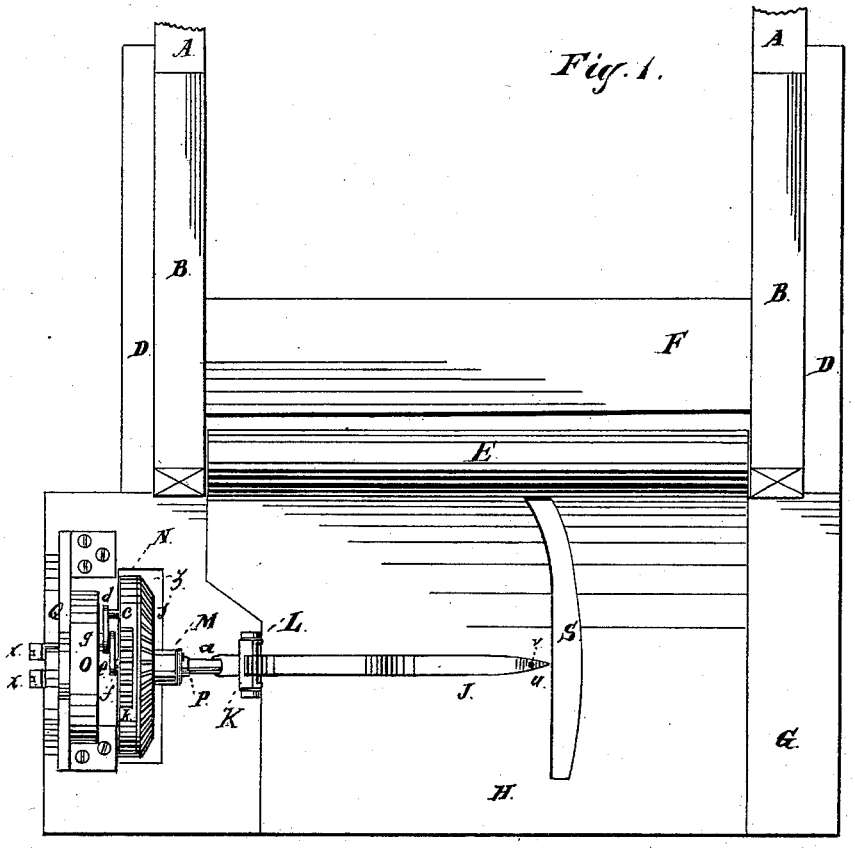
3 Sheets—Sheet 1.

P. F. HODGES.

GRAIN BINDER.

No. 264,160. Patented Sept. 12, 1882.

Fig. 1.



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H. L. Bruns

Pliny F. Hodges
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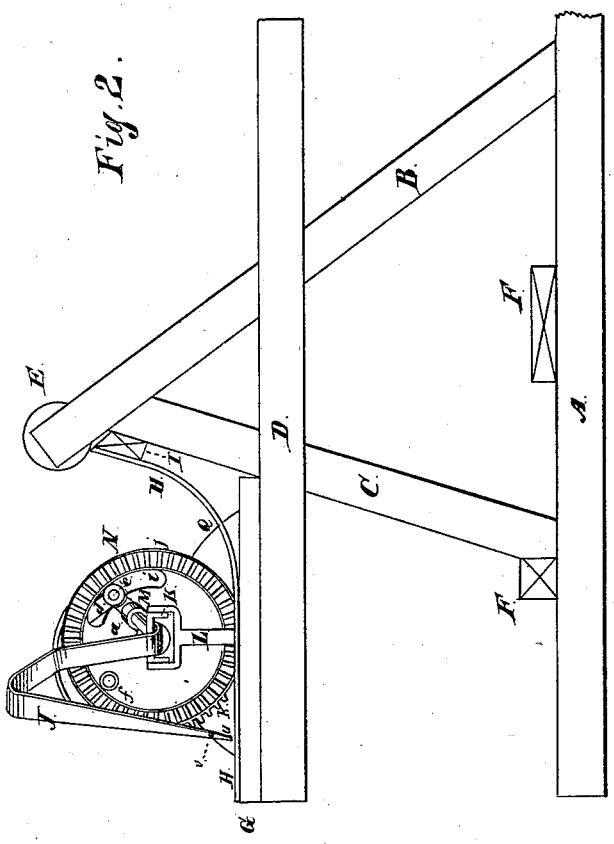
3 Sheets—Sheet 2.

P. F. HODGES.

GRAIN BINDER.

No. 264,160. Patented Sept. 12, 1882.

Fig. 2.



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GRAIN BINDER.

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Fig. 3.

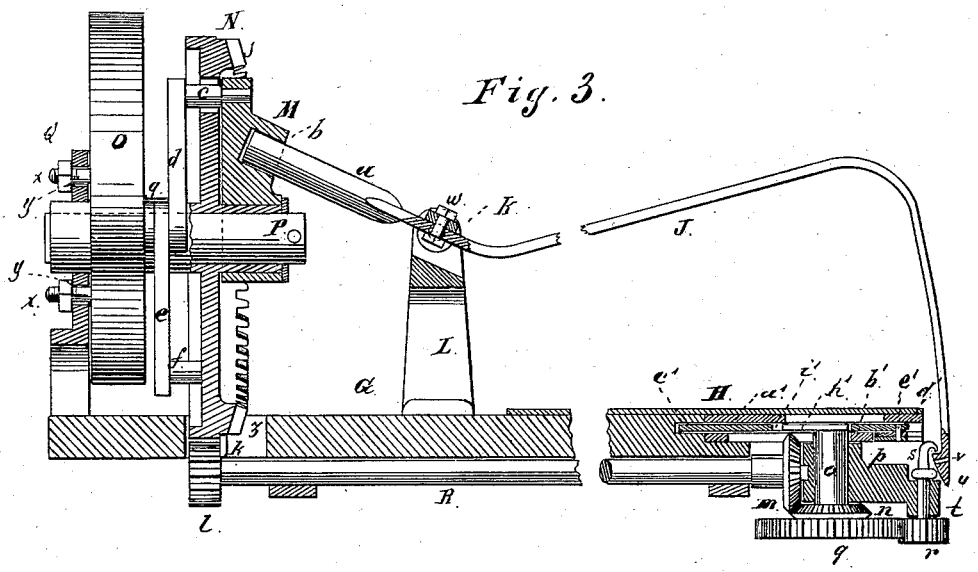


Fig. 4.

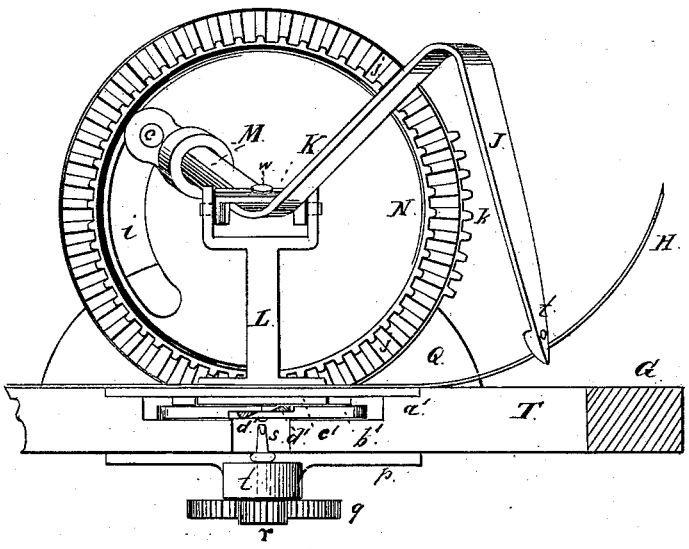


Fig. 5.

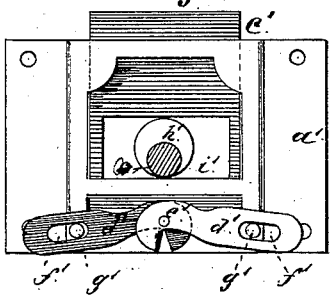
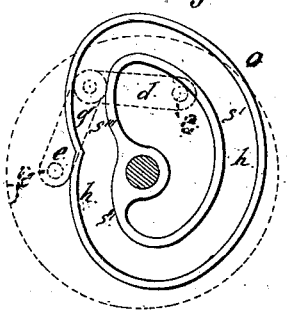


Fig. 6.



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UNITED STATES PATENT OFFICE.

PLINY F. HODGES, OF MASSILLON, OHIO, ASSIGNOR TO ELIJAH H. GAMMON AND WILLIAM DEERING, OF CHICAGO, ILLINOIS.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 264,160, dated September 12, 1882.

Application filed July 20, 1877.

To all whom it may concern:

Be it known that I, PLINY F. HODGES, of Massillon, Stark county, State of Ohio, have invented new and useful Improvements in Grain-Binders, of which the following is a full description, reference being had to the accompanying drawings, consisting of three sheets, in which—

Figure 1 is a top or plan view; Fig. 2, a side elevation; Fig. 3, a longitudinal section, on an enlarged scale, of the binding attachment only; Fig. 4, a cross-section of the same; Fig. 5, a detail showing the cutting device; Fig. 6, a detail of the cam for stopping the movement of the binding-arm.

This invention relates to that class of grain-binders in which the grain is received upon a table or receiver and there automatically bound.

The objects of the invention are to provide efficient devices for stopping the movement of the binding-arm while the twisting devices are in operation, to provide simple means for operating the twisting-hook, and to provide efficient means for operating the cutter.

The grain-binding machine will be fully hereinafter described in detail, and the improvements specifically pointed out in the claims.

In the drawings, A represents the main frame or sills of a harvester; B C, the elevator-frame; D, the cross-pieces of the elevator-frame, on which the driver's platform and seat are mounted, and also on which the binding table or platform is secured; E, the upper elevator-roller; F, the cross-bars of the main frame between which the main or driving wheel (not shown) is located. These parts A, B, C, D, E, and F may be made in any of the well-known forms of harvesters of this class; and the completed machine is to be provided with the ordinary drive-wheel, elevator, grain-wheel, divider, sickle, reel, and gearing for operating the several parts; but as these parts may be of any of the usual forms and construction they are not shown or described.

G is a table or platform secured to the cross-bars D of the elevator-frame, on which the binding-arm and mechanism are supported.

H is a curved metal plate on which the grain falls from the elevator, one edge of which is secured to the outer edge of the platform G, and the other edge is secured beneath the upper elevator-roller.

I is a cross-bar secured to the portion C of the elevator-frame, under the upper roller, to which, as shown, the upper or curved portion of the plate H is secured. This bar and the curved portion of the plate H serve as a guide to direct the flow of the grain, and also prevent the grain from falling through beneath the elevator-roller.

J is the binding or needle arm, supported above the table G in a universal joint, so that it can move up and down and to the right and left, the arc described by its extreme point being that of a circle. This arm is provided with a rear extension, forming a portion thereof, which forms a means for connecting the arm with its operating crank or mechanism.

K is a rock-shaft, to which the binding-arm is pivoted, the pivot and rock-shaft forming a universal joint for the binding-arm, so as to permit of free lateral and vertical movements.

L is a standard or post, secured at its lower end to the table G. Its upper end is forked or provided with ears, between which the rock-shaft K is located, the shaft having its bearings in the ears.

M is a crank for operating the needle-arm, provided with a socket on the outer end, in which the end of the needle-arm extension is received, so that as the crank is carried around the extension will move with it, causing the point of the arm to describe a corresponding circle.

N is the wheel for operating the twisting and binding devices, located on the same shaft with the crank M. This wheel is to be operated from the main or drive wheel of the machine by suitable gear. The crank M is connected with this wheel N, so that when the wheel revolves the binding-arm will be operated by reason of its connection with the crank through the extension.

O is a double-walled cam, formed as shown in Fig. 6, located on the shaft of the wheel N at a little distance back of the wheel.

P is the shaft on which the parts M N O are located. This shaft is supported on the table G, and its location above the table is such as

to bring its center in a line with the center of the rock-shaft K and pivot, so that the fulcrum or turning-point of the needle-arm will be in a direct line with the axis of the driving-wheel N, which is the shaft P, as shown.

Q is a frame or support to which the shaft or axis P is permanently secured, which frame is secured to the rear end of the table G. To this frame the cam O is adjustably secured, so that the position of the cam can be changed to limit the length of stoppage of the binding-arm.

R is the shaft for operating the twisting-hook. It is supported in suitable bearings beneath the table G.

S is a slot or opening in the metal plate H, through which the needle or binding arm passes.

T is an opening in the table G, beneath the opening S, for the passage of the point of the needle.

a is the rearward extension of the binding-arm.

b is the socket in the end of the crank M, into which the end of the extension *a* passes and connects the binding-arm J and crank M together.

c is a pin permanently secured in the extreme outer end of the crank M, and extending through the slot *i* in the wheel N.

d is a link, the outer end of which is secured to the end of the pin *c*, on which it turns.

e is a similar link, the outer end of which is secured to the pin *f* in the back of the wheel N.

f is a pin, one end of which is secured to the wheel N, and to the other end of which the link *e* is secured. The inner ends of these links *d e* are attached to the same pivot.

g is a small wheel located on a shaft, which shaft forms also the pivot for the inner ends of the links *d e*.

h is a passage between the inner and outer walls of the cam O, forming a cam-groove, in which the wheel *g* operates.

i is a slot or opening in the wheel N, through which the pin *c* passes. The links *d e* and pins form a means for operating the crank M and wheel N together, and the form of the cam-groove *h* is such as to permit of the movement of the wheel to a certain extent independent of the crank, which movement is necessary while the binding is being performed, during which operation the binding-arm should be stopped.

j are beveled cogs on the face of the wheel N, with which a beveled-gear wheel, (not shown,) operated from the main wheel, engages, for driving the wheel N, and through it operating the binding mechanism.

k is a cogged segment located on the periphery of the wheel N, and so arranged as to drive the shaft R of the twisting devices, its length being sufficient to revolve the twisting-hook sufficiently to twist the strands of the binding-wire together.

l is a cog-wheel on the end of the shaft R, located beneath the wheel N, with which the cogged segment *k* engages to drive the shaft R.

m is a miter-wheel on the opposite end of the shaft R.

n is another miter-wheel, which engages with the wheel *m*.

o is a short shaft, to the lower end of which the miter-wheel *n* is secured, which shaft is supported in a suitable bearing beneath the table G.

p is a metal frame supporting the twisting-hook and its operating devices, secured by any suitable means to the under side of the table G. The journal-bearing for the shaft *o* is also in this frame *p*.

q is a cogged wheel secured to the end of the shaft *o*, beneath the wheel *n*.

r is a smaller cogged wheel, secured to the shaft of the twisting-hook and engaging with the wheel *q*.

s is the twisting-hook, having its upper end formed so as to grasp the strands of the wire and twist them together.

t is the journal-bearing for the shaft of the twisting-hook, formed on the frame *p*.

u is the extreme lower point of the needle-arm.

v is the opening in the point *u* through which the binding-wire passes.

w is the pivot securing the needle-arm J to the rock-shaft K.

x are the set-screws for holding the cam O in any desired position.

y are slots in the frame Q, to permit the adjusting of the set-screws when the position of the cam is changed. Other devices than the set-screws and slots may be used for this purpose.

z is an opening in the table G, beneath the wheel N, through which the wheel passes to permit the segment *k* to engage the gear-wheel *l* and revolve the shaft R.

a' is a plate secured to the top of the table G; *b'*, a plate secured to the plate *a'*, so as to leave an opening between the two plates.

c' is a reciprocating plate moving in suitable guideways in the opening between the two plates *a' b'*.

d' are two movable cutters, located back of the twisting-hook on the sliding plate *c'*, the opening between the ends of the cutter being in line with the twisting-hook.

e' is the pivot connecting the heads of the cutters together, and also connecting the cutters to the sliding plate *c'*.

f' are slots in the levers or handles of the cutters *d'*.

g' are pins permanently secured to the plate *a'* and projecting up through the slots *f'*, so that when the plate *c'* is moved forward or back the cutters will be closed or opened.

h' is a cam secured to the upper end of the post *o*, and so arranged that when the post or shaft *o* is revolved the cam will operate the sliding plate *c'*.

i' is an opening in the sliding plate *c'*, in which the cam *h'* operates to move the plate.

In place of the two movable cutters *d'* shown, one of them might be secured rigidly to or

form a part of the reciprocating plate c' and perform the office of severing the wire, in the same manner as if two movable cutters were used.

The spool for the binding-wire is to be located above the standard L, or on the frame of the harvester, as desired.

In use the binding-wire passes from the twisting-hook s through the eye v in the point of the needle, and thence to the wire-spool. The grain, as it comes over the upper elevator-roller, will fall upon the shield or receiver H, between the binding-wire and elevator, when the binding-arm J is at its highest point, at which time the crank M will be at its lowest point, or nearly so. As the crank is carried around with the revolution of the wheel N the extreme point of the needle will be carried over toward the elevator, carrying with it the binding-wire; but at the same time that it is carried over by this action of the crank it is also carried down by means of the crank and the rock-shaft K, to which it is pivoted, and this downward movement of the needle will cause its point to enter the flowing grain and separate a gavel therefrom, which gavel at the same time will be partially surrounded by the binding-wire, the binding-arm passing through the slot S in the receiver H, so that the flow of the grain will be checked by coming in contact with the arm, the parts being in the position represented in Fig. 4. As the crank continues its upward movement with the continued rotation of the wheel N the point of the binding-arm will be carried still farther down and outward toward the twisting mechanism, carrying with it the gavel formed between the wire and arm, which movement will continue until the point of the binding-arm is in line with the twisting-hook, at which time the binding-wire has completely encircled the bundle and is in position to have its strands grasped by the twisting-hook, the crank M has reached the highest point in its revolution, and the needle its lowest point of descent, the parts being in the position represented in Fig. 3. As the wheel N continues its forward movement the position of the wheel g in the cam-groove h is such that the link d will turn on the pin c, allowing the link e to move with the wheel N without pushing the link d around with the crank M, so that the wheel N is free to revolve independent of the crank. The stoppage of the crank also stops the movement of the binding-arm, which remains stationary in the position shown in Fig. 3, the point u being just below the twisting-hook s. As the wheel is carried forward the segment k engages with the wheel l on the shaft R and revolves the shaft and the wheel m, which, through the wheels n q r, causes the twisting-hook to revolve, twisting the two strands of wire together and coiling the main wire around the shank of the hook s, at which time the shaft o has revolved far enough to bring the cam h' in contact with the front face of the slot i', forcing the plate c' forward and until the binding-wire is between the blades of the cutter. Then as the plate c' is carried still farther forward the blades are closed by the action of the forward movement and the stationary pins g', severing the wire between the bound bundle and the hook s and leaving the end of the binding-wire coiled around the hook. Then as the cam h' is carried around by the revolution of the shaft o it comes in contact with the rear face of the slot i' and draws the plate c' and the blades d' d' back, ready for the next operation, at which time the segment k is disengaged from the wheel l and no movement will take place in the binding mechanism. The wheel g has now reached a point in the cam-groove h where it will begin to travel again, when the link d will cease to turn on the pin and will be pushed or carried along with the rotation of the wheel, so that as the wheel N is revolved the crank M will also move. Then as the crank is carried down by the movement of the wheel N the extreme point of the needle will be carried outward and upward, carrying the bound bundle away from the twisting mechanism and discharging it from the table G. The crank M continues its descent, carrying up the binding-arm J and bringing the parts into their first position, ready for their next operation; and these movements will continue for each succeeding bundle. During the descent of the needle-arm the movement of the crank M with the wheel N is maintained by reason of the contact of the wheel g with the faces s' and s'' of the cam, the forms of which are such that the wheel g will be pushed or carried around in the groove h by the action of the link e, which is carried around by reason of its connection through the pin f with the wheel N. The position of the links d e at this time is such that the link d must also be pushed ahead, carrying around with it the crank M, and these parts remain in this relative position until the wheel g has reached a point in the cam-groove h where the link e ceases to push forward the link d, but causes it to turn on the pin c, thus stopping the movement of the crank M. This stoppage with the form of cam-groove shown takes place when the wheel g commences its ascent on the face s''' of the cam-groove; but the cam-groove can be formed so that the stoppage will occur at some other point. This stoppage of the crank M also stops the movement of the arm J, and the stoppage will continue as long as the form of the cam permits the link d to swing on its pin c.

As shown, the extension a of the binding-arm is connected to the crank M; but it is evident that it might be connected directly with the face of the wheel N, in which event the crank M could be dispensed with and the binding-arm be operated directly from the wheel N.

By locating the binding-arm in a universal point located in line with the center of the axis of the driving mechanism it will be observed that the travel of the needle-point will be at the same distance from the center of its pivot in every direction, so that its movement will

always be uniform in a true circle, which causes the point of the needle to enter the flowing grain and make a clean separation of the gavel from the grain as it comes over the elevator. The arm thus acts as a separator, and no other devices are required to stop the flow of the grain. It also has a uniform steady motion to carry the gavel outward to the twisting devices in proper shape for binding without the aid of any other carrying devices.

By this construction the several parts of the binder are simplified, and can be arranged in a compact form on the machine with little liability to get out of order.

The cam O can be so arranged that the travel of the wheel in the cam-groove will be reversed, in which case the link *e* will operate to draw the link *d* around with it, instead of pushing it. The operation of the devices will be the same in either case, so far as the stop movement for the binding-arm is concerned.

What I claim as new, and desire to secure by Letters Patent, is—

1. The double-wall cam O, wheel *g*, and links *d e*, in combination with the wheel N, crank M, and binding-arm J, for stopping the movement of the binding-arm while the twisting devices are in operation, substantially as described.

2. The reciprocating plate *c'* and cutters *d'*, pivoted thereto, in combination with the cam *h'*, shaft *o*, miter-wheels *m n*, shaft R, wheel *l*, segment *k*, and wheel N, substantially as and for the purpose specified.

3. The reciprocating plate *c'*, in combination with the cutters *d'* and stationary pins *g'*, whereby the reciprocating movement of the plate will operate the cutters, substantially as specified.

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