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L. V. LEWIS & S. S. ALLEN.

CORN HARVESTER.

No. 394,704. Patented Dec. 18, 1888.

Fig. 1.

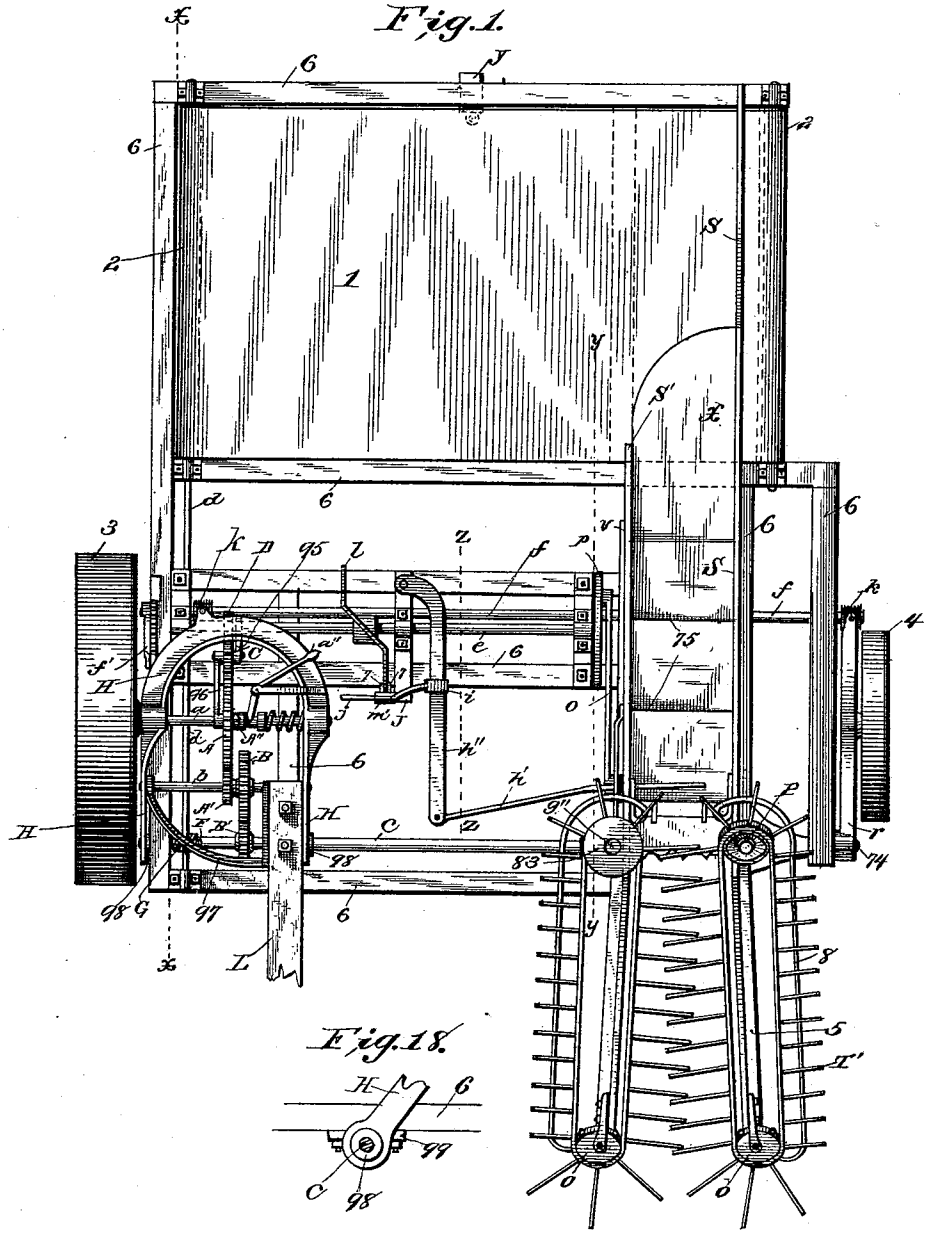


Fig. 1a.

Witnesses,
Harry C. Rohrer,
Geo. H. Lamar.

Inventor,
Ledyard V. Lewis,
Stephen S. Allen
by Lamar, Stiles & Greene,
Attorneys.

N. PETERS, Photo-Lithographer, Washington, D. C.

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L. V. LEWIS & S. S. ALLEN.

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Fig. 2.

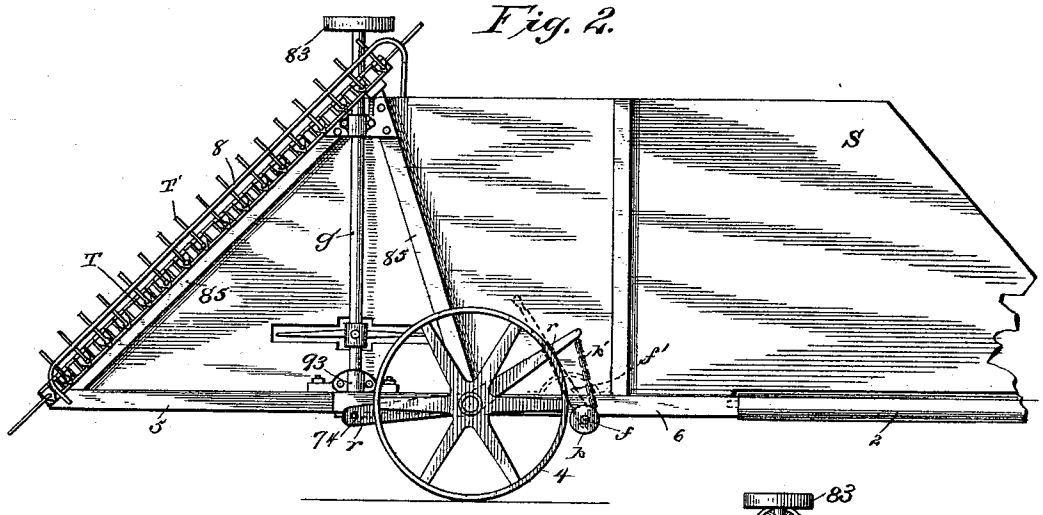


Fig. 3.

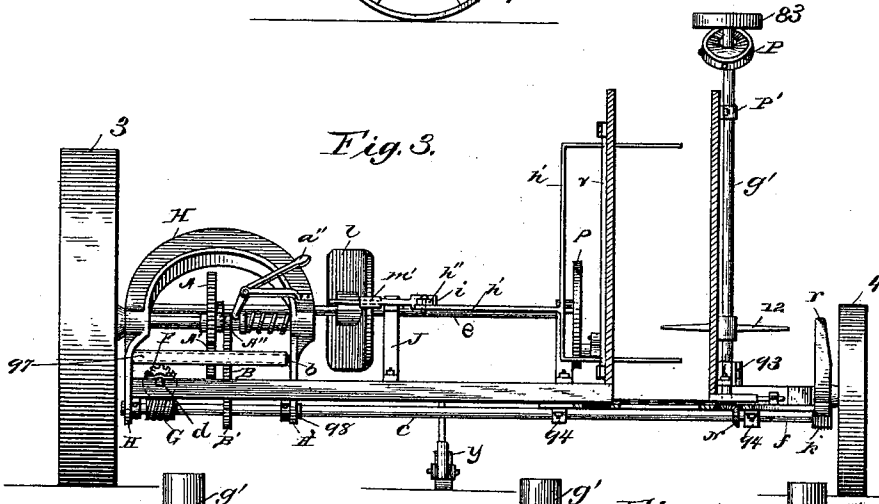


Fig. 11.

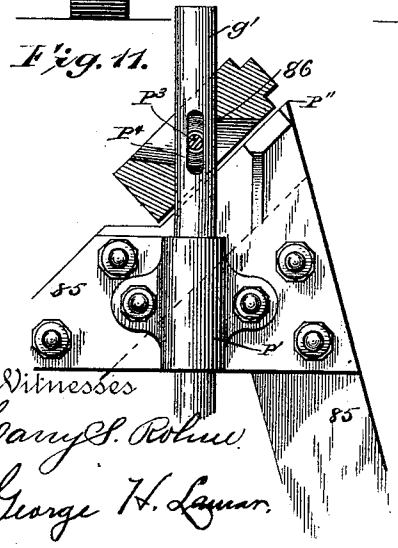


Fig. 12.

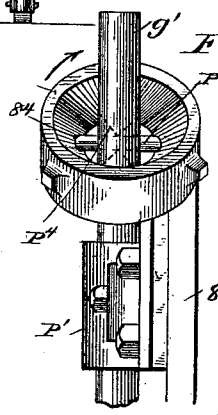
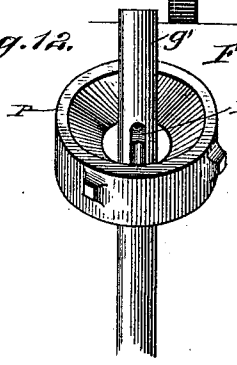


Fig. 13.



Witnesses
Harry S. Robine
George H. Lamar.

Inventor,
Ledyard V. Lewis
Stephen S. Allen
by Lamar, Wales & Munn
Attorneys.

N. PETERS, Photo-Lithographer, Washington, D. C.

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L. V. LEWIS & S. S. ALLEN.

CORN HARVESTER.

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Fig. 4.

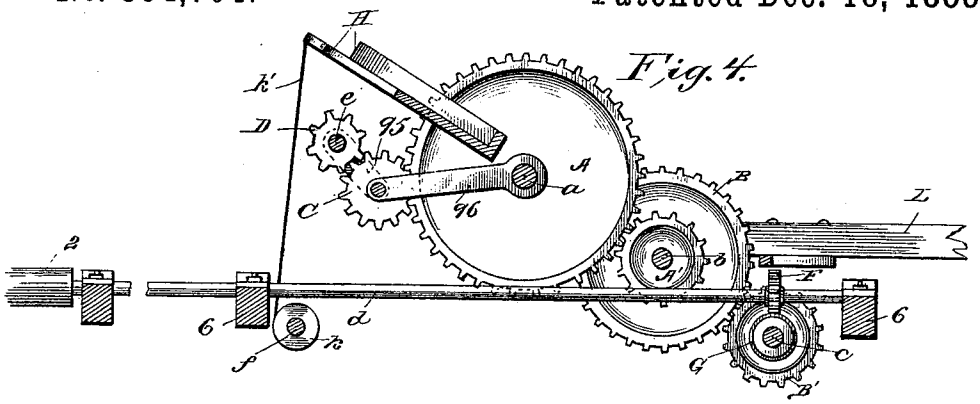


Fig. 5.

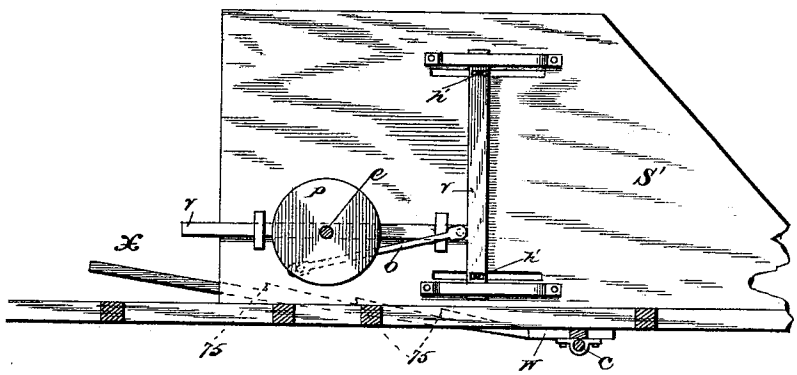


Fig. 6.

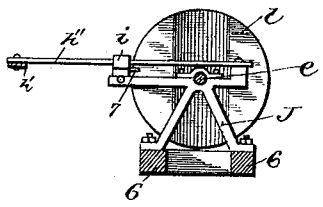
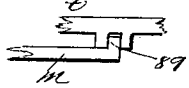


Fig. 10.



Witnesses
Harry S. Ashton,
George N. Lamar.

Inventor
Ledyard V. Lewis
Stephen S. Allen
by Lamar, Hills & Keene
Attorneys.

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 4 Sheets—Sheet 4.

L. V. LEWIS & S. S. ALLEN.

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Fig. 7.

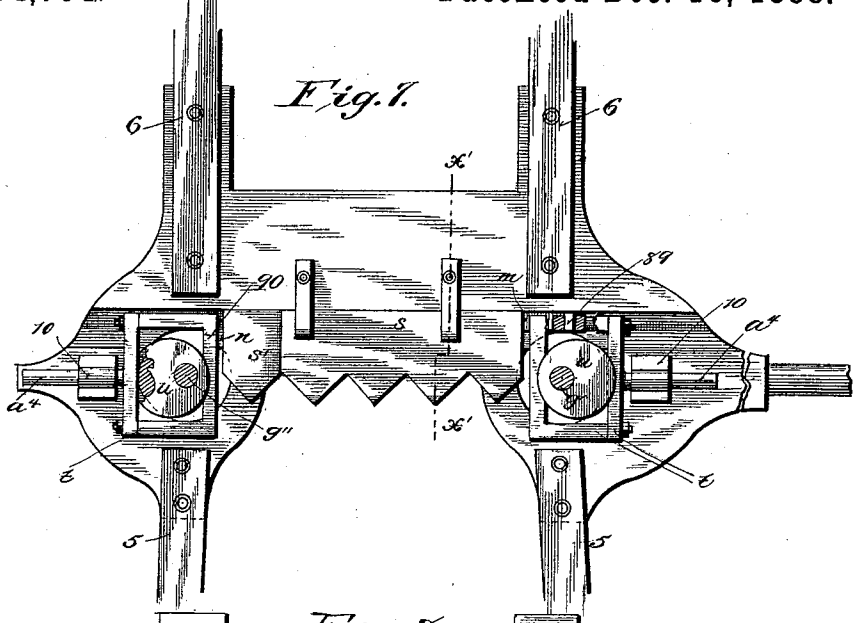


Fig. 8.

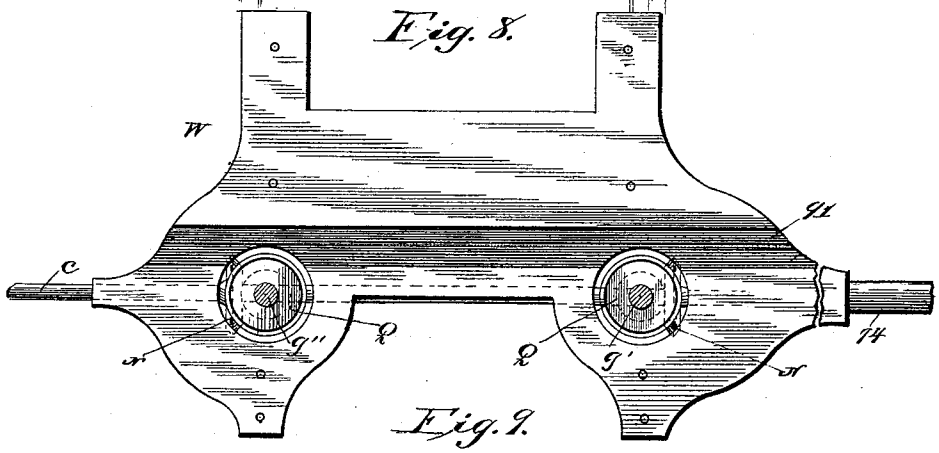


Fig. 9.

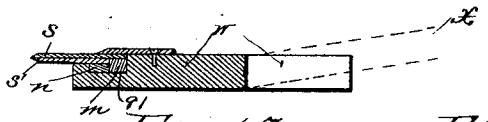


Fig. 16.

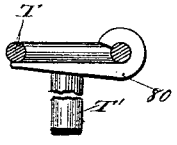


Fig. 15.

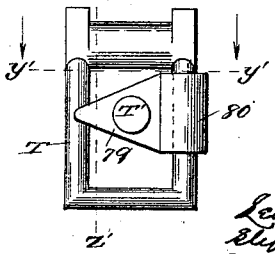
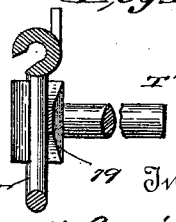


Fig. 17.



Witnesses,
Harry S. Rohrer.
George H. Lamar

Inventor,
Ledyard V. Lewis
Stephen S. Allen
by Lamar Wales & Greene
Attorneys

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

LEDYARD V. LEWIS AND STEPHEN S. ALLEN, OF SUN PRAIRIE, WISCONSIN.

CORN-HARVESTER.

SPECIFICATION forming part of Letters Patent No. 394,704, dated December 18, 1888.

Application filed February 14, 1888. Serial No. 264,030. (No model.)

To all whom it may concern:

Be it known that we, LEDYARD V. LEWIS and STEPHEN S. ALLEN, both residents of Sun Prairie, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Corn-Harvesters; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to corn-harvesters adapted to cut one or more rows of corn and deliver the same still erect to a binder and to deposit the bundles upon the ground at one side of the machine.

In the drawings, Figure 1 is a plan of the machine. Fig. 2 is an elevation of the grain side of the same. Fig. 3 is a front elevation, with certain minor parts removed. Fig. 4 is a section on the line *x x*, Fig. 1, looking grainward. Fig. 5 is a section on the line *y y*, Fig. 1, looking in the same direction, many parts being omitted. Fig. 6 is a partial section at *z z*, Fig. 1, looking in the opposite direction, only details of the fork-operating apparatus being shown. Fig. 7 is a plan of the knives and the devices by which they are driven, with the supporting-casting, the parts above being removed. Fig. 8 shows the same casting and connecting parts with the knives and their actuating mechanism removed. Fig. 9 is a section on the line *x' x'*, Fig. 7. Fig. 10 shows in side elevation the connection between one knife and parts by which it is actuated. Figs. 11, 12, 13 are enlarged detail views of the upper sprocket-wheel of the gathering device and adjacent parts. Figs. 15, 16, 17 are a plan of one link of the gathering-chain, a section on the line *y' y'*, and a section on the line *z' z'*. Fig. 18 is a lateral view of the end of the casting H and connecting parts.

Briefly, our apparatus consists of a vertically-adjustable frame, 6, carried upon three wheels, 3 4 *y*, by the first of which the mechanism is driven, knives *s s'*, simultaneously moved in opposite directions, inclined arm bearing sprocket-chains T for gathering the stalks and presenting them to the knives, vertical walls S S', forming, with an inclined serrated platform, *x*, a way for the cut stalks, a longitudinally-reciprocating horizontally and laterally swinging fork, *h'*, for forcing the stalks backward in said way, and a traveling apron, 1, passing beneath the rear end of the platform *x* to deliver the stalks, which are bound while standing between the walls S S' at one side of the machine, out of the way of the next round.

The driving-wheel is provided with an axle, *a*, upon which is pivotally mounted a U-shaped casting, H, whose ends project downward and forward to receive short gudgeons 98, Fig. 18, upon the frame 6, and whose rear end is connected by a cable, *k'*, with a drum, *k*, upon a transverse shaft, *f*, mounted upon and beneath the frame 6. Upon the opposite side of the machine is a centrally-pivoted bent lever, *r*, whose pivot is the axle or gudgeon of the wheel 4, whose front end receives a gudgeon, 74, upon a casting, W, bolted to the lower side of the frame 6, and whose rear end is connected, like the casting H, to a drum on the shaft *f*. The shaft *f* may be rotated by means of a lever, *f'*, Fig. 1, held in place by ordinary pawl-and-ratchet mechanism, and the consequent shortening of the two cables *k'* raises the frame 6.

The shaft *a* rotates with the wheel 3, and this rotation is transmitted to the shaft *c*, through gears A A' B B' of which the former is loosely mounted upon the shaft *a*, but caused to rotate therewith by an ordinary toothed clutch held in engagement with the gear-hub by a spring coiled about the shaft. The clutch is disengaged by the common forked lever *a''*, pivoted upon an arm of the casting H. The gears A' B are borne upon a shaft, *b*, mounted in the casting H, and on this shaft swings vertically a casting, 97, to which the tongue L of the harvester is bolted. The gear A also transmits motion to the fork-actuating shaft *e* through gears C D, the gear C being mounted in links 95 96 depending from the shafts *e' a²*.

The shaft *c* passes centrally through the gudgeons 98, Fig. 18, by which the frame 6 is pivoted to the casting H, and thus these gudg-

eons serve the secondary purpose of shaft-bearings. At the opposite end the shaft *c* is mounted in bearings 94 upon the casting W, and upon it near these bearings are fixed bevel-gears N, which engage, respectively, gears Q upon two vertical shafts, *g' g''*, that operate the gathering and cutting devices. As these gears, shafts, and attachments are duplicates, and are shown in Figs. 1, 7, and 8, one is omitted for clearness in Fig. 3, and one only is for the most part mentioned in giving the construction. The shafts *g' g''* are supported by bearings 93 above the gears Q, which gears rotate upon the free end of the shafts and partly within the casting W, and by bearings P', near the top of the shafts and upon vertical frame-work 85 5. The members 5 are bolted to the casting W, and slightly diverging from each other project in front of the body of the frame. Upon the shafts are placed, near their tops, sprocket-wheels P, of peculiar construction, and each of these carries a gathering-chain, T, which also passes around a common sprocket-wheel, O, fixed upon the lower front end of the frame-work 85 5. Now the shafts *g' g''* are rotated simultaneously in opposite directions by the shaft *c*, and necessarily the corresponding parts of the chains travel in the same direction, the direction of rotation being such that the inner or adjacent folds of the two pass upward, and as the chains bear arms T' long enough to overlap in this part of their course, stalks caught between successive arms are carried rearward with no possibility of escape.

The chain-links are ordinary sprocket-links detachable from each other, and the arms are hinged to them by bending the end 80 of a plate, 79, (formed integrally with and at right angles to each arm,) about the upper side bar of a link. The other or free end of the plate 79, striking the lower side bar of the link, prevents the falling of the arm below the horizontal, while the arm may be raised to any extent. Now, as the ascending chain passes outward around the sprocket-wheel P, the arms T' are thrown up at a considerable angle by passing over a bar, 8, a little outside of, parallel to, and above the path of the chain, and thus elevated pass down nearly to the sprocket-wheel O, where they pass off the bar and fall into their normal position, ready to gather up straggling stalks while moving around the sprocket-wheel. They are thus raised to release the stalks they have carried backward in their ascent and to prevent their accidental entanglement with stray stalks in passing downward. As the sprocket-wheels P are in the plane of the chains—that is, oblique to the shafts upon which they are placed—ordinary construction cannot be employed.

The devices adopted are shown in Figs. 11, 12 and 13. The sprocket-wheel is conically concave upon each face and provided with a central opening larger than the shaft *g'*, upon which it is placed. Midway between the two faces a small pin or shaft, P^3, passes diametrically across the opening and through a vertical slot, P^4, in the shaft *g'*. This slot is in horizontal width equal to the diameter of the pin or shaft P^3. Its vertical width at the axis of the shaft *g'* is nearly the same; but at the surface of the shaft, on each side, it extends some distance both above and below the horizontal plane of the sprocket-wheel's center. It is therefore evident that the pin or shaft P^3 may by vertical oscillation in the slot change its inclination to the axis of the shaft *g'*.

Fig. 11 shows the sprocket-wheel in position, cut by a plane passing through the axis of the shaft *g'* and the center of the corresponding sprocket-wheel, O, Fig. 1. The position chosen for illustration is that in which the pin or shaft P^3 is horizontal. Fig. 12 shows it seen from the front when in the same position. A block, P'', Fig. 11, rigidly secured upon the frame-work, supports the upper side of the pulley's lower face and prevents it changing its inclination to the axis of the shaft *g'*. Now, rotation of the shaft *g'* causes rotation of the sprocket-wheel in the oblique plane, for it must rotate with the shaft, and it cannot change its obliquity.

The nature of the sprocket-wheel's compound motion is readily understood if we consider, for example, a rotation of ninety degrees (in the direction of the arrow) from the position illustrated in Figs. 11 and 12. In such rotation the end 84 of the pin or shaft P^3 will have arrived at a point corresponding to the point 86, Fig. 11, and the shaft will have simply become inclined in the slot P^4. When seen from the front, as in Fig. 12, it will appear as in Fig. 13.

Each shaft *g' g''* carries at its upper end a balance-wheel, 83, Figs. 1, 2, and 3; but in Fig. 1 that upon the shaft *g'* is omitted. Each shaft also bears upon its lower part a reel, 12, Figs. 2, and 3, for pressing the lower ends of the stalks rearward. Each further bears near its lower end an eccentric, *u*, Fig. 7, for operating knives *s s'*, of which the first rests upon the second and the latter upon the casting W. The eccentrics are peripherally grooved to receive, preferably, adjustable rectangular frames *t*, provided with cylindrical or rectangular bars a^4, sliding in bearings 10 upon the casting W. The rear sides of the knives are rigidly fastened to bars *m n*, respectively, sliding in a groove, 91, in the casting W and projecting beyond the knives in opposite directions to engage, respectively, the two frames *t*. Lugs 89 90, upon the upper surface of each bar, engage lugs depending from the lower surface of the corresponding frame *t*, Figs. 7 and 10; but other well-known means of attachment may be substituted. The eccentrics are rotated simultaneously by the shaft *c*, and are so set that the two knives are thrown in opposite directions at the same instant.

Fig. 8 shows the connection between the

shaft c and the shafts g' g''. The gears N upon the shaft c engage gears Q, lying partly within apertures in the casting W and fixed upon the shafts g' g'', respectively.

After the stalks are severed by the knives s s', they pass rearward, still standing, between two vertical walls, S S', along a slightly-inclined platform, x, whose surface is continuous with the upper surface of the casting W, and is provided with slight offsets 75, that prevent any tendency of the body of stalks to slip forward. Beneath the rear end of the platform x is a transversely-traveling apron, 1, supported upon rollers 2, mounted on the frame 6 and driven by a shaft, d. The shaft d is rotated by a worm-and-gear connection, G F, Figs. 1, 3, and 4, with the shaft c. The wall S extends, preferably, entirely across the apron 1, the platform x, nearly to the middle, and the wall S', just over the edge of the same.

The mechanism for forcing the severed stalks backward in the way S S' x remains to be described. A fork, h', having its tines in the same vertical plane, is at intervals thrust across the space between the walls S S', swung rearward, and withdrawn, the wall S' being slotted to permit its motion. The end of the fork-handle is pivotally joined to a bar, h'', whose opposite end is pivoted to a suitable bearing, J, near the middle of the frame. The bar h'' is loosely held near its middle in a loop, i, connected by a rigid arm with a sleeve, m', sliding freely upon a short bar, j, projecting from the bearing J, Figs. 1, 3, and 6. A slotted projection, 7, upon the sleeve m' at all times engages the margin of an irregular cam-plate, l, fixed upon the shaft e. Although the parts of the cam-plate are not in the same plane, its margin is everywhere equally distant from the shaft, and it is evident that in each revolution of the shaft the sleeve m' and loop i must be carried back and forth upon the bar j, and that this motion must be imparted to the bar h'' and fork h'.

Upon the outside of the wall S', Fig. 5, a T-shaped slide, r, is mounted in suitable guides and connected by a pitman, o, with a crank-plate, p, upon the end of the shaft e. Through the vertical member of this slide the tines of the fork h' pass, and thus while each revolution of the shaft e causes the fork to be thrust into the way and retracted, as above described, it also causes an intermediate lateral motion that forces the stalks rearward at proper intervals.

It is intended that the stalks shall be bound while still between the walls S S', and that the bundles shall be successively forced off the rear end of the platform as the fork forces the entire contents of the way rearward.

What we claim is—

1. In a corn-harvester, the combination, with a suitable frame and a driving-shaft and cutting devices mounted upon the frame, of vertical shafts g' g'' at each side of said cutting devices, each having near its upper end a diametrical slot, P^4, whose vertical width is greatest at the surfaces of the shaft, inclined sprocket-wheels P, each having an axial opening flaring at each surface of the wheel, through which opening passes one of the shafts g' g'', pins P^3, passing diametrically through the sprocket-wheels P and the corresponding slot, P^4, sprocket-wheels O, mounted in front of the lower portion of each shaft g' g'', respectively, and in the plane of the sprocket-wheels P, and gathering-chains T, each passing around a sprocket-wheel P and the corresponding sprocket-wheel O, substantially as and for the purpose set forth.

2. The combination, with the frame 6, supported upon suitable wheels, and the shaft c, fixed to said frame and rotated by connection with one of said wheels, of gears N Q, transmitting the motion of said shaft to vertical shafts g' g'', oblique sprocket-wheels P, mounted upon and near the upper ends of the shafts g' g'', sprocket-wheels O, mounted in front of the lower portions of said shafts g' g'', respectively, gathering-chains T, carried by each pair, P O, of sprocket-wheels and bearing-plates 79, whose free ends rest against the lower side bars of the links, each plate hinged to the upper side bar of the link and carrying an outwardly-projecting arm, T', whereby the arms are prevented from falling below the horizontal position, substantially as and for the purpose set forth.

3. The combination of the casting W, provided with the groove 91, bars m n, sliding in said groove, the superposed knives s s', fixed, respectively, to said bars, the shafts g' g'', grooved eccentrics u, oppositely placed on said shafts, frames t, inclosing said eccentrics, connected with said bars and provided with bars a^4, sliding in bearings 10 upon said casting, and gearing connecting said shafts with a single power-shaft, whereby the knives are driven from opposite ends simultaneously in opposite directions.

4. The combination of the platform x and walls S S', forming a way for the standing severed stalks, the fork h', projecting into the way, slide r, engaging said fork and the crank-plate p and pitman o, the bar h'', pivoted to the end of said fork, the sliding sleeve m', provided with the slotted projection 7, and the loop i, engaging said lever, and the rotary cam-plate l, actuating said sleeve and imparting longitudinal motion to said fork, substantially as set forth.

5. The combination, with a corn-harvester frame and a power-shaft, c, mounted thereon, of superposed knives s s', vertical shafts g' g'' at opposite ends of the knives, gearing connecting these shafts with the shaft c and rotating them oppositely, frames t, connected to the knives, respectively, grooved eccentrics u upon the shafts g' g'', engaging the frame t, the sprocket-wheels P, inclined upon their shafts g' g'', blocks P'', fixed upon the harvester-frame in contact with the faces of

said sprocket-wheels to maintain their inclination, sprocket-wheels O, mounted in front of the lower portion of each shaft g' g'', and endless chains T, each bearing hinged arms T′ and each passing around a sprocket-wheel, P, and the corresponding sprocket-wheel, O, substantially as and for the purpose set forth.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

LEDYARD V. LEWIS.
STEPHEN S. ALLEN.

Witnesses:
CAROLINE V. BULL,
G. W. BULL.