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S. D. LOCKE.

HARVESTER.

No. 178,785. Patented June 13, 1876.

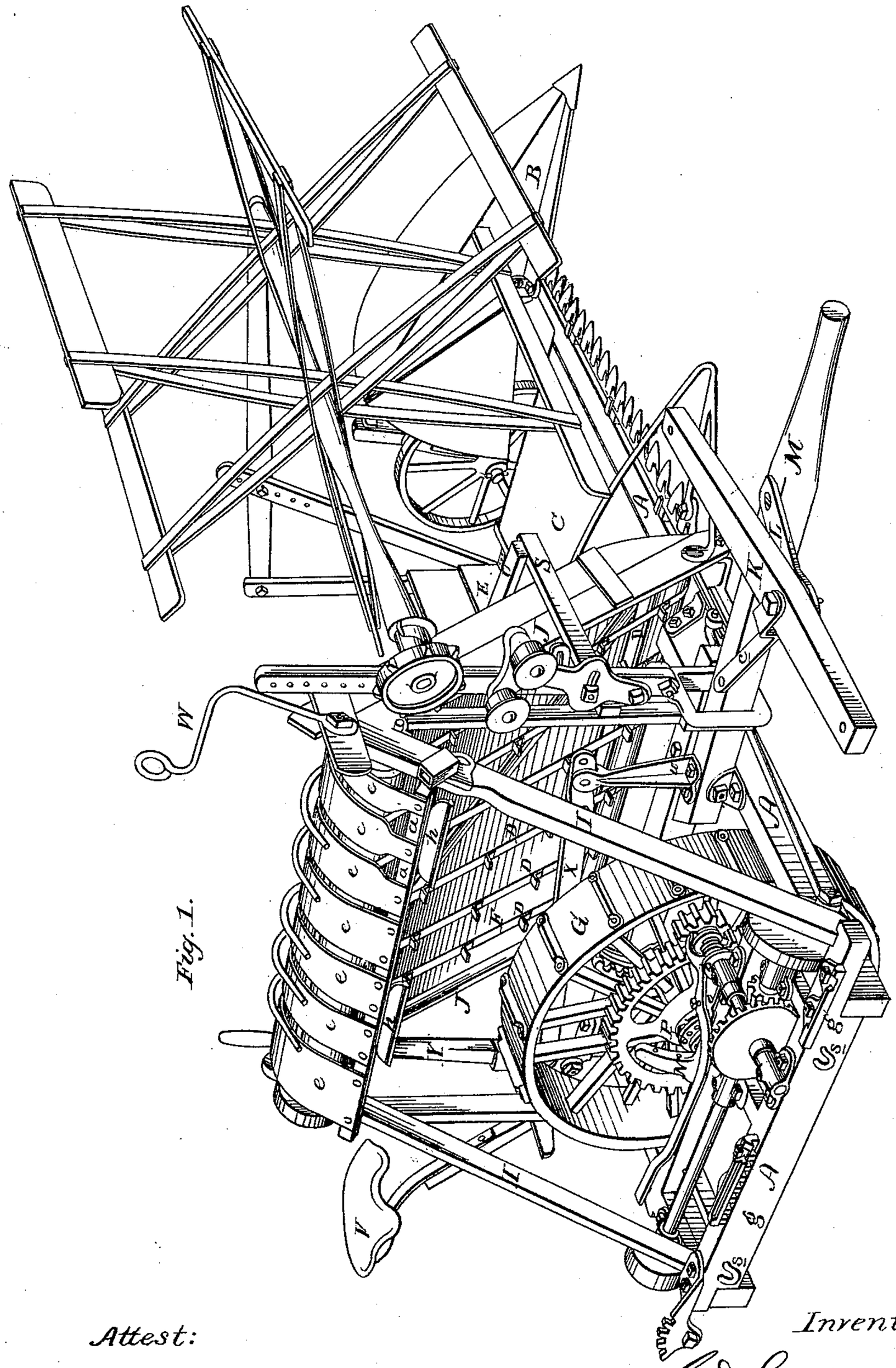

Fig. 1.

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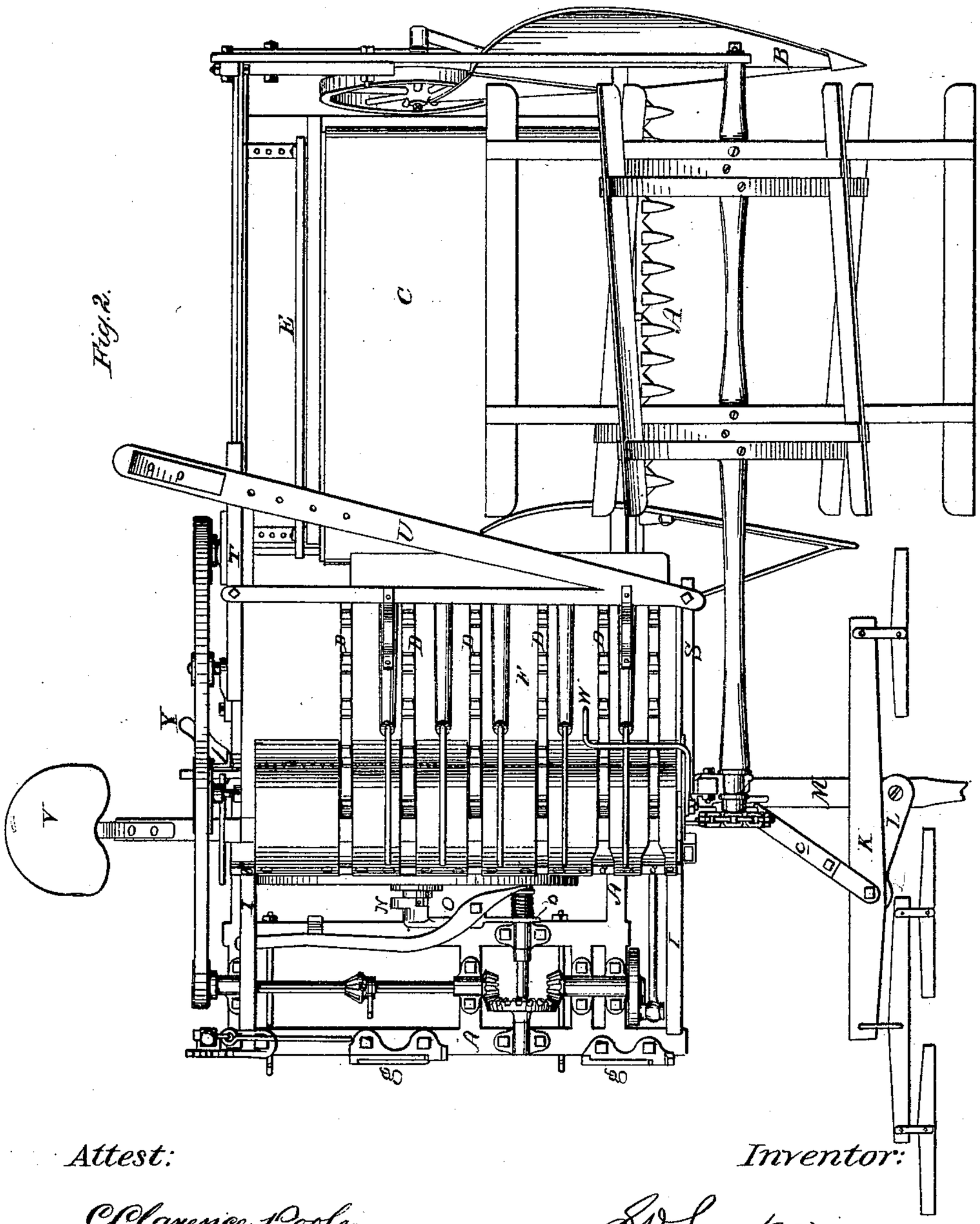
Fig. 2.



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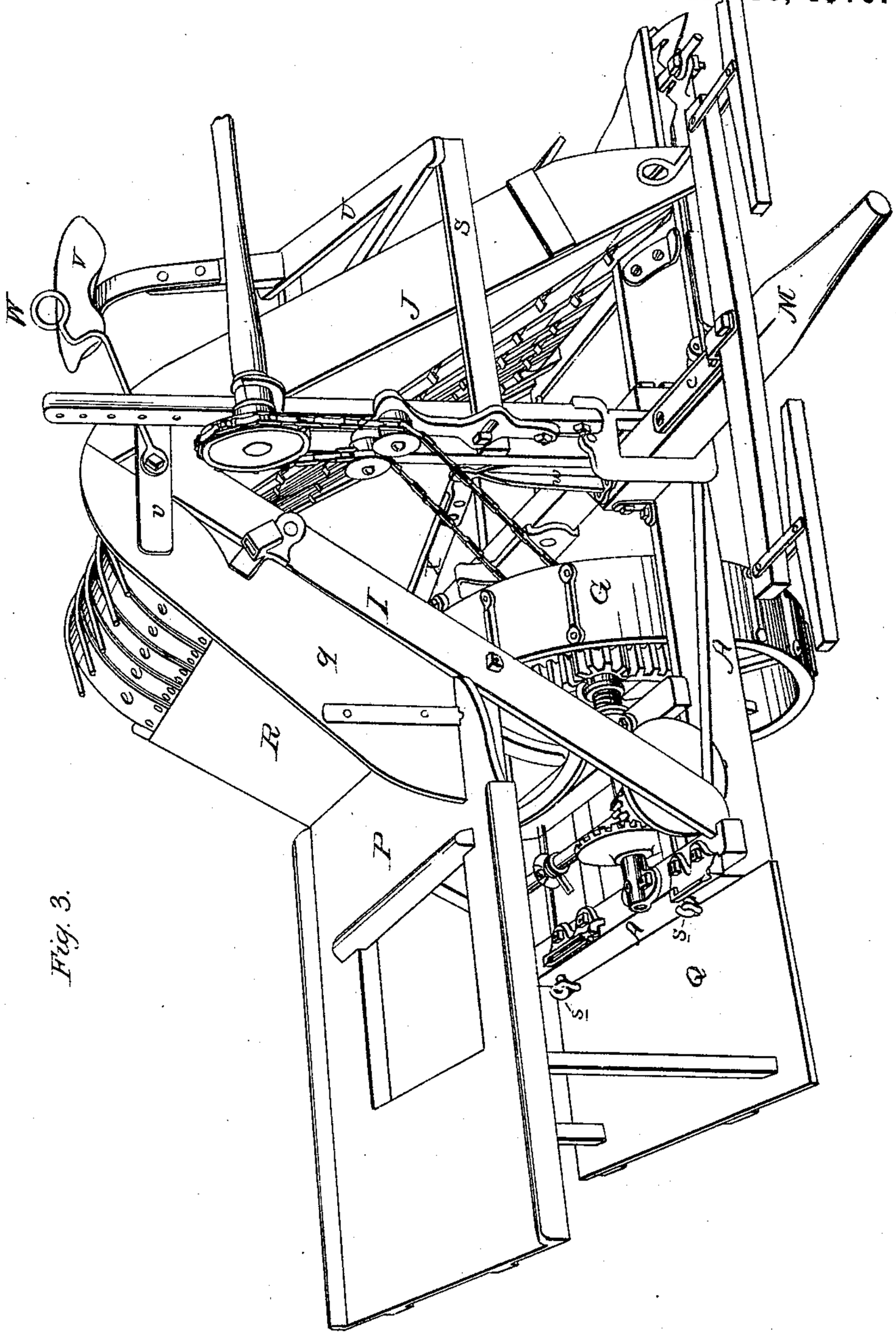

Fig. 3.

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Fig. 6.

Fig. 7.

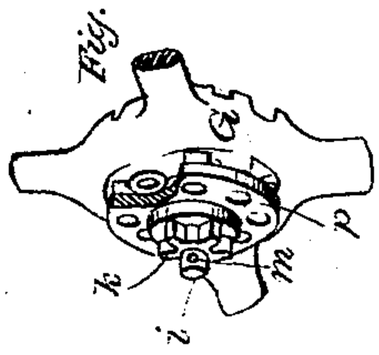

Fig. 4.

Fig. 8.

Fig. 5.

Fig. 9.

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Fig. 10.

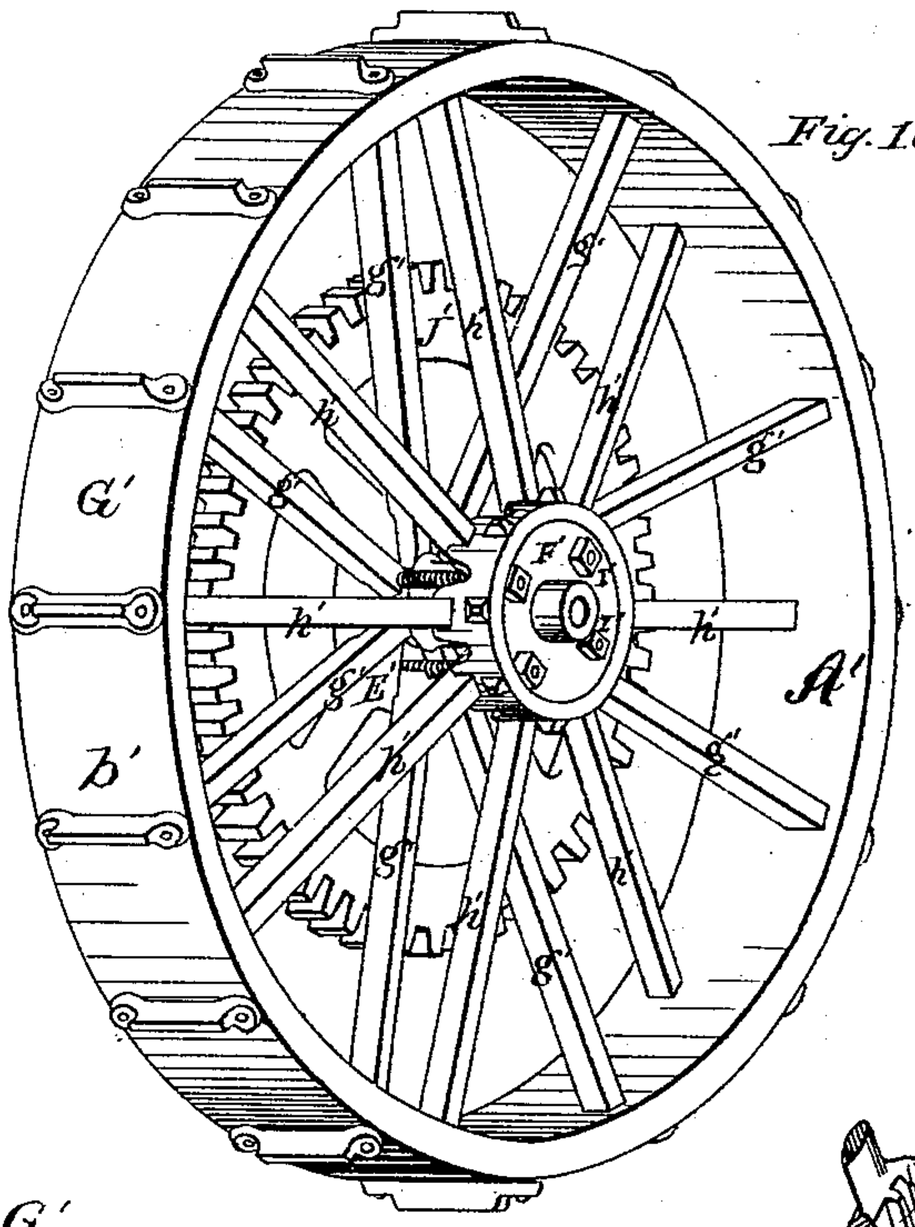
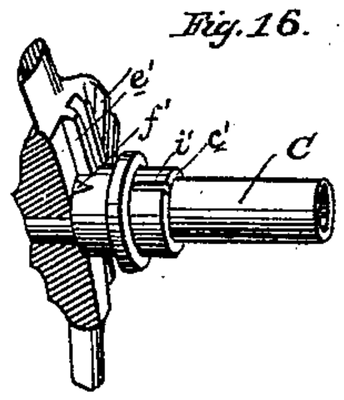


Fig. 16.



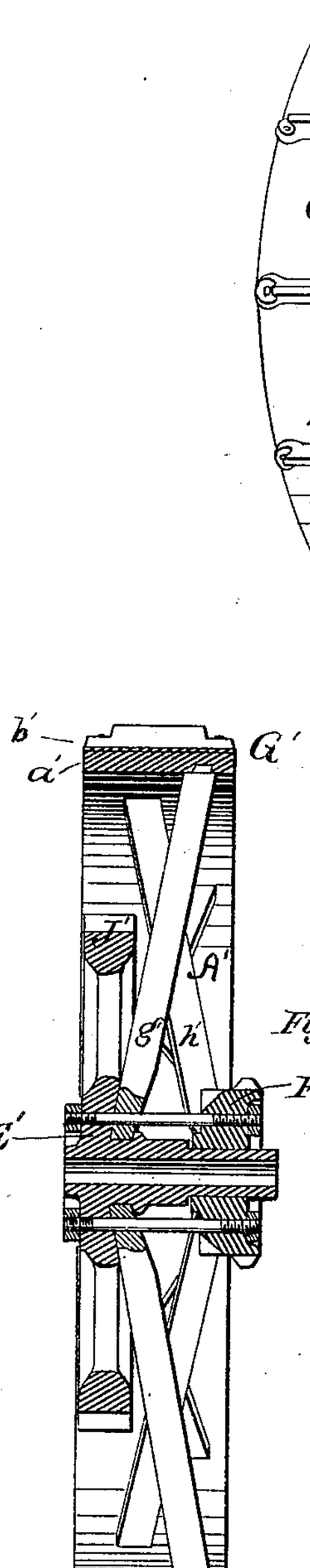


Fig. 11.

Fig. 12.

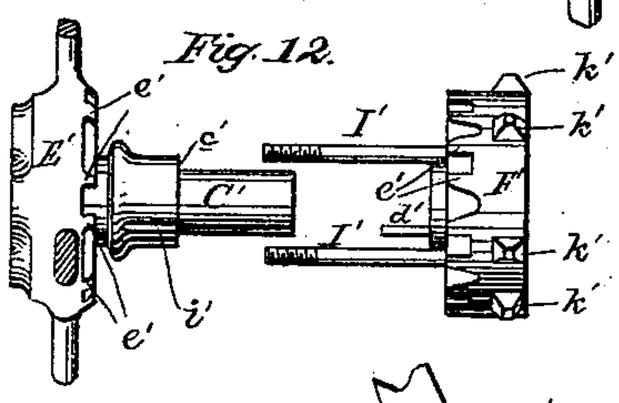


Fig. 14.

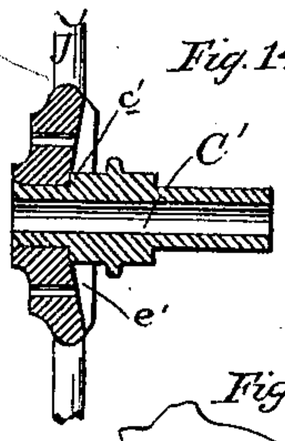


Fig. 13.

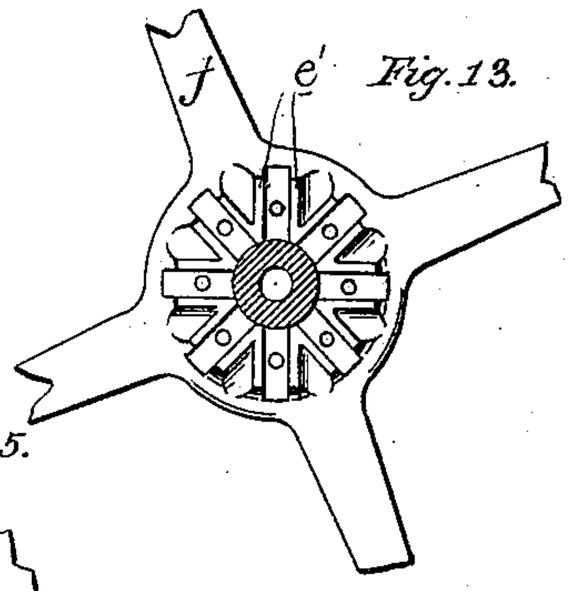
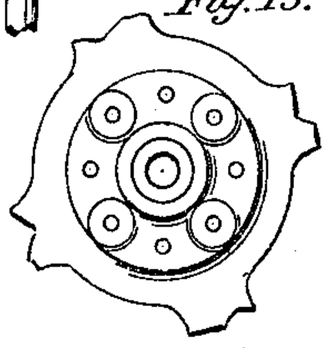


Fig. 15.



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UNITED STATES PATENT OFFICE.

SYLVANUS D. LOCKE, OF HOOSICK FALLS, NEW YORK.

IMPROVEMENT IN HARVESTERS.

Specification forming part of Letters Patent No. **178,785**, dated June 13, 1876; application filed March 23, 1876.

To all whom it may concern:

Be it known that I, SYLVANUS D. LOCKE, of Hoosick Falls, Rensselaer county, New York, have invented a new and useful Improvement in Harvesters, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

This invention relates to that class of harvesting-machines wherein the cut grain is received upon an endless apron moving across the platform behind and parallel with the cutters, whereby it is moved to the inner side of the machine, and there delivered to an elevator, which carries said grain over the main wheel and discharges it into a receptacle, from which it is removed in gavels, to be bound by persons riding on the machine, or by automatic binding machinery attached to and driven by the operative mechanism of the harvesting-machine; and it consists, first, in enlargements of certain of the stripper-slots near the connection of said strippers with the supporting-beam at their outer ends, and for the purpose specified; second, in a three-horse evener-brace, attached to the tongue to support the three-horse evener, and capable of adjustment to receive an ordinary double-tree for two horses; third, in a segment-rack plate for the main wheel, extended forward to inclose or constitute an inner box for the main pinion-shaft, whereby the main axle and the axis of said pinion-shaft are maintained in a constant relation to each other; fourth, in a pinion-plate secured to the main axle, and provided with radial sockets for the reception of a lever, whereby said axle may be rotated to cause the same to traverse up or down the segment-racks; fifth, in a lock or pin plate attached to the other end of said axle, perforated with a series of holes, through one or another of which a pin may be inserted to lock said plate and the wheel together, if it is desirable to move said axle up or down by the revolution of said wheel; sixth, in the structure and arrangement of the grain-receptacle and binders' table and foot-board; seventh, in a removable chute-board, to receive the grain from the elevator and stripper and deliver it upon the binders' table or receptacle; eighth, in a movable line-guide, through which the reins may be led to the driver, whether upon one seat or the other; ninth, in a double socket-lever head for the tongue-lever, whereby said lever may be adjusted to be convenient to the hand of the driver, upon whichever seat he may be.

My machine is constructed with a rectangular main frame, inclosing at one end a main driving and supporting wheel, and supporting the required gearing to transmit the motion of the same to the other operative mechanism of the machine. An adjustable tongue is provided for the proper attachment of the team by which the machine is to be advanced. A cutting apparatus of usual construction is secured along the front edge of the said main frame upon the grain side of the tongue. The opposite end of the machine is carried upon a grain-wheel, as heretofore, and the cut grain is received upon an endless apron moving behind and parallel to the cutters.

A triangular elevator-frame is mounted upon the main frame above the main wheel, to carry the cut grain from the main apron over said wheel, and deliver it to an automatic binder attached to the main frame outside of said wheel, or to persons riding upon a platform provided therefor, and similarly attached to said main frame. A horizontal reel is supported above and in front of the cutting apparatus, and is driven by a chain or belt in the usual way.

These parts are, briefly, similar to those ordinarily in use in machines of this class, and do not require more specific mention, as they do not form any part of the invention as herein claimed.

That others may more fully understand the invention, which is designed to be included in this patent, I will more particularly describe its several parts, having reference to the accompanying drawings, wherein—

Figure 1 is a perspective view of my machine. Fig. 2 is a plan of the same. Fig. 3 is a perspective view of the outer end of my machine, with binders' tables attached. Fig. 4 is a transverse section of that part of the machine shown in Fig. 3. Fig. 5 is a side elevation of the segment tie-plate for main axle and main pinion shaft-box. Fig. 6 is a perspective of the axle-pinion socket-plate. Fig. 7 is a per-

spective of the axle-pinion pin-plate. Fig. 8 is a perspective of the three-horse evener brace-plate. Fig. 9 is a perspective view of the double-socket tongue-lever head. Fig. 10 is a perspective view of main wheel. Fig. 11 is a transverse section of the same. Fig. 12 is an elevation of the hub-sleeves, separated. Figs. 13, 14, 15, and 16 are details in reference to the wheel.

A is the main frame with the cutting apparatus. B is the divider, and C is the apron on which the cut grain is received and conveyed to the elevator D.

Machines of this class, as heretofore constructed, have not generally been provided with any means of adjustment or adaptation to long or short grain-stalks, and hence they have necessarily been constructed with reference to the longest, and when used in fields of average or less than average growth the grain has been liable to uneven distribution on the carrying-apron—that is to say, by the action of the reel or the wind, or on account of the light puffy condition of the grain, some of the grain will fall farther back upon the apron than other, and the butts will not be even. This not only interferes with the proper action of the carrier and elevator, but with the convenience and facility of binding also. To obviate this disadvantage I place a tail-board, E lengthwise of the machine, behind the apron, and provide the same with dowels, to be inserted in any of a series of holes in the frame, or other suitable means for the purpose of adjusting said tail-board forward or backward, to adapt the practical width of the apron to the length of the straw in the field which is being harvested.

Heretofore it has been common to construct the elevator with one or more belts provided with lugs or teeth projecting up through the slots of a platform in front of said belt or belts, so that the grain to be elevated is caused to slide upon said platform by the teeth which project through its slots. This method requires the belt to be drawn very tightly over its rollers, or it will sag, and the points only of its teeth will project. If drawn tightly the friction upon its roller-bearing is increased. If it sags, the resistance of the straw comes upon the ends of the teeth, and the looseness of the belt permits them to bend over backward, so that, in any event, the power required is increased. To obviate this disadvantage, I construct a close platform, F, with a series of belts, D D, passing over its front surface. These belts pass over rollers at the top and bottom, and each belt is provided with projecting lugs or fingers *d d*, against which the grain rests as it is transported up the platform F. By these means it is not required that the belts should be tightened more than sufficient to prevent them from slipping upon their rollers *f f*, and the grain rests always at the bases of the teeth, so that there is little tendency to make them turn backward, and the power required is decreased at the top. The platform F is slotted so that it extends above the upper roller *f*, so that the belts D pass through said slots and behind the platform, and the grain is thereby taken off the teeth *d*. The slats at the upper end of the platform F have extension-strips *e* of sheet metal nailed fast to them; and said extension-strips are bent over above the upper roller and fastened to the bar H, which is a part of the elevator-frame. These metallic strips acts as strippers to effectually remove the grain from the elevator-teeth about the time they have reached the highest point of their course, the grain being pushed over and down the strippers by the pressure of the ascending grain behind it. It is found in practice that the butts of the grain, because of the grass they more or less contain, are more liable to be entangled with the elevator-teeth, and to be drawn down into the slots between the strippers than the heads, and I have, therefore, enlarged said slots at their lower ends adjoining the bar H, as at *a*, and have found this enlargement to be a complete remedy. Said enlargements may be made at all the slots, though I have found it to be unnecessary to make them except at the two slots at the front or butt end of the elevator. The elevator-frame is triangular in transverse section, and is composed of the beams I and J, the upper ends of which are rigidly secured together, and the lower ends are seated upon the main frame, which thereby forms the base of the triangle above mentioned.

It has been found necessary to place the forward edge of the elevator as far forward as the points of the cutters, to insure the proper carriage of the butts of the grain, and therefore the forward beams I J are in advance of the forward girt of the main frame. Heretofore they have been supported upon metallic brackets, but I prefer to extend the end beam of the main frame beyond the forward girt far enough to receive and support the lower end of the beam I, as shown in Fig. 1.

When the grain is very heavy, or the ground soft, it is necessary to employ three horses to draw the harvester. At other times two horses may suffice. It is then of some importance to construct the eveners so that they can readily be shifted for two to three horses. To effect this object I employ the evener K and angle-brace L, which is just long enough to set the evener-pivot off the proper distance. The angle-brace L is secured to the tongue M by a bolt through the same hole otherwise occupied by the hammer-bolt. The hammer-strap *c* is swung off sidewise, so that the hammer-bolt passes through it, and through the evener into the angle-plate, as shown, while a shorter bolt passes through the hammer-strap and the angle-plate L near its extremity. This makes a firm triangular structure, the base of which is the tongue, and the evener K is pivoted to its apex. When two horses only are to be used the evener K and plate L are removed, and an ordinary double-tree is substituted upon the tongue, the ham-

mer-strap then occupying the usual position over the tongue.

Heretofore the segment-rack N has been provided with a plate for its secure attachment to the side bar of the main frame, and the main pinion-box has been independently bolted to the said side bar. The slightest looseness of the fastening-bolts, or the usual yielding of the joints of the machine, will disturb the relation of the axes of the main wheel and main pinion-shafts. I therefore extend the segment-plate O forward as far as the main pinion-shaft, and construct it with the collar *b* at its forward end, through which the end of the pinion-shaft box is inserted, and thereby the centers of main wheel and main pinion are prevented from changing their relative positions under any stress of rough usage.

The main wheel G is mounted loosely upon an axle, *i*, near to each end of which a small pinion, *k*, is rigidly fastened. The ends of the axle rest in curved grooves J in the segment-plates O, and the pinions *k* mesh with the cogs of the segment gear or rack *l*, so that the rotation of said axle *i* will cause it to travel up or down said segment-gear, and raise or lower the main frame accordingly.

When at rest the axle is fixed, and prevented from turning, by pins inserted through holes *m* in the rim of the segment-plate, and, correspondingly, through the end of the axle, as shown in Figs. 4 and 7. The object of this part of my invention is to furnish a ready and convenient means for raising or lowering the main wheel; and I have therefore secured to the axle, near to, or attached to one of, the pinions *k*, a plate, *n*, having radial sockets on one side for the reception of a convenient lever, whereby the axle may be revolved, and the pinion forced to travel up or down.

It is sometimes desirable to lock the wheel and axle together, as when shifting the lever from one socket of plate *n* to another; and I have, therefore, secured to the opposite end of the axle *i* a perforated plate or disk, *p*, through one of the perforations of which a pin may be thrust into one of a series of corresponding holes in the wheel-hub behind said plate, as clearly shown in Fig. 7. I also use this locking device when I desire to raise or lower the frame by drawing or backing of the machine, as thereby the turning of the wheel forces the axle to revolve and move up or down in the segment-grooves *j* of the plate O.

The rails *g g* and *h h* are placed on the frame for the reception and support of an automatic binding-machine; but such machines cannot be used at all times. I have therefore provided my harvester with removable receptacles and binders' tables, whereby it may be converted at any time to a hand-binding harvester. These attachments consist of a receptacle and binding-table, P, foot-board or platform Q, chute-board R, and wind-board *q*. The table P is bolted to the said bars I of the elevator-frame at *o*. Its outer edge is supported upon feet *r*, the lower ends of which rest in sockets in the foot-board Q. The foot-board Q is attached to the harvester-frame by means of hooks *s*, permanently placed on said frame, and eyes attached to said foot-board to engage with said hooks. Braces *t*, which form the foundation for said foot-board, extend under the main frame, as shown in Fig. 4, and give it a firm bearing to support the weight of the binders and their table.

When the machine is being moved along the road, through bars or gates, it is desirable to reduce the width occupied by the machine. The platform P will fold up, turning upon the bolts *o*, and the platform upon the hooks *s*.

The chute-board R is placed under the bar H, and extends down to the receptacle P, to conduct the grain from the strippers to said receptacle. Said chute-board is held in place by dowels *u* at its lower edge, its upper edge resting against, and being kept in place by, the rails *h*.

A detachable wind-board, *q*, is arranged at the front end of the receptacle P, and extends thence up to the top of the elevator-frame, to prevent the wind or atmospheric disturbance, due to the motion of the machine, from catching and displacing the loose grain as it falls down over the chute-board. The said wind-board is secured by a dowel at its bottom, and at its top in a recess behind the cross-bar *v*.

When the automatic binding-machine is employed with the harvester, it is desirable that the driver's weight should be nearly, or exactly, in line with the main wheel, because the apron of the machine is more than sufficiently heavy to counterbalance the weight of the binding-machine, and that the driver may be near to control the operation of the binder; but when two persons are riding upon the foot-board Q, the case is different, for then the weight of the apron end of the machine is not sufficient to counterbalance the weight of the binders, and, therefore, it is necessary to locate the driver over the apron end. To provide a proper seat for the driver in rear of the cutting apparatus, I place two horizontal bars, S T, upon the ends of the elevator-frame, and projecting therefrom toward the grain end of the machine. A diagonal bar, U, is secured to these horizontal bars, its rear end being farther from the elevator than its front end, and upon said rear end the driver's seat V is adjusted, making this bar long and diagonal.

I employ boys as drivers, and maintain a proper balance of the machine, with a light or heavy driver. When the driver's weight is not required to counterbalance the weight of the binders his seat V is shifted to the rear of the elevator-frame, where it is secured to the post P′, as shown in Figs. 1 and 2, and in dotted lines in Fig. 4.

It is necessary to carry the driving-reins over the machine, and out of the way of accidental contact with the elevator-teeth or whatever is carried up thereby. I therefore mount a line-guide, W, on the front end of the eleva-

tor-frame, and extending above and backward over said frame far enough to raise the reins clear of the elevator. The guide W has a ring at its upper end, through which the reins pass.

When the seat V is shifted to the bar U, the reins require to be led in that direction, and also to be adjusted lower down. I therefore make the guide W adjustable at its fastening to the elevator-frame, so that it may stand upright, or be leaned over toward the apron.

The tongue is hinged to the main frame, and is raised or depressed at its rear end with said main frame, by means of a post, *w*, connecting-rod X and lever Y, said lever being inserted in a socket in the plate *y*, which is pivoted to a segment-plate, *x*, which is bolted to the rear bar or girt of the main frame.

The plate *x* is notched or perforated along its edge, and the lever-plate *y* is provided with a stud, which engages with one or another of said notches, as may be desirable, and thus the tongue is locked in any desired position.

When the driver is on the seat, located upon the bar U, the lever Y would be out of his reach, and I therefore make the socket or lever plate *y* with two sockets, as shown in Figs. 4 and 9, into either of which the lever may be inserted, and brought within reach of the driver's hand upon whichever seat he may be located.

For convenience, I employ for the several purposes of raising the main frame by means of the plate *n*, and for controlling the tongue by means of the plate *y*, a metallic bar or lever, which is fitted to all of the several sockets named.

The wheel G belongs to that class of harvester-wheels called expanding or truss wheels, which are provided with two ranks of spokes starting near each other in the rim, (ordinarily from two to four inches apart,) and diverging from the plane of the wheel as they approach the center, where each rank is inserted in a line of radial sockets in a metallic hub-head, of which there is one for each rank, separate from each other, and each having its independent bearing upon the axle. These hub-heads are somewhat widely separated, and are drawn together by a series of bolts running through them parallel to the axle of the wheel, whereby the ends of the spokes are forced outward and into the rim-sockets, the tire being first made, and the rim, spokes, and hub-heads placed in position therein.

Heretofore the driving-gear has been attached to the wheel by bolting it directly to the spokes, whereby it is wholly supported.

This form of construction makes a very strong and very light wheel, but in use is attended with some very serious practical difficulties, viz: First, the difficulty of keeping the wheel in its assigned position on the axle, as the wheel on its bearings in the hub-heads is constantly shortened as the spokes are tightened; second, the great friction and wear on the axle, occasioned by the cramping thereon of one or both of the hub-heads. This cramping is caused by the unequal tightening of the bolts, or by any sudden rack or side strain which the wheel may receive when in use, the axle being the only thing that keeps the hub-heads true or in line as to their bearings. Third, the displacement of the driving-gear, both with reference to the bearing and the rim of the wheel, as well as the connecting-gearing as the hub-heads are drawn together to tighten the spokes, and its displacement as the hub-head for its rank of spokes is tilted over and out of line as to the other head.

The difficulties are obviated in my wheel, wherein is interposed between the axle and the hub-heads a sleeve, to which one of the heads should be fixed, while the other is allowed to slide freely thereon as the wheel is tightened; and the second part of my invention consists in attaching the driving-gear firmly to one of the hub-heads, whereby the gear-rim is not displaced by the movement of the spokes in tightening up the wheel, or otherwise.

The spokes are crossed so that an equal obliquity and power of expansion are obtained with less length of hub, and thereby the gear-ring may be brought laterally within the rim of the wheel, and protected from dropping of mud and obstructing matter. A sliding stop is also placed on the sleeve and hub, whereby they are permitted to move upon each other axially, but not to rotate, and thereby the driving-strain is equally distributed between the two ranks of spokes.

A′ is the rim or felly of the wheel, which I prefer to make of a single piece of bent wood. The tire *b′* may be welded or riveted at its ends, and the felly expands and fills it. C′ is the central sleeve of the hub, and is fitted upon the axle. At one end of the sleeve C′ there is a flange, E′, provided on its back or inner face with ribs *e′*, arranged in pairs so as to form radial sockets to support those ends of the first rank of spokes *g′*, which butt against the sleeve and flange E′. Hub head or collar F′ is fitted to slide upon the opposite end of the sleeve C′, and said collar is also provided with ribs *c′*, arranged in radial pairs similar to those on the flange E′, and for the similar purpose of receiving and supporting those ends of the second ranks of spokes *h′* which butt against the collar F′.

In the drawings, the spokes *g′ g′* belong to the first rank, and the spokes *h′ h′* to the second rank. This mode of designation then will be adopted in this description for convenience only, as the spokes themselves do not differ from each other. The outer ends of the spokes of each rank are confined in sockets arranged in lines in the inner surface of the rim, and the lines of the two ranks are parallel and on either side of the central line of said rim.

The ranks are adjusted so that the spokes cross each other, as shown, so that as much outward thrust can be obtained as heretofore, but with a hub materially shorter. Bolts

I′ I′ connect the flange E′ and collar F′, and force them toward each other, the collar sliding along the sleeve C′. This operation forces the inner ends of the ranks toward each other, and as their outer ends rest in permanent sockets they correspondingly move outward, and force the felly against the tire, and thus the wheel is expanded.

The gear-ring J′ is supported upon radial arms, which are connected with the end of the sleeve C′—it may be by casting said ring, with its arms and the sleeve, all in one piece, or, as I prefer, by casting said ring with its arms and a central hub, which is bored and fitted to the end of said sleeve and rigidly attached there by riveting down the end of the sleeve, or by any other proper means.

In practice I provide the sleeve C′ with a shoulder, *c′*, against which the hub of the gear-ring is seated, and also with a small stud or projection, *f′*, which engages with a corresponding recess in the shoulder *c′*, to determine the position of said ring on the sleeve.

This determination is useful in connection with a similar provision on the collar F′, to wit, a stud or feather, *d′*, and groove *i′*, whereby the collar F′ is prevented from rotating on the sleeve, while it may still slide freely back and forth thereon.

It is useful, as before stated, to provide the gear-ring hub with a determinate position corresponding definitely with the position of the collar F′, as then the holes in said collar and hub for the reception of the bolts I′ will always be opposite each other without further trouble.

It will be evident that when the gear-ring J′ is employed and constructed as above described, the before-mentioned flange E′ is replaced by the hub of the gear-ring, and the latter is provided with socket-ribs on its back, in the manner heretofore described as to said flange E′. The collar F′ may be provided with sprockets K′, so as to carry a chain to transmit motion to some other mechanism, such as the reel of a harvester, &c.

Having thus described my improvement, what I claim as new is—

1. The enlargement *a* at the terminations of the stripper-slats *e e*, for the purpose set forth.

2. The evener-support, composed of the angle-plate L and hammer-strap *c*, substantially as and for the purpose described.

3. The segment-rack and groove-plate O for securing and adjusting the height of the axle, prolonged forward sufficiently far to inclose with the collar *b* the end of the main pinion-shaft box, as set forth.

4. The axle *i*, provided with axle-plate *n*, constructed with radial lever-sockets, as set forth.

5. Axle *i*, provided with pinions *k k* and with perforated pin-plate *p*, combined with the wheel G, provided with holes in its hub corresponding with the holes in said plate, substantially as set forth.

6. A harvesting-machine, substantially as described, the frame of which is provided with rails *h h g g* and hooks *s* and pivot-bolt *o*, or their equivalents, for the purpose of attaching a binding-machine or binders' table and foot-board.

7. The binders' foot-board Q, constructed with the braces *t t* extending under and supported by the cross-bars of the frame A, and hung upon the hooks *s*, combined with the receptacle P, jointed to the timbers I I, and supported at its outer side upon folding legs, which rest in sockets in said foot-board, substantially as set forth.

8. A harvesting-machine, substantially as described, provided with the seat-post P′ in rear of the elevator-seat V, and seat-bar U at the inner side of the elevator-frame.

9. The line-guide W, mounted upon the front end of the elevater-frame and extending upward and backward, and adjustable in relation to the elevator and transferable seat V, for the purpose set forth.

10. The lever head-plate *y*, provided with two sockets, oblique to each other, for the lever Y, whereby said lever may be placed convenient to the hand of the driver, whether seated at the rear of the elevator-frame or upon the bar U.

SYLVANUS D. LOCKE.

Witnesses:
E. P. MARKHAM,
WILLIAM KELYER.