3 Sheets—Sheet 1

W. H. PAYNE.

GRAIN-BINDER.

No. 191,776. Patented June 12, 1877.

Fig. 1

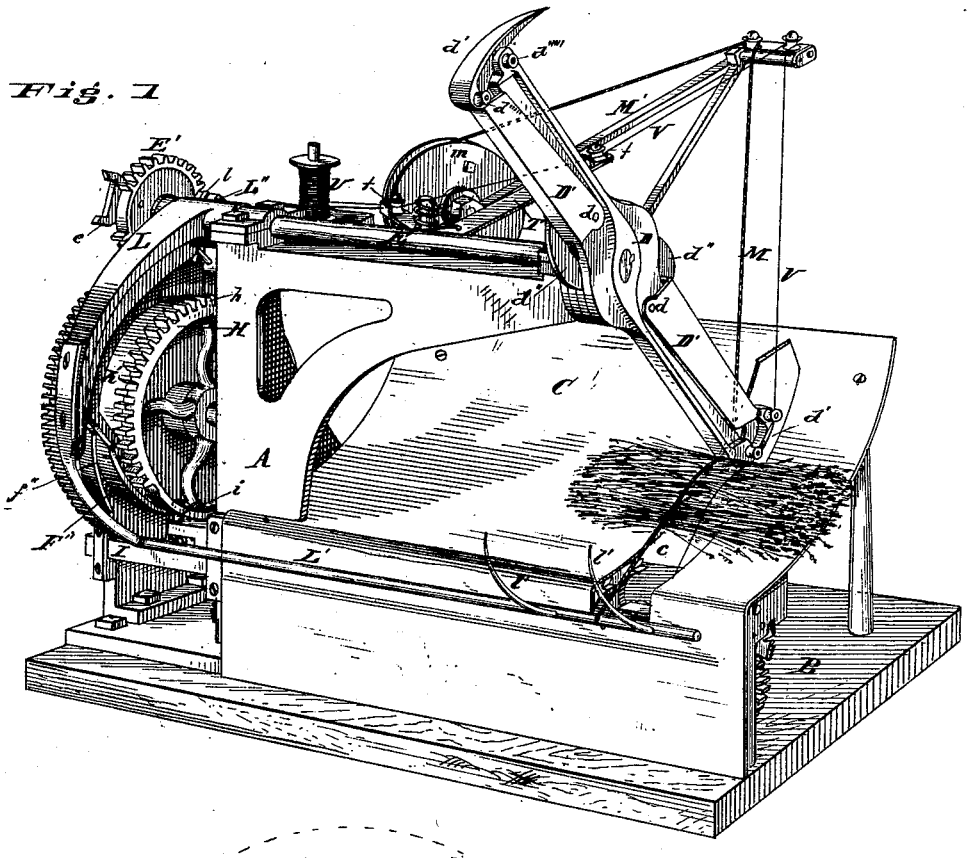
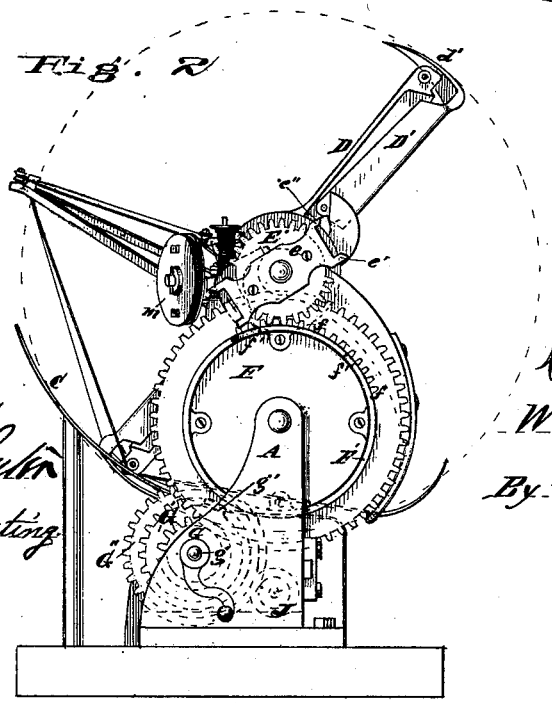


Fig. 2



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3 Sheets—Sheet 2

W. H. PAYNE.

GRAIN-BINDER.

No. 191,776. Patented June 12, 1877.

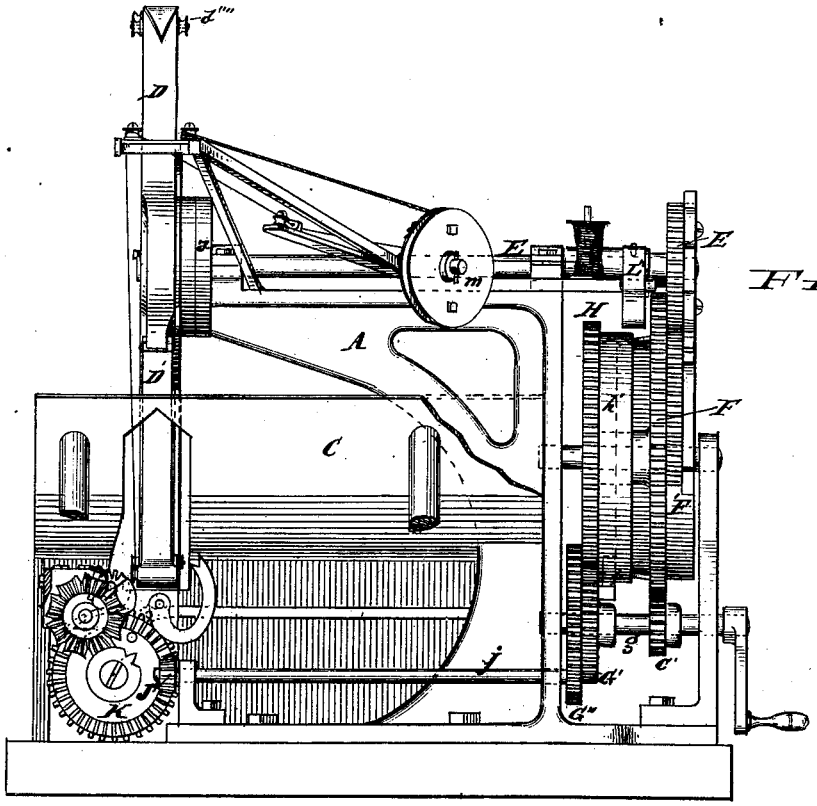


Fig. 3

Fig. 4

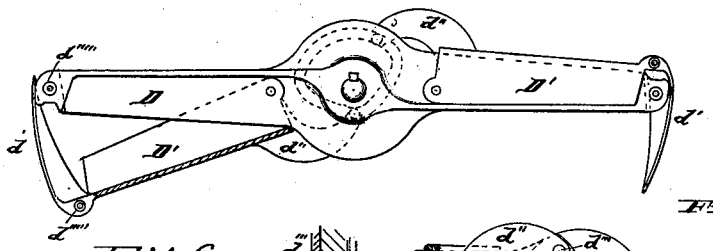


Fig. 7

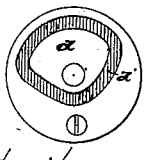


Fig. 6

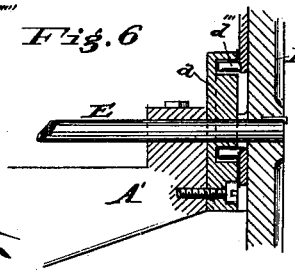
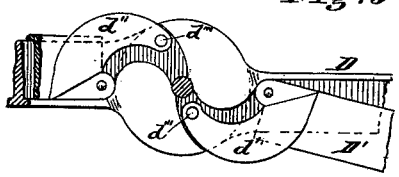


Fig. 5



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3 Sheets—Sheet 3.

W. H. PAYNE.

GRAIN-BINDER.

No. 191,776. Patented June 12, 1877.

Fig. 8

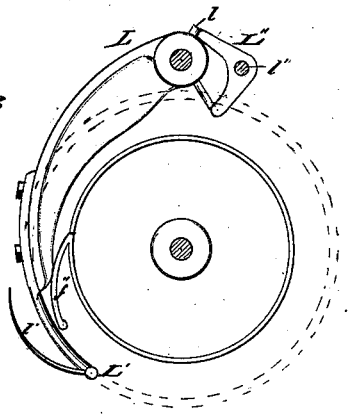


Fig. 9

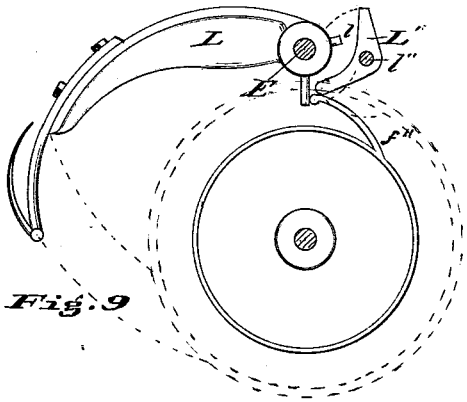


Fig. 10

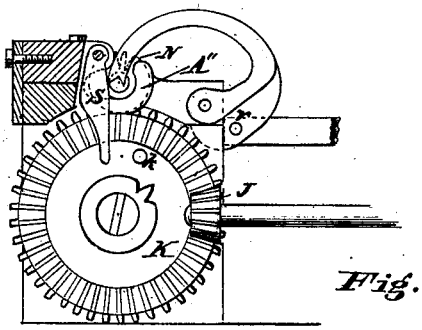


Fig. 11

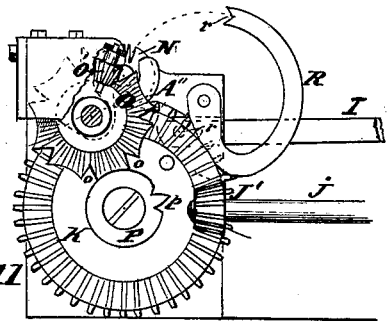


Fig. 12

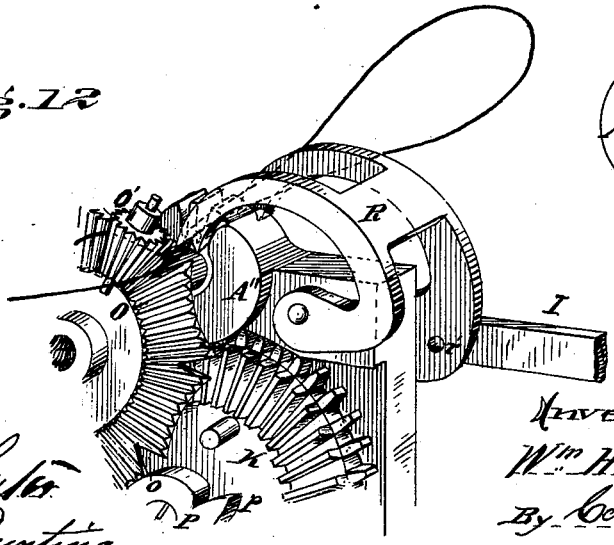
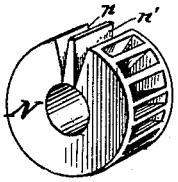


Fig. 13



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UNITED STATES PATENT OFFICE.

WILLIAM H. PAYNE, OF SANDWICH, ILLINOIS.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **191,776**, dated June 12, 1877; application filed April 4, 1876.

To all whom it may concern:

Be it known that I, WILLIAM H. PAYNE, of Sandwich, in the county of De Kalb and State of Illinois, have invented a new and useful Improvement in Grain-Binders, which is fully described in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a perspective view of the machine; Fig. 2, an end elevation, showing the driving-gearing; Fig. 3, a rear elevation of the binder; Figs. 4 and 5, views of the rotating gathering-arm; Fig. 6, a sectional view taken on the line *x x*, Fig. 4; Fig. 7, a plan view of the cam-guide which operates the hinged pieces of the gathering-arm; Figs. 8 and 9, detailed views of the bundle-holder and mechanism for operating and stopping it. Figs. 10 and 11 represent different views of the twisting mechanism; Fig. 12, a perspective view of a portion of the twisting mechanism on an enlarged scale, and showing the position of the wire; and Fig. 13, a perspective view of the twisting-pinion.

My invention relates to mechanism which is to be attached to a grain-harvester for the purpose of binding the grain automatically as it is delivered from the grain-platform.

The invention consists in a revolving gathering arm or gaveler, which is constructed with a long hook at each end, and hinged pieces which are thrown out at the proper time to secure a perfect separation; also, in a vibrating bundle-holder, to which the compressing-cord is attached which receives and holds the bundle while being bound, and is then raised to discharge the latter upon the ground; also, in a peculiar construction of the twisting-pinion; also, in a vibrating frame with two notched arms for placing the wire within the twisting-pinion; and, also, in various devices and other mechanism, as will be hereinafter more fully set forth.

In the drawings, A represents a metallic frame which is securely fastened to a platform, B, suitably arranged upon the harvesting-machine to receive the cut grain as it is discharged from the grain-platform either intermittently in the form of gavels, or in a continuous stream.

A receiver, C, preferably of sheet metal, is supported upon the frame A and platform B, into which the grain to be bound is delivered. This receiver is slotted at one end as at *c*, to accommodate the revolving gatherer D, which is mounted upon one end of a shaft, E. This gatherer or bundler is composed of the straight arm D and two pieces, D′, which are pivoted to the arm D at *d*, on each side of the shaft E. The outer ends of the hinged pieces D′ are provided with long hooks d^1, and at their inner ends there are rigidly attached short curved pieces d^2, which are provided at their extremities with pins d^3 fitting in the groove *a′* of a cam-guide *a*, which is fastened to the end of the upper arm A^1 of the supporting-frame. At the ends of the gatherer upon the inside of the arm D is a small pulley, d^4, and upon the outside are two similar pulleys, d^5, one upon the piece D and the other upon the hinged piece D′. Upon the other end of the shaft E is a gear-wheel, E′, which, however, is not provided with teeth around its entire periphery, two vacant spaces being left upon opposite sides of the wheel. A stop, *e*, is attached to the face of the wheel E′, the ends of which project beyond the wheel and nearly cover the blank spaces upon its periphery. The ends of the stop are provided with two short projections, e^1 and e^2, the former being a little longer than the latter, and all of them having their ends beveled inward, as shown in Fig. 2 of the drawings.

F is the main gear-wheel, mounted in the frame A, and receiving motion from a pinion, G, on the shaft *g*. Upon the outer face of the wheel F is a flange, F^1, which is provided with a series of cogs, *f*, upon a portion of its periphery. These cogs do not extend entirely across the flange, but the outside portion is left smooth, so that it may travel around beneath the stop *e*, the ends of which rest upon it when brought round to a proper position. The teeth *f* engage with the teeth on the wheel E′, giving it a semi-revolution with each revolution of the wheel F. The outer portion of the flange F^1 has notches f^1 arranged with reference to the section of cogs *f*, so as to accommodate the revolution of the wheel E′, by permitting the stops e^1 e^2 to drop into them at the proper intervals. Upon the inner side of the wheel F is another flange, F^2, which ex-

tends only partially around the wheel, and is provided at one end with a cam-projection, f^2. A wheel, H, is attached to the same shaft as the wheel F, and carries upon its periphery a section of cogs, *h*. A portion of its rim, *h'*, is also extended inward toward the wheel F, so as to form, in connection with the flange F^2, a cam-guideway, in which is fitted a pin, *i*, upon one end of a sliding bar, I. The gear-section upon the wheel H meshes with a gear-wheel, G^1, fitted loosely upon the shaft *g*, which is also provided with a flat stop, *g'*, on its periphery, that rests against the plain portion of the rim of the wheel H, thus preventing any movement of the wheel G^1, except when it is in mesh with the gear-section *h*. Another gear-wheel, G^2, is rigidly attached to the wheel G^1, so as to turn with it. This wheel engages with and drives a pinion, J, on one end of a shaft, *j*, upon the other end of which is mounted a beveled pinion, J', that meshes with a bevel-gear wheel, K, and thereby transmits motion to the twisting mechanism. A curved arm, L, is fixed loosely upon the shaft E, and to it is fastened one end of the bundle-holder L^1, which projects outward in front of and a little below the receiver C, and has two curved teeth, l^1, upon its outer end. The cam f^2 is brought in contact with the arm L, or a pin thereon, at each revolution of the wheel F, and raises the arm up at the proper time to discharge the bound bundle. Upon the upper end of the arm L is a small pin or stop, *l*, with which a swinging dog, L^2, engages, so as to keep the bundle-holder firmly in position while the bundle is being bound. The dog L^2 is supported upon a pivot, l^2, on the frame of the machine, and is released at the proper moment by the cam f^2 striking against its lower projecting end just before it reaches the arm L. One end of the tension-cord M is attached to the holder L^1, opposite the slot in the receiver C, and is carried backward and upward over a small pulley on an arm, M', attached to the main frame, and thence to a tension-pulley, *m*, journaled on the same arm M', about which it is wound.

The twisting mechanism is located underneath the receiver C, at the lower end of the slot therein. The wheel K is also a crown-wheel, and the teeth upon its periphery engage with and drive the twisting-pinion N. This pinion is closed—that is, its faces extend out even with the cogs, as shown in Fig. 13. One tooth is left exposed, however, so that there are two open spaces, *n* and *n'*, left in the pinion, which receive the two ends of the binding-wire. The pinion is loosely journaled in a circular seat adapted to receive it in an upright post or plate, A^2, attached to the frame A, and the driving mechanism is so timed that when the rotation of the pinion ceases the two open spaces *n n'* are opposite an opening in the upper part of the seat or bearing. One end of the binding-wire is held between a bevel-wheel, O, and a small beveled pinion, O', as shown in Fig. 12 of the drawings. The wheel O has a series of notches, *o*, cut in its periphery, and at each revolution of the wheel K a projecting point, *p*, on a collar, P, which is attached to the same shaft as the wheel K, enters one of these notches and drives the wheel O around the distance of one section, and thereby the end of the wire is carried back and griped between the wheel O and pinion O'.

A curved skeleton-frame, R, is pivoted to the upright A^2, the free ends of which have notches *r* in them. This frame operates as a placer, and is vibrated by the sliding bar I, which is pivoted to it eccentrically to the axis of the frame, as seen at *r'*, and is reciprocated by the pin *i*, which is moved back and forth by the cam guide-way between the wheels F and H. When the bar is moved toward the gear-wheel F the placer is swung up and its notched ends are brought against the upper strand of the binding-wire, and force it into one of the open spaces in the twisting-pinion, where it is held until the band is twisted.

A cutting-blade, S, is pivoted just in rear of the axis of the twisting-pinion, against the inner face of which it rests. A pin, *k*, on the wheel K strikes against the lower end of this cutter at every revolution of the wheel, and swings it forward to sever the wire between the twisting-pinion and the holders O O'.

An angular tension-arm, T, is pivoted to the upper part of the supporting-frame, and is provided with pulleys, *t t*, around which the wire V, for binding, is carried from the spool U; thence the wire is passed around a pulley on the arm M' and brought down to the wheel and pinion O O', between which the free end is firmly held.

The operation of my machine is as follows:

The grain, being delivered to the receiver C in a continuous stream, is separated by the hook upon the revolving gatherer D as it passes down into the slot *c* in the receiver. At the same time the tension-cord is caught under the pulley d^4, and the wire is caught in a similar way under the pulleys d^5, on the outside of the gatherer. The gavel of grain is carried forward by the revolving arm underneath the tension-cord and band-wire, as shown in Fig. 1 of the drawings. As the arm approaches the end of the slot in the receiver, its two parts are separated by the operation of the pin on the hinged part traveling in the cam-groove *a'*, and this cam is so arranged that when the arm is finally stopped at the lower end of the slot *c* the opening between the two parts is the widest, and is about as shown in Fig. 4 of the drawings.

This operation of the hook and hinged piece on the arm is especially adapted to machines where the grain is delivered in a continuous stream, as the separation between the gavel and the grain back of it is effected in a very satisfactory manner; but it is also beneficial where the grain is delivered intermittently in gavels, for, by the separation of the two parts of the gathering-arm, the bundle is forced off from the hook, out upon the curved teeth on

the bundle-holder. The compressing-cord and band-wire are carried out in front of the bundle, so that when the latter finally stops upon the holder L^1 the cord and wire are in the form of loops, almost surrounding the bundle. As the wire is carried forward in this manner the strand beneath the bundle, running from the holders O O′, is laid in the outer space *n* of the twisting-pinion, as shown in Fig. 12 of the drawings.

The operation of the cam-guide upon the pin on the sliding bar I, heretofore described, now swings up the notched arms R, which pass through the opening between the two parts of the gathering-arm, and seize the upper strand of the wire V, carry it down, and place it in the other space, *n′*, of the twisting-pinion. The wires and holding mechanism are now in the position shown in Fig. 12 of the drawings. The wheel K then begins to move, which revolves the twisting-pinion N, and the two strands of wire are twisted together on each side of the twisting-pinion.

The point *p* is a little forward of the pin which operates the cutter S, so that the wheel O and pinion O′ are rotated, and the free wire carried in and griped between them before the band is cut. The pin *k* then strikes against the cutter S, the wire is severed between the twisting-pinion and the holders, the placer R is retracted, and the bundle-holder L^1 is raised up, so that the bound bundle falls upon the ground. As the holder L^1 falls back again the gathering-arm commences to revolve, and the operation is repeated.

The stopping and starting of the mechanism, as well as the holding of the parts firmly in position when stopped, will be readily understood from the description of the driving-gear and devices connected therewith which has already been given.

I have shown a compressing-cord upon this machine, but with strong wire this device may be dispensed with, the band itself operating as a compressor.

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

1. A revolving bundler or gatherer, consisting of a main straight arm attached to a drive-shaft and auxiliary arms provided with hooks on their outer ends, and pivoted to the former, in combination with a cam-guide constructed, arranged, and operating substantially as described.

2. The revolving arm D, in combination with the vibrating pieces D′, pivoted on opposite ends of the arm D, and provided with hooks at their extremities, the pins d^3 on the inner ends of the pieces D′, and the cam *a*, in which both pins travel, substantially as and for the purpose set forth.

3. The bundle-holder L^1, provided with curved arms l^1, and vibrating intermittingly away from the binding mechanism, substantially as and for the purpose set forth.

4. The combination of the bundle-holder L^1, compressing-cord M, and revolving gathering-arm, substantially as described.

5. The combination of the revolving gathering-arm, vibrating bundle-holder L^1, and band-wire V, substantially as described.

6. An independent wire-carrier, in combination with the notched vibrating placer R, disconnected from the wire-carrier and wire, and twisting-pinion N, substantially as and for the purpose set forth.

7. The twisting-pinion N, constructed with its sides closed flush with all the teeth except one, so as to leave the two spaces on opposite sides of said tooth clear, substantially as and for the purpose set forth.

8. The wheel O and pinion O′, for seizing and holding the band-wire, substantially as described.

9. The combination of the wire-holders O O′, twisting-pinion N, and band-placer R, substantially as described.

10. The combination of the bevel-wheel O, notched as described, and collar P, provided with projecting tooth *p*, substantially as set forth.

11. The combination of the pivoted band-placer R, reciprocating bar I, provided with a pin, *i*, and a camway, which moves the pin back and forth, substantially as described.

12. The arm L, loosely journaled on the shaft E, in combination with the bundle-holder L^1 and the cam f^2 on the wheel F, substantially as and for the purpose set forth.

13. The combination of the arm L, hung loosely on the shaft E, pin or stop *l*, and pivoted dog L^2, substantially as and for the purpose set forth.

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