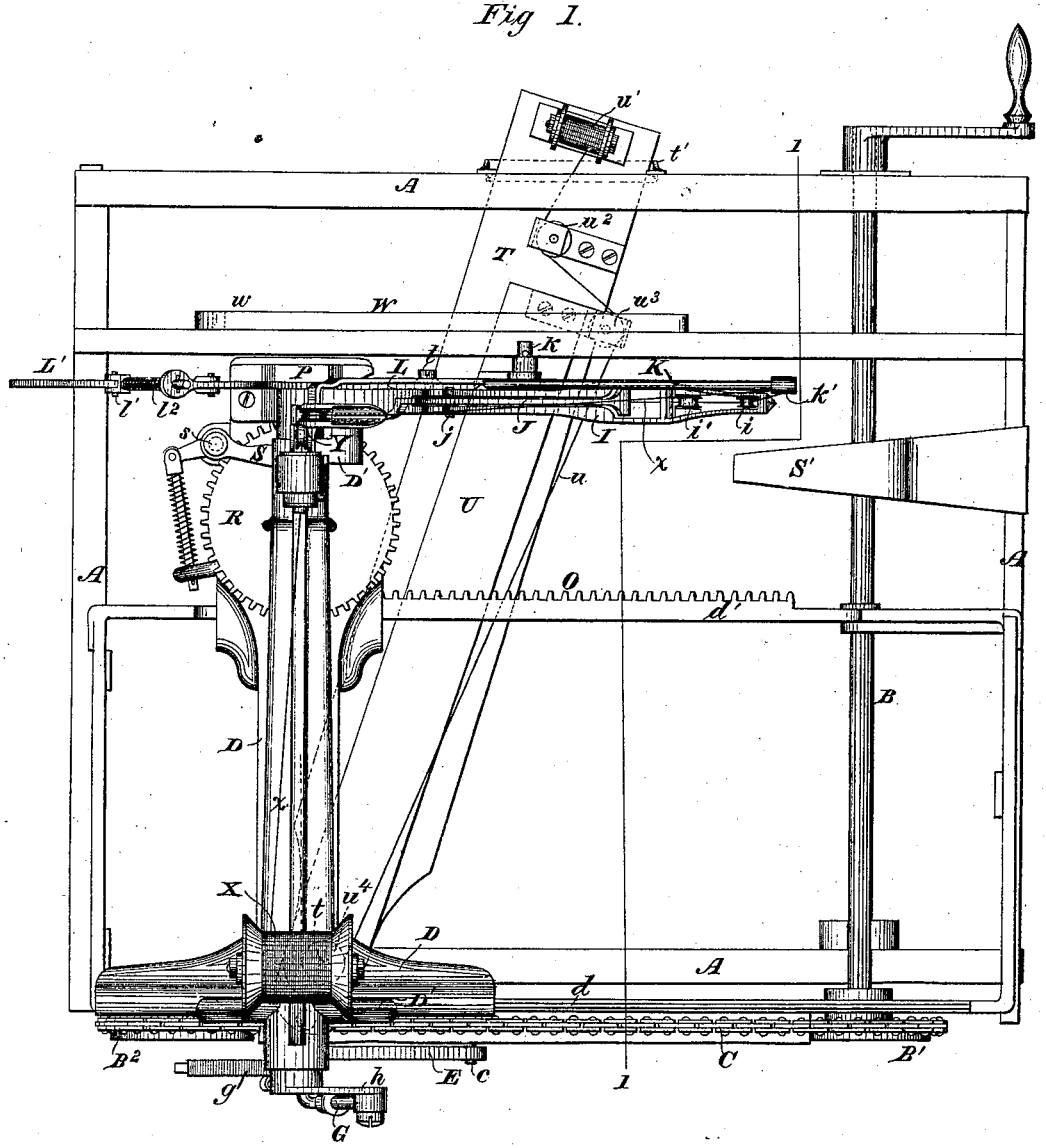
7 Sheets—Sheet 1.

# L. ERPELDING.

## Grain-Binder.

**No. 205,067.** **Patented June 18, 1878.**

*Fig 1.*




WITNESSES

Wm A. Skinkle

F. Stieh

INVENTOR

By his Attorney Lambert Erpelding.

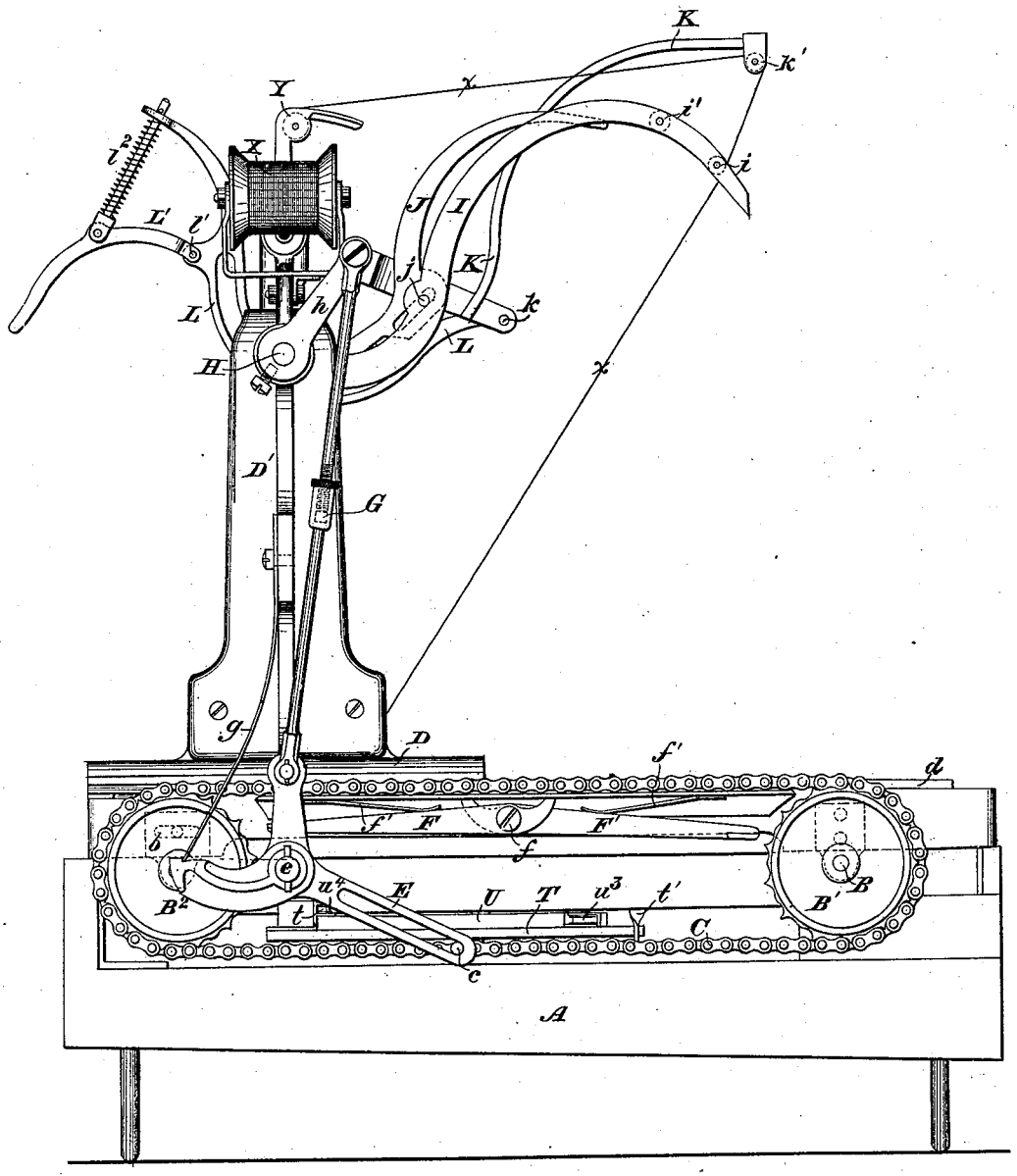
Wm D. Baldwin

# L. ERPELDING.

## Grain-Binder.

**No. 205,067.** **Patented June 18, 1878.**

*Fig 2.*




*WITNESSES*

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W. D. Baldwin

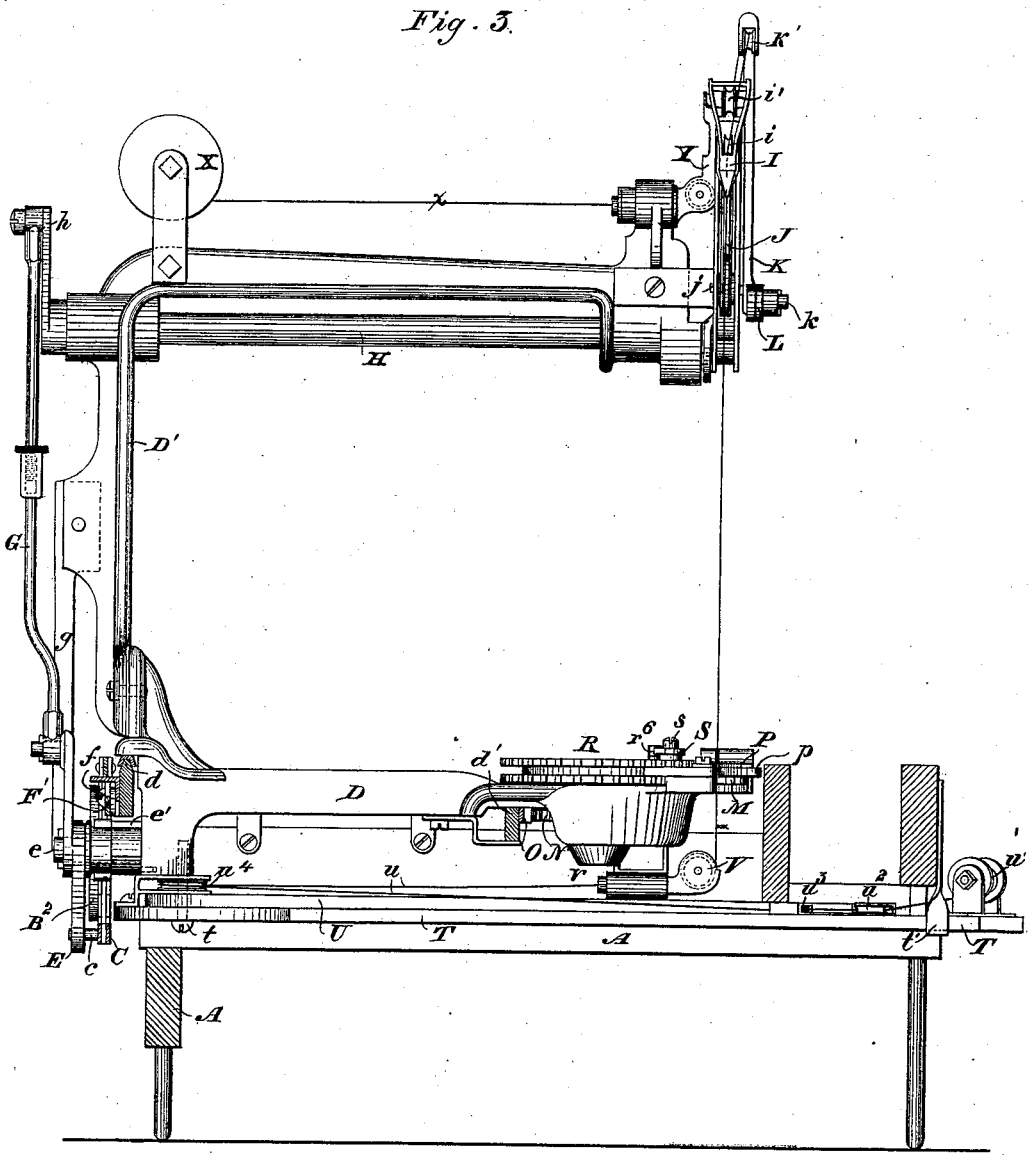
7 Sheets—Sheet 3.

# L. ERPELDING.

## Grain-Binder.

No. 205,067. Patented June 18, 1878.

*Fig. 3.*




WITNESSES

Wm A. Skinkle
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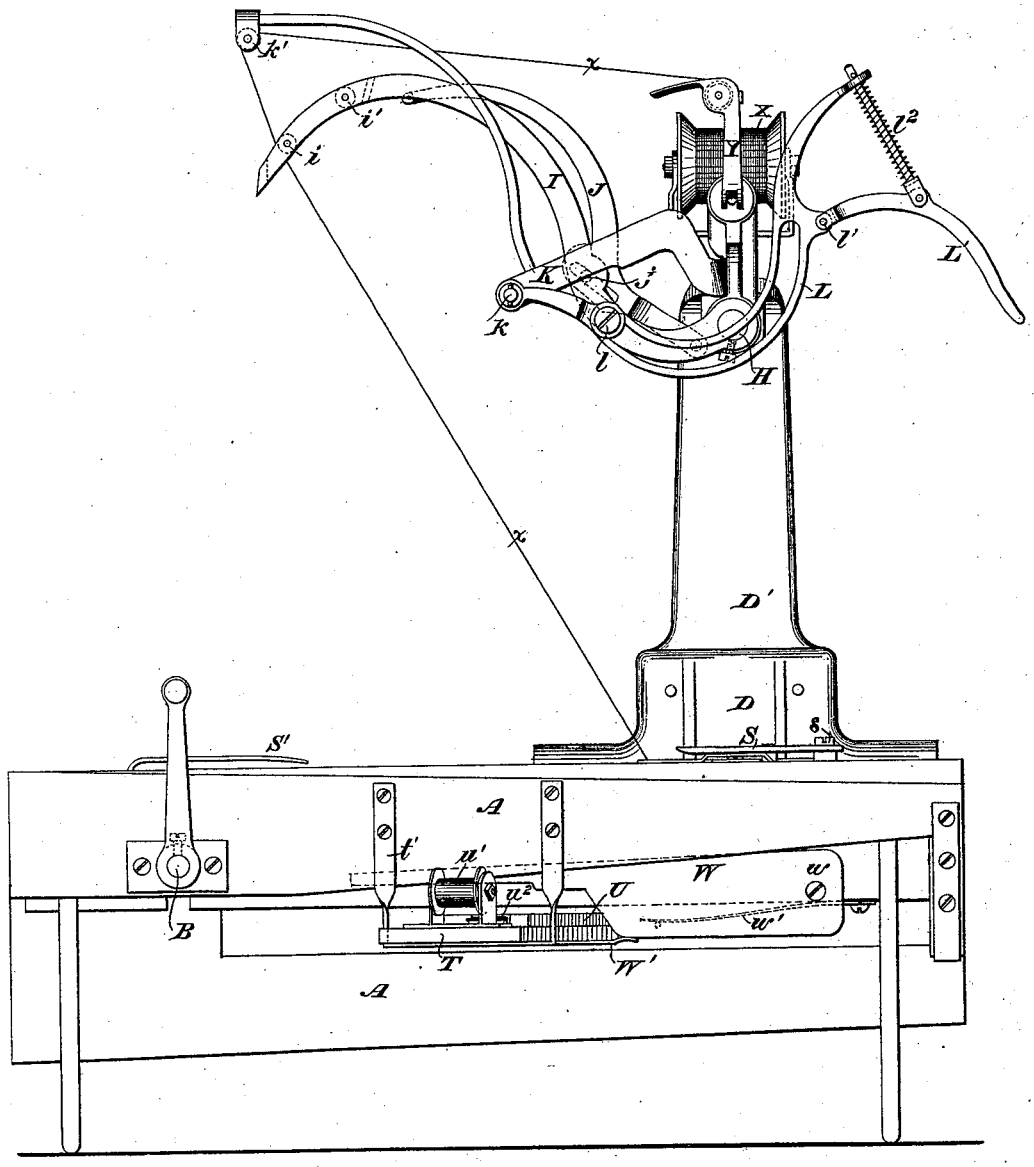
7 Sheets—Sheet 4.

# L. ERPELDING.

## Grain-Binder.

**No. 205,067.** **Patented June 18, 1878.**

*Fig 4*




*WITNESSES.*

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*INVENTOR*

*Lambert Erpelding.*

Wm. Baldwin

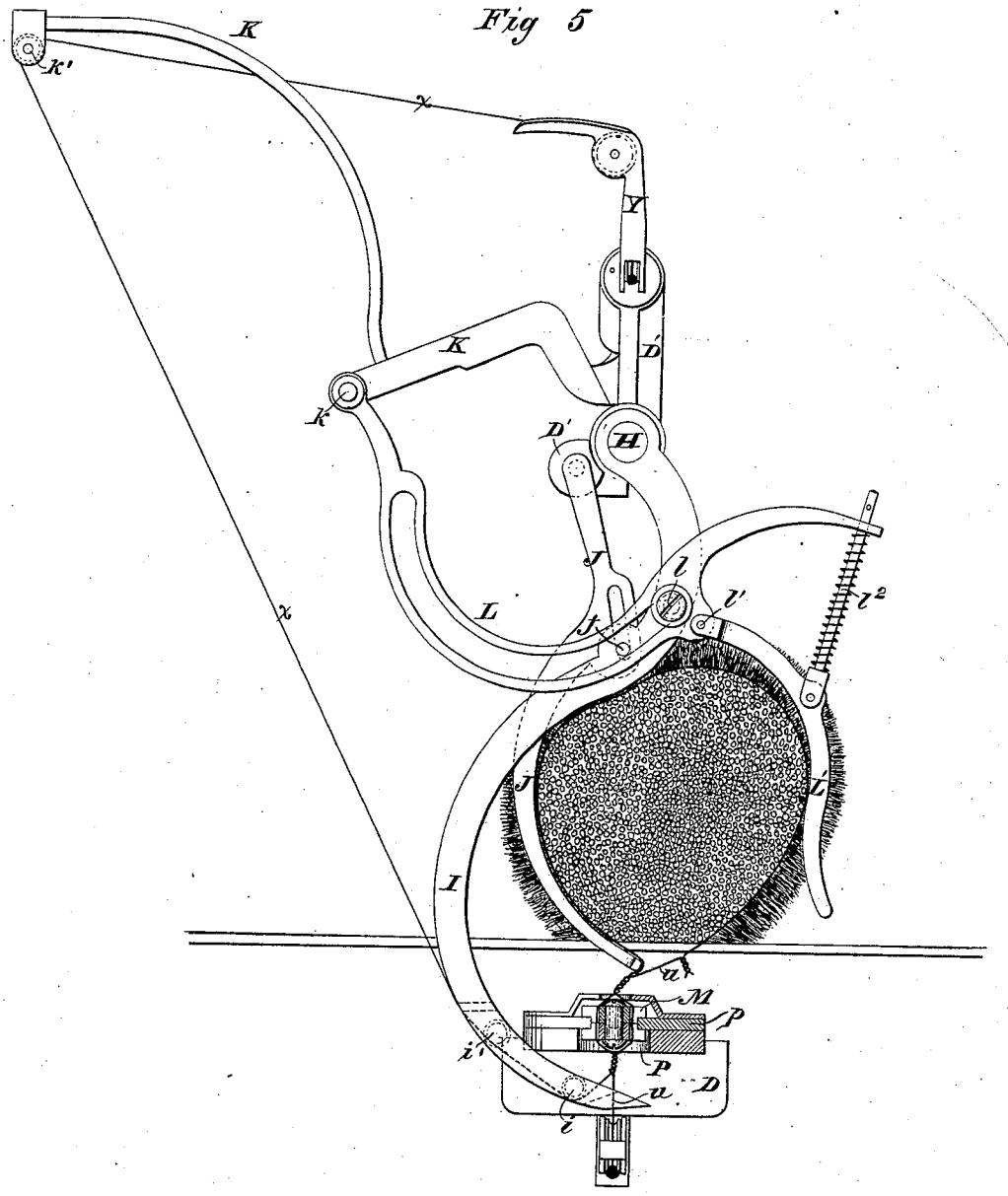
7 Sheets—Sheet 5.

# L. ERPELDING.

## Grain-Binder.

No. 205,067. Patented June 18, 1878.

*Fig 5*




*WITNESSES*

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## Grain-Binder.

**No. 205,067.** **Patented June 18, 1878.**

Fig 6

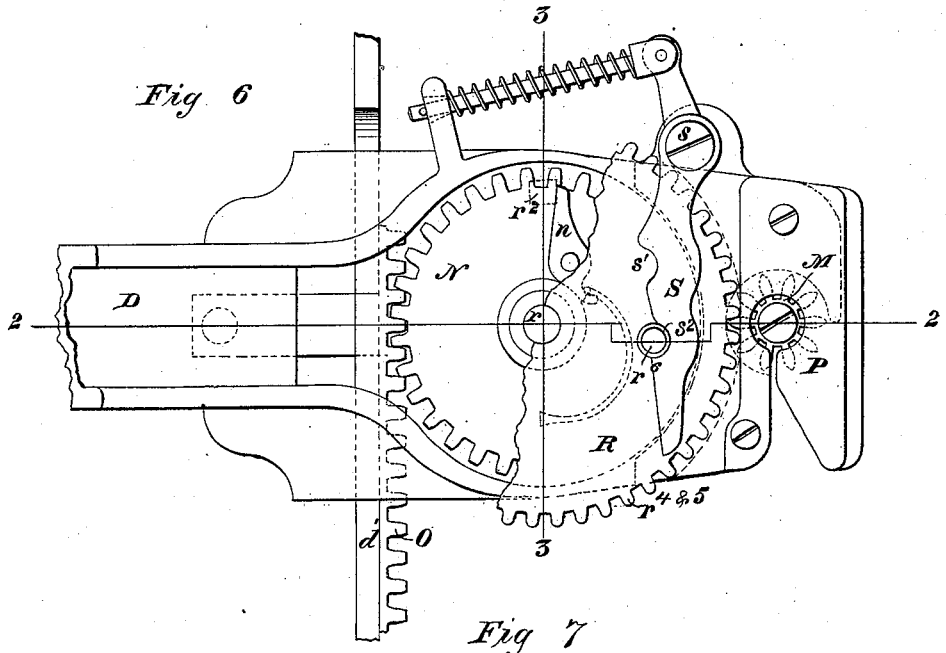



Fig 7

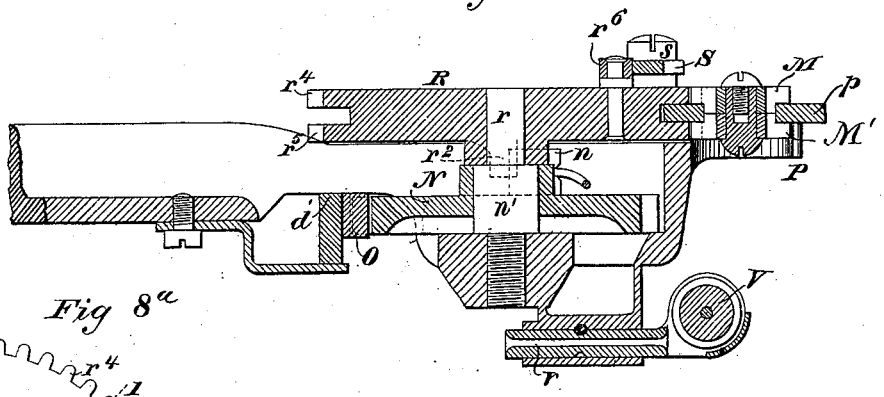



Fig 8ª

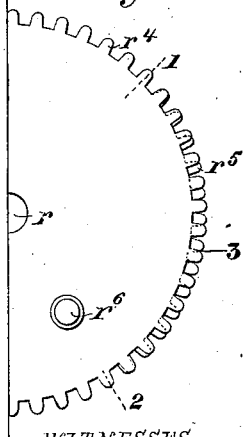
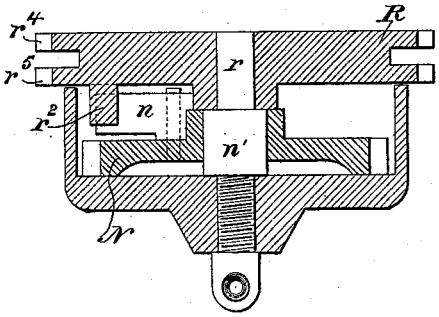



Fig 8




WITNESSES

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## Grain-Binder.

No. 205,067. Patented June 18, 1878.

*Fig 9.*

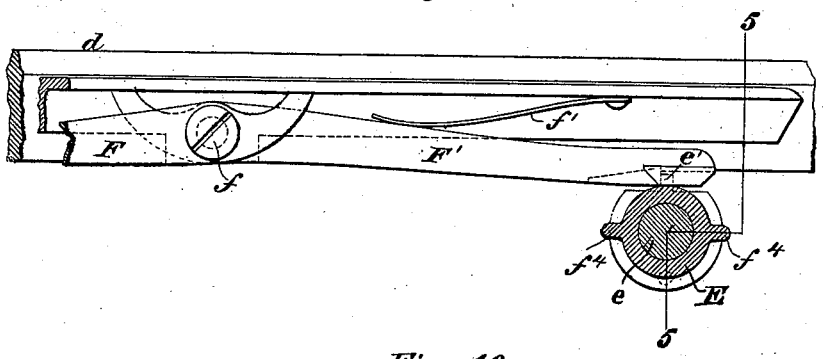



*Fig 10.*

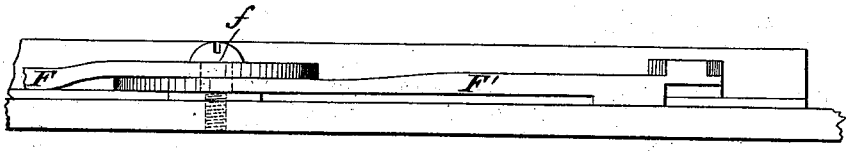



*Fig 11.*

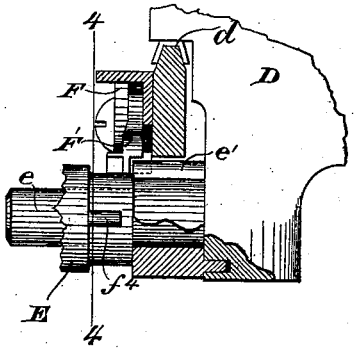



*Fig 12.*

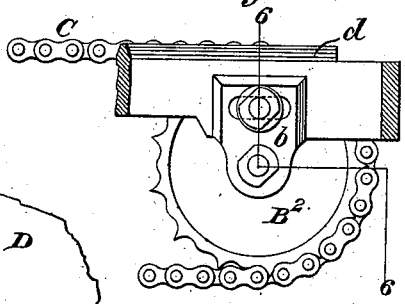



*Fig 13.*

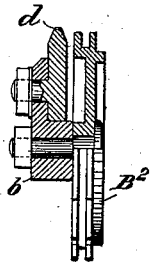



*Fig 14.*

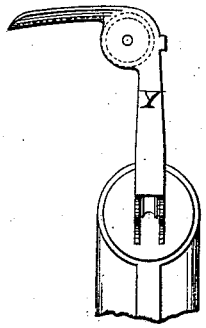
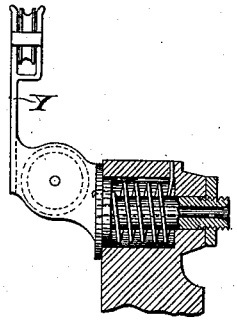



*Fig 15.*




WITNESSES

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# UNITED STATES PATENT OFFICE.

LAMBERT ERPELDING, OF CHICAGO, ILLINOIS, ASSIGNOR TO C. H. AND L. J. McCORMICK, OF SAME PLACE.

## IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **205,067**, dated June 18, 1878; application filed January 27, 1878.

*To all whom it may concern:*

Be it known that I, LAMBERT ERPELDING, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grain-Binders, of which the following is a specification:

My invention more especially relates to that class of binding mechanism having a reciprocating binding-carriage and employing two wires, as in the well-known Withington binder manufactured by C. H. and L. J. McCormick, of Chicago aforesaid.

One form of said Withington binder is shown in Letters Patent No. 174,454, granted to him March 7, 1876.

The nature and objects of my improvements and the subject-matter claimed will hereinafter specifically be designated.

In the accompanying drawings, which represent my improvements as embodied in the best way now known to me, Figure 1 represents a plan or top view of so much of a binder embracing my improvements as is necessary to illustrate the invention herein claimed, the grain-platform being removed and the mechanism shown in the attitude it assumes just after binding a bundle, and when about to move forward to grasp a fresh one. Fig. 2 represents a rear elevation of the same; Fig. 3, an end view thereof, partly in section, on the line 1 1 of Fig. 1. Fig. 4 represents a front view of the apparatus from the side opposite that shown in Fig. 2. Fig. 5 represents a view in elevation of the binding apparatus, showing the parts in the attitude they assume while the wire is being twisted after encompassing the bundle. Fig. 6 represents a plan view of the twisting mechanism, with portions broken away to show the details more clearly. Fig. 7 represents a vertical longitudinal section through said mechanism on the line 2 2 of Fig. 6; Fig. 8, a vertical transverse section therethrough on the line 3 3 of Fig. 6, and Fig. 8ª a plan view of the differential gears which actuate the sectional cutter and twister-pinion. Fig. 9 is a detail view, partly in section, on the line 4 4 of Fig. 11, showing the locking-stop which holds the binding-carriage stationary for a short period at each end of its reciprocating movement. Fig. 10 represents a bottom-plan view of the parts shown in Fig. 9. Fig. 11 represents a vertical transverse section through the line 5 5 of Fig. 9. Fig. 12 shows a detail view, partly in section, of the driving-chain and sprocket-wheel which reciprocates the binding-carriage; Fig. 13, a transverse section therethrough on the line 6 6 of Fig. 12; and Figs. 14 and 15 represent detail views of the take-up tension.

The binding mechanism is, by preference, mounted upon a suitable frame, A, secured upon or removably connected with the frame of a harvester of any usual well-known construction. A shaft, B, driven in usual well-known ways, carries a sprocket-wheel, B′, over which an endless driving-chain, C, travels, as well as over a corresponding wheel, B″, mounted in a bracket, *b*, adjustable by means of a slot and a set-screw, as shown Figs. 2, 12, and 13, to adjust the tension of the chain. A binding-carriage, D, reciprocates upon ways *d d′* on the frame A, being moved backward and forward at suitable intervals by means of a pin, *c*, on the chain C, working in a slotted intermittingly-rotating crank, E, mounted upon a stud-axle, *e*, on the traversing carriage-frame D, in a manner somewhat similar to that shown in the Withington patent above mentioned.

The mechanism thus far described resembles in most particulars that shown in Wm. R. Baker's patent of May 22, 1877, No. 191,096, and is not herein claimed. The traversing carriage D is temporarily locked at each end of its movement, while the binding-arm is being raised or lowered, by means of a lug or spline, *e′*, on a collar fixed on the stud-axle on which the crank-lever E turns, which lug or spline abuts against the ends of spring stops or latches F F′ rocking on a pivot, *f*, (on the frame on which the binding-carriage slides,) and held down by springs $f^1$. These latches point in opposite directions, rock on the same pivot, overlap each other, and have their inner ends curved upward, so as to form stops which limit the descent of the latches. (See Figs. 2, 9, 10, and 11.)

A pitman, G, adjustable in length, (instead of being in one piece, as in the aforesaid pat-

ent of Baker,) is pivoted at one end to one arm of the crank E, while the other end is connected to a crank, *h*, of a shaft, H, rocking in bearings in the standard D′ of the traversing carriage, to the other end of which shaft a wire-carrying arm, I, is fixed, so as to vibrate or oscillate with its shaft.

By making the pitman G adjustable in length, I am enabled to vary the range of movement of the binding-arm without varying the adjustment of the cranks E and *h*.

The intermittently-rotating crank E is provided with three arms, one being slotted for the reception of the driving-pin *c*. Another serves as a crank to control the wire-carrying arm, and a third as a stop to prevent the backward movement of the crank, which crank is preferably made in one piece.

The binding-arm is slotted both vertically and longitudinally, as shown in the drawings, in which slot a supplementary wire-guiding arm or tucker, J, plays, being pivoted intermediate of its ends on a fulcrum, *j*, in said arm I, and at its rear end to the standard D′ of the binding-frame, at a point eccentric to the axis of the shaft on which the binding-arm oscillates, as clearly shown in Figs. 4 and 5, the effect of which is to produce a differential or eccentric movement between the wire-carrying arm and the supplementary arm or tucker, which differential movement is clearly illustrated in Figs. 4 and 5, and the effect of which is to bring the point of the supplementary arm within the slot of the wire-carrying arm when moving forward to encompass a gavel, as shown in Fig. 4, and to bring it to the upper or opposite side of the twister to that occupied by the wire-carrying arm as the wire is being twisted, as seen in Fig. 5.

An arm, K, projecting from the standard D′ of the carriage-frame, carries a pulley, *k′*, through which the upper wire passes.

A curved slotted lever, L, is pivoted at *k* to the arm K above mentioned, while its slot traverses a guide-pin, *l*, on the wire-carrying arm I.

A compressor, L′, is pivoted at $l^1$ on the opposite end of the slotted lever L, to which it is also connected by means of the spring-link $l^2$.

A sectional cutter and twister wheel, M M′, mounted upon the outer end of the lower arm D of the binding-carriage, is driven at proper intervals by means of a gear-wheel, N, revolving on an axle, *n′*, in said arm, and actuated by means of a straight rack, O, fixed upon the frame.

The twister-wheel is also a cutting-wheel, being bisected horizontally and revolving in a suitable casing or guideway, P, and provided with a stationary guide-plate, *p*, as shown in Letters Patent granted to William R. Baker, January 11, 1876, as No. 171,972.

The gear-wheel R, which actuates this twister-wheel, is also formed with an annular slot to embrace this plate *p*, so that its teeth may engage with both sections of the twister-wheel. This wheel R revolves on an axis, *r*, concentric with but independent of that of the actuating-gear N, so that the two may rotate independently when desired.

At suitable intervals the gear R is actuated by the gear N by means of a spring-pawl, *n*, pivoted on the actuating-gear N, which abuts against the stud $r^2$ on the under side of the gear-wheel R. (See Figs. 6, 7, and 8.)

The two parallel sets of teeth $r^4$ $r^5$ of the gear R are arranged symmetrically for about three-quarters of their circumference; but from the point 1 to the point 2 the teeth of one gear slightly overlap those of the other, as shown in Fig. $8^a$, thus producing a differential movement of the sectional twister-cutter M M′ necessary to sever the wire.

By inspection of Fig. $8^a$ it will be noticed that the teeth $r^4$ of the upper section of the gear R gradually overlap those $r^5$ of the lower section from about the point 1 to the point 3, from whence their amount of overlap gradually diminishes to the point 2, the result of which is to cause one section, M, of the cutter M M′ to gain upon the other to sever the wire, and then to restore their normal relation, so as to be ready to receive the wire again.

The gears $r^4$ $r^5$, it will be observed, are fixed relatively to each other, so as always to move at the same speed, while the sections M M′ of the twister gain and lose relatively to each other at intervals.

The gear R is normally locked in position, and thus prevented from actuating the twister, by means of a spring-latch, S, rocking on a pivot, *s*, and provided with notches $s^1$ $s^2$, which alternately interlock with a locking-pin, $r^6$, on the gear R.

At proper intervals a stop, $S^1$, Fig. 1, fixed on the frame A, abuts against a pin, $r^6$, on the gear R, and releases the spring-latch S therefrom, thus causing the gear R to rotate a distance sufficient to impart a half-turn to the twister-wheel, thereby carrying the wire lying in the slot in the twister around to the back of the twister-wheel, so as to be opposite the other wire as it is forced into the twister by the descent of the wire-carrying arm.

The reel which carries the lower wire is mounted on a radius-bar, T, swinging on a pivot, *t*, on a down-hanger of the binding-carriage, and provided with a supplementary swinging lever, U, locking-latch W, and releasing-wiper W′, to feed the wire positively.

These devices are not, however, herein claimed, they being fully described in Baker's patent of May 22, 1877.

It is obvious that other methods of feeding the lower wire might be employed instead of the one herein described.

The upper wire *x* passes from the spool X through the swiveling-spring take-up Y and over the pulley *k′* of the arm K, and around pulleys *i* *i′* in the wire-carrying arm to the twister, where it is united to the lower wire.

The operation of my improved apparatus, generally speaking, is similar to that de-

scribed in the Withington patent above mentioned. The rotation of the driving-shaft imparts a continuous traversing movement in one direction to the driving-chain C, which reciprocates the binding-carriage D through the medium of the slotted crank E. In passing around the pulley $B^2$ this intermittently-rotating crank, through the pitman G, oscillates the rock-shaft H, thus elevating the grain-binding arm and the supplementary arm pivoted thereon, as well as the slotted compressing-arm L, as shown in Figs. 1, 2, 3, and 4, the wire-carrying arm being held in its elevated position by means of the spring *g* acting on one of the arms of the crank E, and the binding-carriage being prevented from moving forward while this elevation of the wire-carrying arm is going on by the spring-latch F above mentioned, which latch is released as the crank E is still further turned by the forward movement of the chain by the lug $f^4$ on the crank, as shown in Figs. 9 and 11. The binding-carriage then moves forward until the driving-pin of the rocking-crank travels around the sprocket-wheel $B^1$, which movement turns down the wire-carrying arm and compressor at the same time the locking-pin $r^6$ on the gear R abuts against stop S′ on the frame, and gives a half-turn to the twister-pinion, as above described. This turning movement of the pinion R takes place independently of the driving-pinion N, as the stud $r^2$ moves away from the spring-locking pawl *n*, which is thus free to yield to permit of this movement.

The sliding carriage is temporarily locked at this end of its traverse by the locking-latch F above described.

The continued rotation of the crank E compresses the gavel and forces the wire into the slot of the twister, the point of the wire-carrying arm passing below the twister-wheel, while the supplementary arm or tucker J passes above it, as shown in Fig. 5.

The carriage then commences its backward movement, the twister and cutter M M′ being actuated through the stationary rack—the gears N and R above described—until near the termination of the backward stroke of the carriage, at which point the wire is severed by the differential movement of the cutters, caused by the overlapping or increased number of the teeth $r^4$ over those $r^5$, and the wire-carrying arm then rises preparatory to the commencement of the next forward movement.

During the backward movement of the carriage the amount of wire desired to be used from the lower spool is fed out positively by means of the swinging levers or radius-bars T U above mentioned.

I claim as of my own invention—

1. The combination, substantially as hereinbefore set forth, of a traversing binding-carriage, an intermittingly-rotating crank, E, mounted thereon, a driving-chain actuating the carriage through the medium of the said crank, locking-latches F F′, a lug or spline, *e′*, on the collar of the crank, (temporarily to hold the carriage at the end of each stroke,) and releasing-lugs $f^4$ on the crank itself.

2. The combination, substantially as hereinbefore set forth, of an oscillating wire-carrying arm and a slotted spring-compressor actuated directly from said arm.

3. The combination, substantially as hereinbefore set forth, of an oscillating wire-carrying arm, a slotted compressor-arm or lever, and a supplementary spring-compressor pivoted upon and actuated by the slotted arm.

4. A reciprocating rotating twister-pinion, in combination with a locking-latch acting on the twister-actuating gear, and a fixed stop, against which the latch abuts to release the twister and give it a half revolution at the end of its forward movement, substantially as hereinbefore set forth.

5. The combination, substantially as hereinbefore set forth, of a rack, a reciprocating binding-carriage, a twister-pinion, and its actuating-gear mounted thereon, a locking-latch acting on a stud of the gear, and a fixed stop, by which the latch is automatically released and the gear revolved as the carriage reaches the end of its forward stroke to give a half-turn to the twister-pinion to carry the wire around said twister.

6. The combination, substantially as hereinbefore set forth, of a sectional twister and cutter (composed of independently-rotating concentric pinions) and an actuating-gear provided with two series of teeth differentially or irregularly arranged upon a portion of its periphery, to cause one cutter-pinion to gain upon the other to sever the wire, and then to resume its normal position again to receive the wire.

In testimony whereof I have hereunto subscribed my name.

LAMBERT ERPELDING.

Witnesses:
JOHN BIRKHOLZ,
JOHN V. A. HASBROOK.