2 Sheets—Sheet 1.

J. HARRIS.

Harvester Gearing.

No. 204,148. Patented May 28, 1878.

Fig. 1.

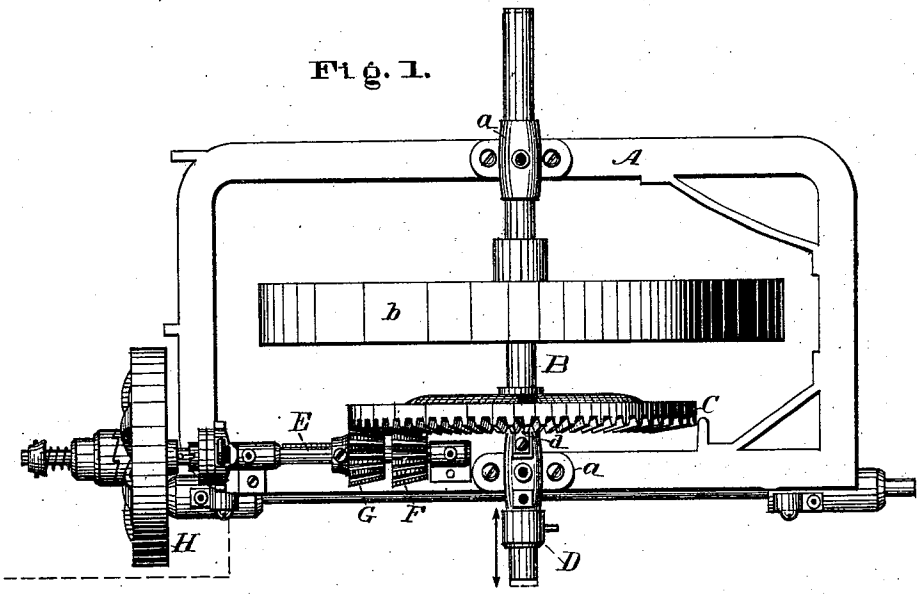


Fig. 2.

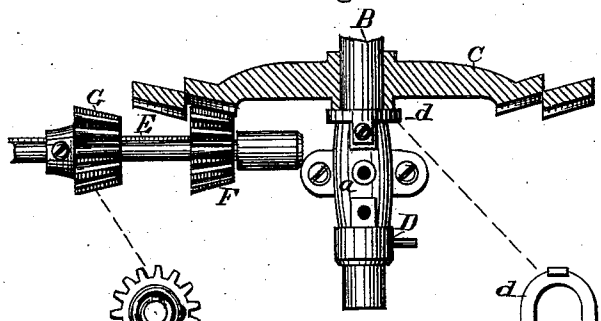


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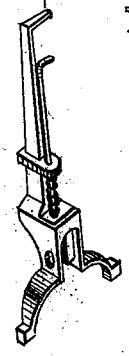


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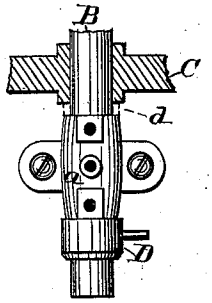
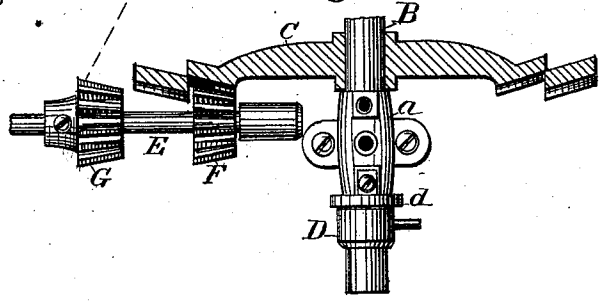


Fig. 5.



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2 Sheets—Sheet 2.

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Fig. 4.

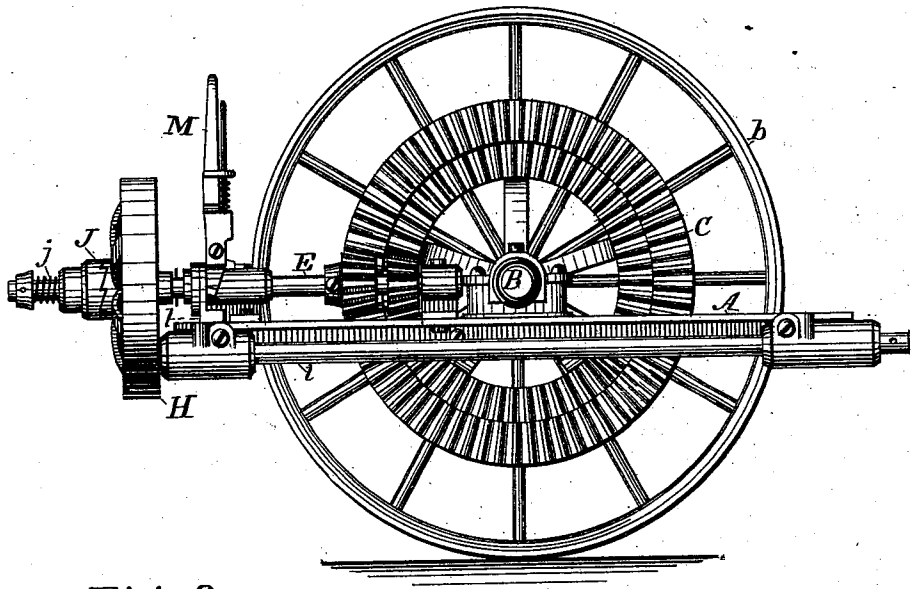


Fig. 9.

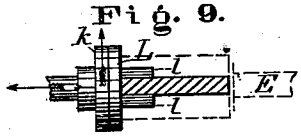


Fig. 10.

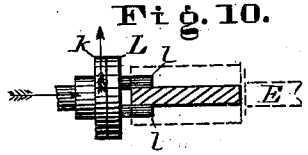


Fig. 8.

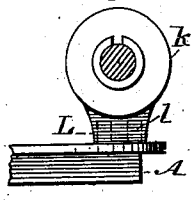
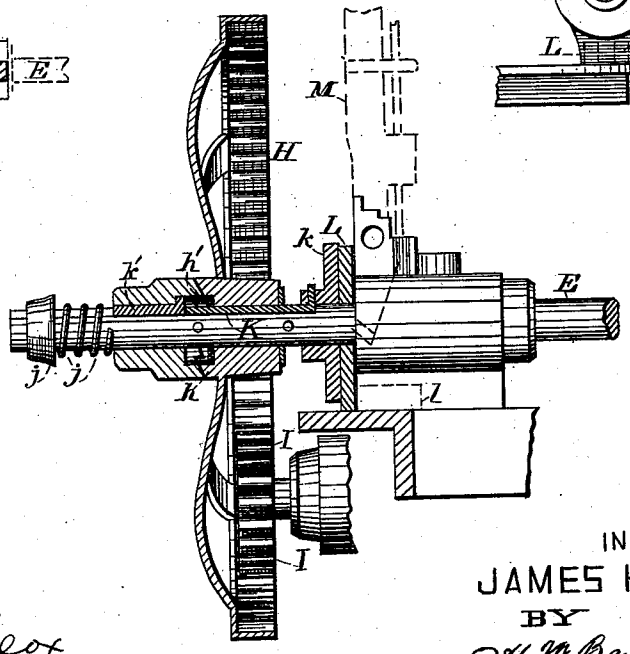


Fig. 5.



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UNITED STATES PATENT OFFICE.

JAMES HARRIS, OF JANESVILLE, WISCONSIN.

IMPROVEMENT IN HARVESTER-GEARINGS.

Specification forming part of Letters Patent No. **204,148**, dated May 28, 1878; application filed February 12, 1876.

To all whom it may concern:

Be it known that I, JAMES HARRIS, of Janesville, in the county of Rock and State of Wisconsin, have invented a new and useful Improvement in Harvester-Gearing; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention consists mainly, first, in the employment of certain novel mechanism for changing the speed of the knives, the same consisting in the combination of a movable gear-wheel, having two series of teeth, with a fixed and a movable pinion, the construction being such that when the gear-wheel is in one position the fixed pinion is caused to engage with its proper series of teeth, and when in the other the movable pinion may be caused to engage with its proper series of teeth, in consequence of which the pinion-shaft will receive more or less rapid movement, as the case may be; and, second, in the special construction of the clutch mechanism for moving the knives in and out of gear.

In the drawings, Figure 1 represents a plan view of my improved machine; Figs. 2, 3, and 7, plan views, partially in section, of the devices for changing the speed; Fig. 4, a side elevation of the machine; Fig. 5, a sectional elevation of the clutch mechanism; Fig. 6, a perspective view of the clutch-lever; and Figs. 8, 9, and 10, detail views of the friction-collars of the clutch mechanism.

To enable others skilled in the art to make and use my invention, I will now proceed to describe fully its construction and manner of operation.

The mechanism for changing the speed of the knives will first be described.

A represents a frame of any suitable construction, and *a a* journal-boxes, located thereon at the proper points.

B represents the main shaft, supported by the main driving-wheel *b*, which is secured to the frame by means of the journal-boxes *a a*, in such manner that a longitudinal movement of one relative to the other is permitted.

C represents the main gear-wheel, secured to the shaft B in any proper manner, and provided with two concentric series of bevel-teeth, the outer one of which has its bearing-face projecting outward beyond the inner, as shown in Figs. 2 and 3, for purposes hereinafter explained.

D represents a sleeve or collar, rigidly secured to the shaft near one end, by means of which the longitudinal movement of the shaft or the lateral movement of the frame, as the case may be, is limited in one direction. Movement in the other direction is determined by the position of the gear-wheel upon the shaft, and its consequent distance from the end of the adjacent journal-box.

d represents a U-shaped iron, provided with a flange having a suitable opening, by means of which and a fastening-screw it is properly secured in place. This is adapted, when the shaft or frame is adjusted in either direction to the extent of its movement, to fill the open space consequently left, either between the inner end of the journal-box and the gear-wheel, as shown in Figs. 1 and 2, or the outer end of the journal-box and the limiting-collar, as shown in Fig. 3, and thus fasten the parts securely in place.

E represents a shaft, located at right angles to the main shaft, and supported in proper journal-boxes upon the frame A, by means of which and proper gearing motion is communicated to the shaft which drives the knives.

F represents a bevel-pinion, rigidly fixed to the inner end of the shaft E, which is adapted to engage with the inner series of teeth of the main gear-wheel when the main shaft is in proper position to bring the parts in contact.

G also represents a bevel-pinion, located upon the shaft, and compelled to revolve with it by means of a spline or equivalent device, but which is free to move in a longitudinal direction. This is adapted to engage with the outer series of teeth of the main wheel when the parts are brought into contact, as will be hereinafter explained.

The operation of these parts is as follows: When the shaft or frame is in such position that the iron *d* lies in the space next the limiting-collar, as shown in Fig. 3, the inner series of teeth are caused to engage with the fixed pinion F, and consequently, when the wheel is in motion, movement is communicated through it and the intermediate mechanism

to the knives of the machine. When it is desired to increase the speed, the iron *d* is removed and the shaft or frame so moved as to leave space between the inner end of the journal-box and the gear-wheel, as shown in Fig. 7. In this space the iron *d* is properly secured in place, as shown in Fig. 2. When the parts are in this position it will be observed that the teeth of the inner series do not engage with the fixed pinion F, an intervening space being left between the two by the lateral movement of the wheel.

To again unite the main wheel to the pinion-shaft, the loose pinion G must be moved upon the shaft E and caused to engage with the teeth of the outer series of the gear-wheel, as shown in Fig. 1. In this position it may be secured by a set-screw or equivalent device.

When the parts are thus adjusted, the motion of the driving-wheel will be communicated, through the teeth of the outer series of the gear-wheel, the pinion G, and the intermediate mechanism, to the knives, the speed of the latter being increased, of course, in proportion to the increased number of teeth in the outer series of the main gear-wheel.

The clutch mechanism will now be described.

H represents an internally-toothed spur-gear, located upon the shaft E at the proper point, but loose thereon, as far as revolution with it is concerned, which is provided with the clutch-face *h*, as shown. *h'* represents a friction-washer, against which the hub of the wheel bears when pressed in that direction. A washer may also be used on the other side of the wheel for a like purpose, the wheel and washers both being held from lateral displacement by securing-pins, as shown.

I represents a pinion, engaging with the teeth of gear H, which is secured to one end of the shaft *i*, and communicates movement to the latter for driving the knives of the machine.

J represents a clutch-box, adapted by means of a proper slot in its eye to slide longitudinally upon the shaft, but rigidly secured thereto, as far as revolution is concerned. *j* represents a collar, secured to the end of the shaft in any proper manner, and *j'* an intermediate spring, by means of which the clutch-box is ordinarily kept in contact with the face of the wheel H.

K, Fig. 5, represents a push rod or bar, held in a proper groove in the shaft E, which bears at one end against the clutch-box J in any proper manner, or against a loose key, *k'*, as shown in Fig. 5, and is secured at the other to the sliding collar *k*, revolving with the shaft E.

L, Figs. 5, 8, 9, and 10, represents a collar loose upon the shaft and free to slide thereon, which is held from revolution by the fingers or bars *l l* resting in contact with the base of the fixed journal-box, as shown.

M represents a shifting-lever, which may be constructed generally in any proper manner, but which is preferably bifurcated at its lower end, and so pivoted upon the journal-box as to cause its lower extremities to bear against the collar L, as shown.

The operation of these parts is as follows: When the machine is in ordinary operation motion is communicated from the main gear-wheel to the shaft E, and from the shaft E, by the clutch mechanism described, to the gear H and the mechanism connected thereto. When the machine is backing the clutch-box prevents movement from being communicated to the knives in the usual well-known manner. When it is desired to throw the knives out of gear the shifting-lever is employed in the usual well-known manner; but this, instead of acting upon a moving surface in the usual manner, acts upon the sliding collar L, Figs. 5, 9, and 10, which has no revolution, and consequently these parts have no appreciable amount of friction or wear. The necessary friction and wear incidental to the contact of the fixed and moving parts, however, is borne by the collars *k* L, which, having large and smooth bearing-surfaces, are better adapted to sustain it.

I do not confine myself to the precise construction shown. If desired, instead of adapting the main shaft to slide, the gear-wheel may be made to slide upon a fixed shaft. If desired, also, the shaft may be adjusted and also held in other ways than that shown. For instance, the main shaft-box may be made movable, or a lever may be used, and also any suitable stop device for limiting the movement of the shaft. A lever also may be employed, if desired, to move the sliding pinion.

Some of the advantages of the described construction are as follows: By the employment of the movable gear and the fixed and the movable pinion, it is possible to work the machine without any more friction or wear than is incidental to the ordinary machine, a single pinion only and single series of teeth being in frictional contact when the machine is running at either rate of speed. By the movement of the gear-wheel, also, it is possible, when desired, to disconnect entirely the subordinate parts from the main gearing, so that no part of the mechanism will be driven, and consequently all useless wear will be avoided.

By constructing the main gear-wheel with one of its series of teeth beyond or overhanging the other, it is possible to use pinions of nearly equal size, and locate the series of teeth close together without danger of contact between the inner series of the teeth and the fixed pinion when the movable pinion is in gear, and without danger of contact between the outer series of teeth and the shaft when the fixed pinion is in gear. The use of pinions of nearly equal size and the near location of the series of teeth are important to obtain the proper speed.

By the employment of the intermediate non-revolving collar between the revolving collar

and the shifting-lever, the wear of the latter is obviated, and the friction transferred to the larger surfaces of the adjacent collars, which are better adapted to bear it.

It will be understood that a machine constructed as described is provided with a double disconnecting mechanism, the first consisting of the main gear-wheel, which may be readily moved out of contact with the fixed pinion if in gear with that, or be disengaged from the loose pinion by properly sliding the latter upon the shaft if in gear with that; and the second consisting of the shifting-lever and the mechanism connected therewith.

The first mechanism is specially adapted for employment where it is necessary to move the machine long distances, such as in going to and from the field, as no part of the gearing will have frictional movement.

The second mechanism is adapted for use when the machine is engaged in work, and it is desired to throw the knives out of gear temporarily for any desired purpose.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with two pinions upon a fixed pinion-shaft, one of which is movable relatively to the other, substantially as described, a gear-wheel capable of movement relatively to the fixed pinion-shaft, substantially as described, having two series of teeth, one of which projects beyond the other, the construction being such that when the parts are in gear for either speed a single series of teeth and a single pinion only are in frictional contact, substantially as set forth.

2. The combination of the following elements: a movable frame having a pinion-shaft fixed thereon, substantially as described, a gear-wheel mounted on the main axle, or drive-wheel, having two series of teeth, substantially as described, a pinion-shaft fixed upon the frame-shaft, adapted to engage with one of the series of teeth, and a pinion movable upon the frame-shaft, adapted to engage with the other series, the construction being such that either pinion may be caused to engage with the proper series of teeth without the frictional movement of the other, substantially as described.

3. The combination of the shaft B, having the limiting-collar D, the sliding frame A, and the fastening-iron *d*, as described.

4. The combination of the grooved shaft E and the loosely-attached gear-wheel H, having clutch-teeth on its outer side, with the sliding clutch J and the push-rod K, adapted to slide in the groove to actuate the clutch, as described.

5. The combination of the sliding clutch-spring *j* and the push-rod K, having the revolving collar *k* attached thereto, with the non-revolving collar L and independent lever M, as described.

6. The combination of the journal-box, lever M pivoted thereto, and non-revolving collar L, having arms *l l* bearing against the journal-box, as described.

7. The combination of two pinions with the main gear-wheel, capable of movement at right angles to the face of the pinions, for engagement with or disengagement from one of the same, the other pinion being capable of movement in a plane parallel to the face of the wheel for engagement or disengagement, substantially as set forth.

This specification signed and witnessed this 1st day of February, 1876.

JAMES HARRIS.

Witnesses:
E. D. STONE,
FENNER KIMBALL.