2 Sheets--Sheet 1.

JOHN BARNES.

Improvement in Harvester-Rakes.

No. 114,094. Patented April 25, 1871.

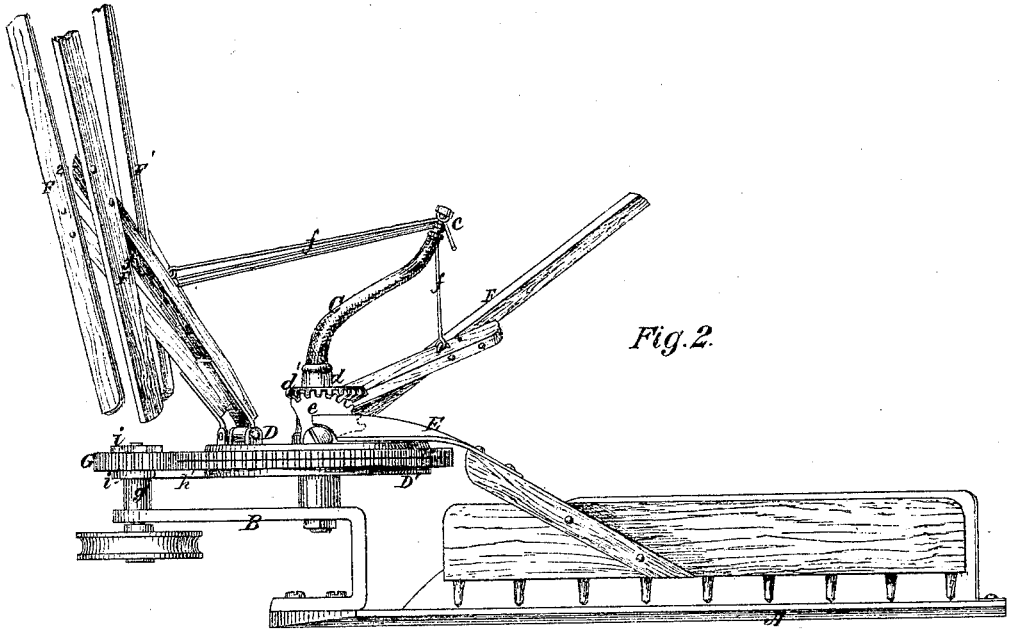
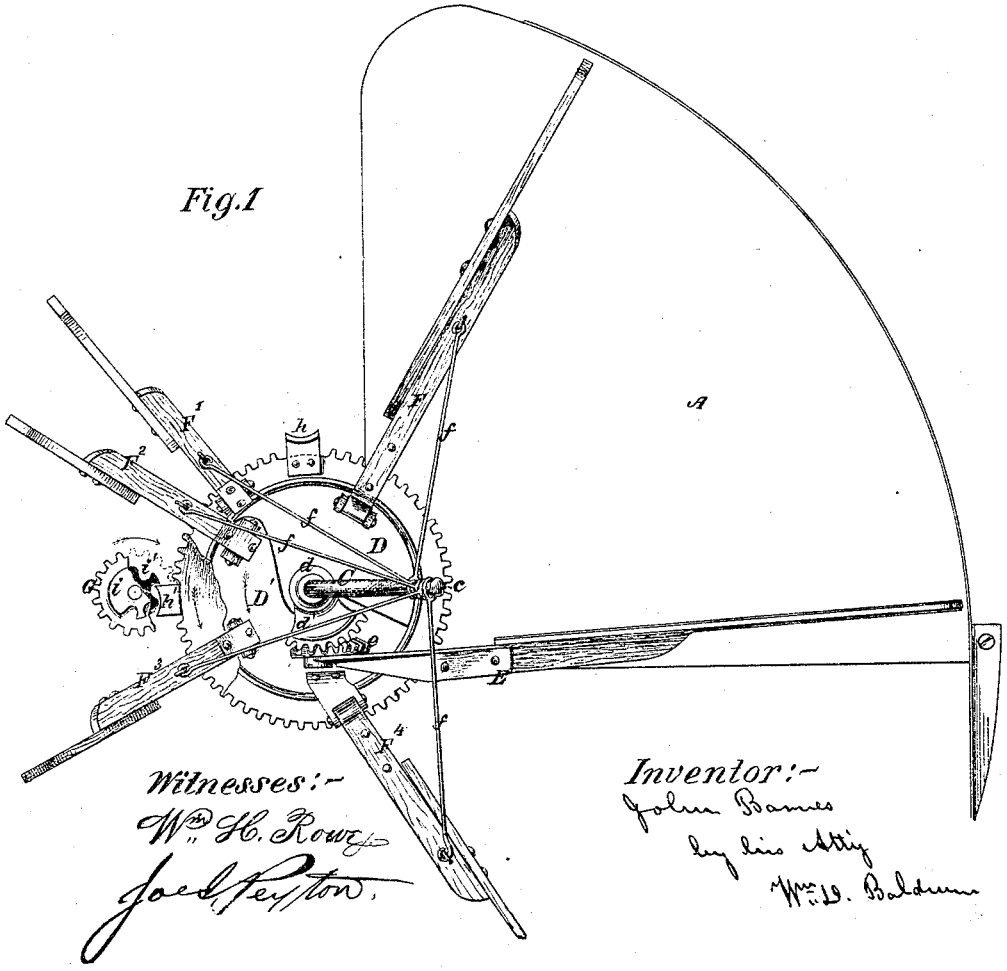


Fig. 2.

Fig. 1



Witnesses:-
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by his Atty
Wm. D. Baldwin

2 Sheets--Sheet 2.

JOHN BARNES.

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Fig. 3.

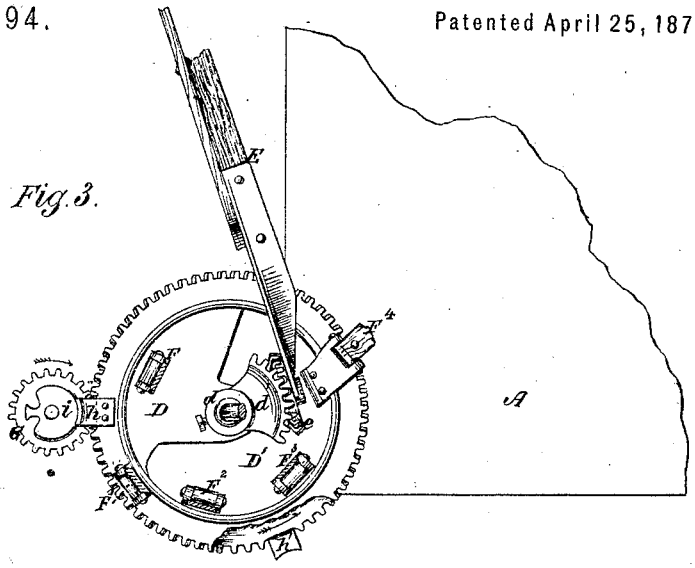


Fig. 4.

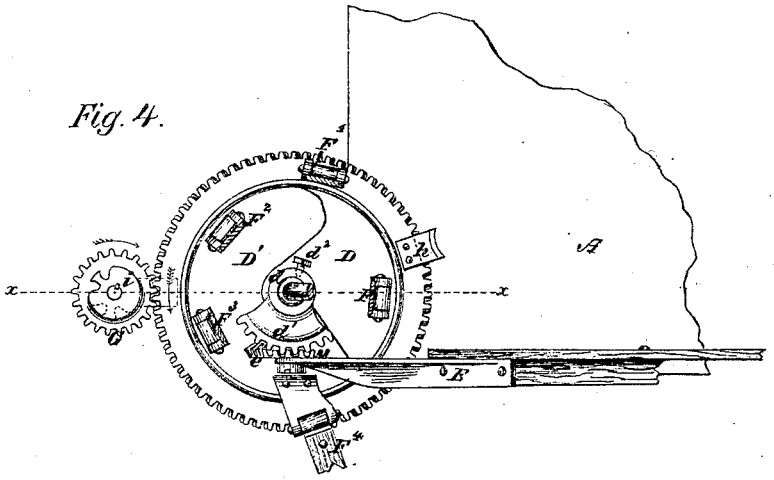
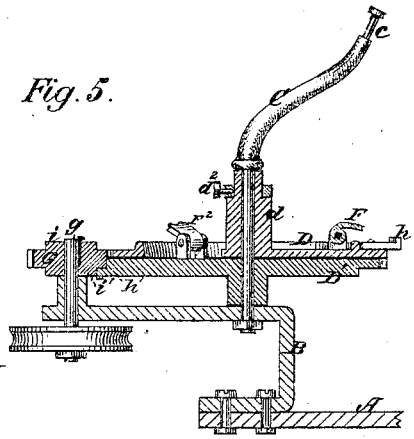


Fig. 5.



Witnesses :-
Wm. H. Rowe.
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UNITED STATES PATENT OFFICE.

JOHN BARNES, OF ROCKFORD, ILLINOIS.

IMPROVEMENT IN HARVESTER-RAKES.

Specification forming part of Letters Patent No. **114,094**, dated April 25, 1871.

To all whom it may concern:

Be it known that I, JOHN BARNES, of Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Harvester-Rakes, of which the following is a specification:

My invention relates to that class of combined reels and rakes in which a series of rotating independently-hinged rising and falling arms are employed. The object of my invention is to reel the grain back to the cutting apparatus by arms descending into the standing grain in front of the platform, and to sweep it from the platform by means of a rake, which descends upon the cut grain in rear of the cutting apparatus; to which end my improvements consist in certain novel combinations of mechanism, hereinafter fully set forth.

In the accompanying drawings, which embody all the improvements herein claimed, but which represent those parts only of the machine which are necessary to the proper illustration of my invention, Figure 1 is a plan, showing the rake just after descending upon the platform, also showing some part of the gear-wheels broken away to show the parts beneath; Fig. 2, a front elevation, showing the same attitude as in Fig. 1; Fig. 3, a plan with the arms broken, showing the relation of the parts at the moment after the discharge of the gavel; Fig. 4, a similar view, showing the rake just beginning to descend upon the platform; Fig. 5, a vertical section through the line *x x* of Fig. 4.

In this instance a platform, A, is supposed to be arranged behind a suitable cutting apparatus in the usual way. A bracket or frame, B, is mounted upon the frame, finger-beam, or platform, to sustain the raking and reeling apparatus. A post, C, fixed to this frame, extends upward vertically a short distance, and is then bent inward over the platform. Two gear-rings, D D′, arranged one above the other, revolve around this post, and the rake-arm E and reel-arms F F^1 F^2 F^3 F^4 are pivoted to these rings in the usual way. In this instance five reel-arms and one rake-arm are shown, two arms, F F^1, being pivoted to the upper ring D, and three reel-arms, F^2 F^3 F^4, and the rake-arm being pivoted to the lower ring D′. The upper ring is cut away, as shown in the drawing, to permit of this attachment. The arm F^1 is pivoted eccentrically to the others, for a purpose hereinafter set forth, and the arm F^4 is not only set at a greater distance from the center than the others, but is also tangential to its axis of rotation. The reel-arms are connected, by pivoted links *f*, to the bent part *c* of the rake-post, which post, in this instance, is fixed instead of vibrating, as it does in my former patent of January 12, 1869. This arrangement is simple and effective, and it dispenses with cams or guides. A collar, *d*, on the upper gear-ring D, carries a segment-gear, d^1, which meshes with a corresponding one, *e*, on the rake-arm, thus causing the rake-arm, at proper intervals, to rise and fall, as hereinafter shown.

The reel-arms, it will be observed, are all radial to their axis of rotation except the one, F^4, next behind the rake, while the rake is tangential, by which means more reel-arms can be used than would be the case were the rake-arm radial as well as that of the reel. This arrangement also gives a more perfect control over the movements of the rake.

It is necessary to impart to the rake and reel arms variable movements relatively to each other, and yet that both should make their revolutions synchronously. To do this I construct the gear-rings D D′ with an equal number of teeth on their periphery, and drive them by a pinion, G, on a shaft, *g*, driven in any of the usual ways. This alone would drive both rings at a uniform speed. To vary this speed I arrange a wheel, *i i′*, having but a single tooth, on the upper and lower sides, respectively, of the pinion G, the two teeth standing about at right angles to each other, as in Fig. 4, where the lower tooth is shown in dotted lines. This relation of the teeth is likewise shown in Fig. 1. Studs *h h′* project radially from the gear-rings D D′ at about a right angle to each other, and the teeth of each gear are cut away beneath its respective stud. The face of each stud is concave to conform to the periphery of its wheel *i i′*. Consequently, when the stud enters the notch at the back of the tooth, the rotation of the gear-ring is stopped until the tooth has made a complete revolution, when it starts the gear-

ring again. Each ring is thus alternately accelerated and retarded in its revolution, as hereinafter more fully explained.

The relation of the two gear-rings, and consequently that of the rake and reel arms, may be adjusted by means of a set-screw, d^2, which locks the collar d to the post C. (See Fig. 5.)

It is obvious that the details of the mechanism hereinbefore described may be modified in various ways well known to those skilled in the art without departing from the spirit of my invention.

The movements must be so true that the pause made by the beaters following the rake while the latter is descending must be so brief as not to interfere with the proper reeling of the grain.

The rake might be attached to the upper, instead of the lower, ring; or all the reel-arms might be attached to one ring and the rake to the other, if desired; but I prefer the form shown.

A smaller number of beaters would do good work; but I find the number shown better, practically.

The operation of the machine is as follows: In Figs. 1 and 2 the rake is shown as having descended into the cut grain lying upon the platform, and as just commencing its backward movement to sweep the gavel from the platform. In this position the lower tooth i' bears against the back of the stud h' and starts the ring D', which carries the rake. The two rings D D' now rotate at a uniform speed; and the gavel is swept from the platform, each reel-beater, in turn, descending into the standing grain, sweeping it back upon the platform, passing over the platform, rising and moving forward again, as is well understood.

As the rake reaches the back of the platform and is ready to discharge the gavel, the stud h of the upper ring D enters the notch of the tooth i, and thus stops the rotation of the ring D, its reel-arms F F^1, together with the segment d^1, and as the lower ring still moves, the rake is suddenly lifted, thus insuring a perfect discharge of the gavel. The relation of the parts at this moment is shown in Fig. 3. The lower ring continues to move, while the upper one remains stationary, until the tooth i strikes the back of the stud h, when both rings revolve together, until the rake has moved forward and been turned around until it lies over the finger-beam and parallel thereto—that is, for nearly three-fourths of a revolution. If the rake were at this moment to drop quickly, it would strike the reel-beater F. To prevent this, the stud h' at this moment engages with the tooth i', and the movement of the ring D' ceases, while that of the upper one, D, continues. The beater F is, consequently, moved out of the way, while the rake is brought down upon the platform by the movement of the segment-gears d^1 e, when the operation above described is repeated.

The pivoting of the arm F^1 farther from the center than its adjacent one, F^2, enables it to work closer to the latter than it could do if not so pivoted. In like manner the tangential arrangement of the arm F^4, together with its being pivoted entirely outside of the gear-rings, prevents its interference with the rake, while causing it to follow closely enough thereto to reel in the grain properly.

It will be observed that while the rake and reel-arms all complete their revolutions in equal times, they sometimes move with variable speed relatively to each other.

I claim as my invention—

1. The combination of an intermittently-rotating rising and falling rake, descending into the cut grain lying upon the platform, with intermittently-moving gearing, to rotate, raise, and lower the rake at proper intervals, these members being constructed and operating substantially as hereinbefore set forth.

2. The combination of an intermittently-rotating rising and falling rake, descending into the cut grain lying upon the platform, intermittently-rotating reel-arms revolving synchronously with the rake, but with varying speed relatively thereto, and connecting gearing to produce these movements, these members being constructed and operating substantially as hereinbefore set forth.

3. The combination of two independent series of intermittently-rotating rising and falling reel-arms with an intermittently-revolving rising and falling rake, revolving uniformly with one set of reel-arms, but with a varying speed relatively to the other, all these members being constructed and operating substantially as hereinbefore set forth.

4. The combination of a stationary bent rake-post, two gear-rings revolving around said post, but at variable speeds relatively to each other, and each carrying independent reel-arms, and links connecting the reel-arms with the bent arm of the rake-post, all these members being constructed and operating substantially as hereinbefore set forth.

5. The combination of the driving-pinion G, the toothed wheels i i', the gear-rings D D', their studs h h', the rake and its segment-gear on one gear-ring, and the collar and its segment-gear on the other, all these parts being constructed and co-operating as hereinbefore set forth.

6. The combination, with the rake-arm, of the beater-arm F^4, pivoted tangentially to the lower ring on an arm overhanging the upper ring, as and for the purpose described.

7. The combination of the beater-arm F^1, pivoted on the outer edge of the upper ring, with the arm F', pivoted to the lower ring nearer the center, as and for the purpose set forth.

In testimony whereof I have hereunto subscribed my name.

JOHN BARNES.

Witnesses:

JOHN HOLLISTER,

J. G. MANLOVE.