which is almost absolutely free from liability to break in use, and at the same time the clutch-sleeve has a free longitudinal sliding movement on the sleeve of the gear-wheel.

N is a fore-and-aft horizontal shaft. It is journaled at its forward end in a suitable bearing provided on the front sill A′, and its rear end passes through the malleable-iron bracket K, immediately above the rear sill A^2. The rear bearing for this shaft is not obtained directly in the malleable-iron bracket, but in a cast sleeve N′, which is inserted through an opening provided for it in the bracket K, and which fits loosely in said opening, but is prevented from turning therein by the notch *k* in the bracket and the tooth *n′* of the sleeve, as seen in Fig. 1. The comparatively loose connection of the sleeve on the bracket K permits the sleeve to adjust itself to the shaft N, so that it never binds in said bearing. On the shaft N, immediately forword of the sleeve N′, the beveled pinion N^2 is pinned fast and is adapted to mesh with the beveled gear H, whereby said beveled gear communicates motion to the pinion and to the shaft N. The shaft N carries at its forward end the sickle-driving crank-wheel O. Intermediate its bearings it carries the sprocket-wheel P for the purpose of driving the binder, and rearward of its sleeve-bearing N′ it may carry the sprocket-wheel Q for the purpose of driving the platform conveyer and elevator or other mechanism which the harvester-frame may support. Said shaft N is therefore the main power-distributing shaft—that is, the shaft from which power is distributed to the various mechanisms mounted on the harvester. The bevel gear-wheel H is thus seen to be the power-communicating gear, and the shaft *g*, although it is not a power-communicating shaft, is a shaft of the main power-communicating wheel.

The purpose of the construction described in respect to the shaft *g* and the parts supported and journaled thereon is that by screwing said shaft into the bracket K the gear-wheel H may be forced into and held in mesh with the gear-wheel N^2 accurately and may be adjusted in mesh as the wheels wear. This facility of adjustment obviates the necessity of such extreme precision in the construction of the frame and bearings as would otherwise be necessary and cheapens the construction accordingly. The malleable-iron bracket K, in addition to affording the support for the stubbleward end of the shaft *g* and for the bearing of the sleeve N′ of the shaft N, has its web extended under both the gear-wheel H and the gear-pinion N^2 as a protection for said gears from straw or stubble, said webs also very materially stiffening the bracket, and it is thereby rendered so stiff that it very materially aids in stiffening the corner of the frame in which it is located, and thereby preserving the right-angular relation of the bearings of the shaft.

I claim—

1. In combination with the main frame, the drive-wheel crank-axle journaled at its wrists on said frame, the main power-wheel concentric and rigid with said drive-wheel, the main power-receiving wheel having fixed bearing on the frame at a point removed from the crank-axle wrist-bearings, and the chain communicating power from the main power-wheel to the power-receiving wheel, the lever-arm C^{61}, rigid with the crank-axle and extending from the crank-wrist radially with respect to the drive-wheel, a lever fulcrumed on the main frame, a pulley on said lever in position to take up the slack of the chain as the lever is rocked, and a link connecting said lever to the arm C^{61}, the pivotal connections of said link being substantially in a plane which contains the axis of the power-receiving wheel and the crank-wrist axis when the drive-wheel axis is also in that plane, substantially as set forth.

2. In combination, substantially as set forth, the drive-wheel and the power-wheel concentric and rigid therewith, the drive-wheel crank-axle, and the power-receiving wheel, said crank-wrists and said power-receiving wheel having bearings fixed with respect to each other on the main frame, the crank having the arm C^{61} rigid with it, the bell-crank lever c' c^2, pivoted on the main frame and having the slack-pulley on one of its arms, and the link C^7, which connects the other arm to the lever-arm C^{61}, substantially as set forth.

3. In combination, substantially as set forth, the frame and the fixed shaft g thereon, the power-receiving wheel adapted to rotate on said shaft, having clutch-teeth at one end of its hub, the beveled gear-wheel H, also adapted to rotate on said shaft and longitudinally stopped thereon, the clutch-sleeve J, feathered on the hub of said beveled gear-wheel and adapted to engage the clutch-teeth of the power-receiving wheel, and a spring coiled about the said sleeve-hub and stopped at one end thereon and at the other end stopped against the hub of the clutch-sleeve, said sleeve having a flange J^2, and the shipping-lever M, pivoted on the frame and adapted to press against said flange to disengage the clutch by moving the clutch-sleeve against the reaction of the spring.

4. In combination, substantially as set forth, the main frame, the bracket K, rigid therewith, the fixed shaft g, screwed into said bracket, the power-receiving wheel adapted to rotate on said shaft and having clutch-teeth at one end of its hub, the beveled gear-wheel H, also adapted to revolve on said shaft, having its sleeve-hub stopped on the shaft at one end and being stopped at the other end by the bracket K, the clutch-sleeve J, feathered on said hub of the beveled gear-wheel and adapted to engage the clutch-teeth of the power-receiving wheel, and a spring stopped at one end on the sleeve-hub and reacting at the other end against the clutch-sleeve, and suitable means for moving the clutch-sleeve endwise to disengage it from the power-receiving wheel, substantially as set forth.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Springfield, Ohio, this 21st of August, 1891.

ANDREW STARK.

Witnesses:
CHAS. A. BAUER,
G. B. GLESSNER.