2 Sheets—Sheet 1.

D. McPHERSON.

GRAIN-BINDER.

No. 176,800. Patented May 2, 1876.

Fig. 3.

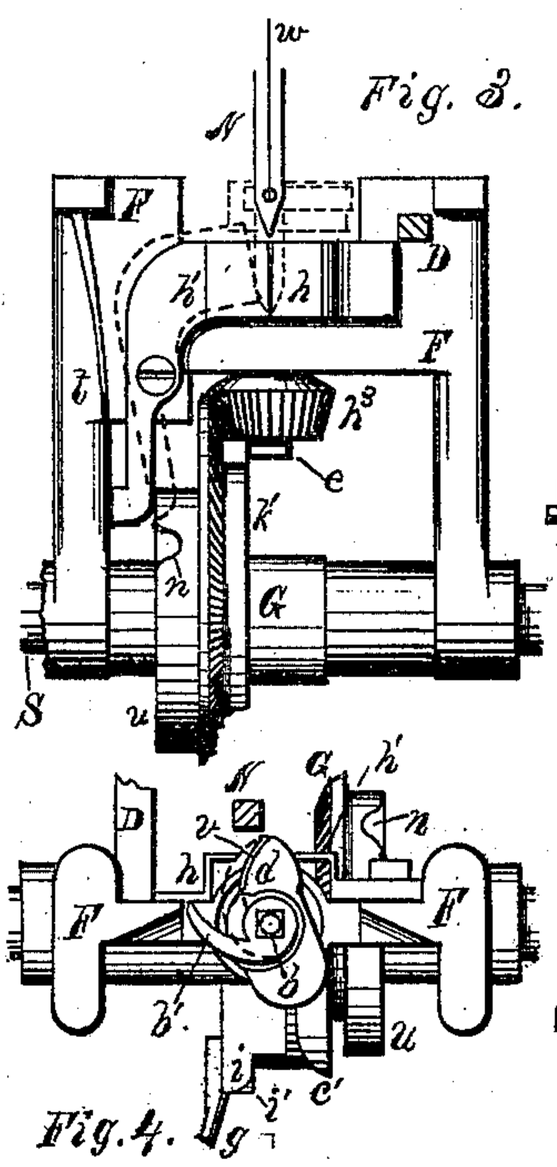

Fig. 4.

Fig. 8.

Fig. 5.

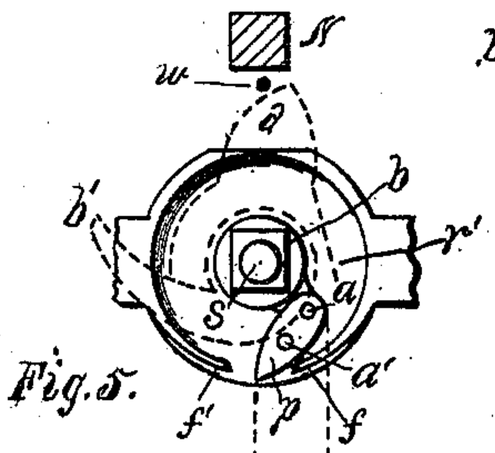

Fig. 6.

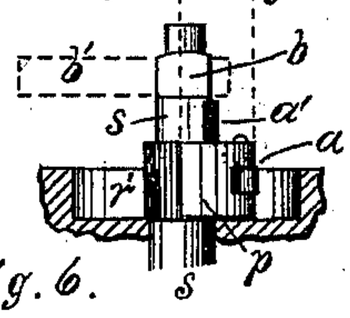

Fig. 7.

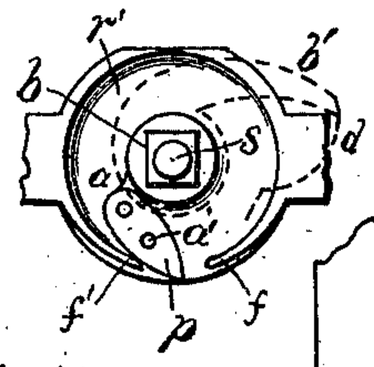

Fig. 9.

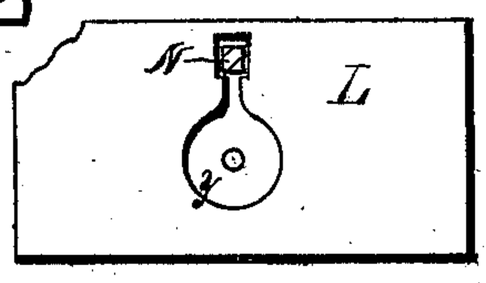

Fig. 1.

Fig. 2.

Witnesses:
E. B. Whitmore
H. A. Clement

Inventor:
D. McPherson
By Wm. C. Loughborough
Atty.

2 Sheets—Sheet 2.

D. McPHERSON.

GRAIN-BINDER.

No. 176,800. Patented May 2, 1876.

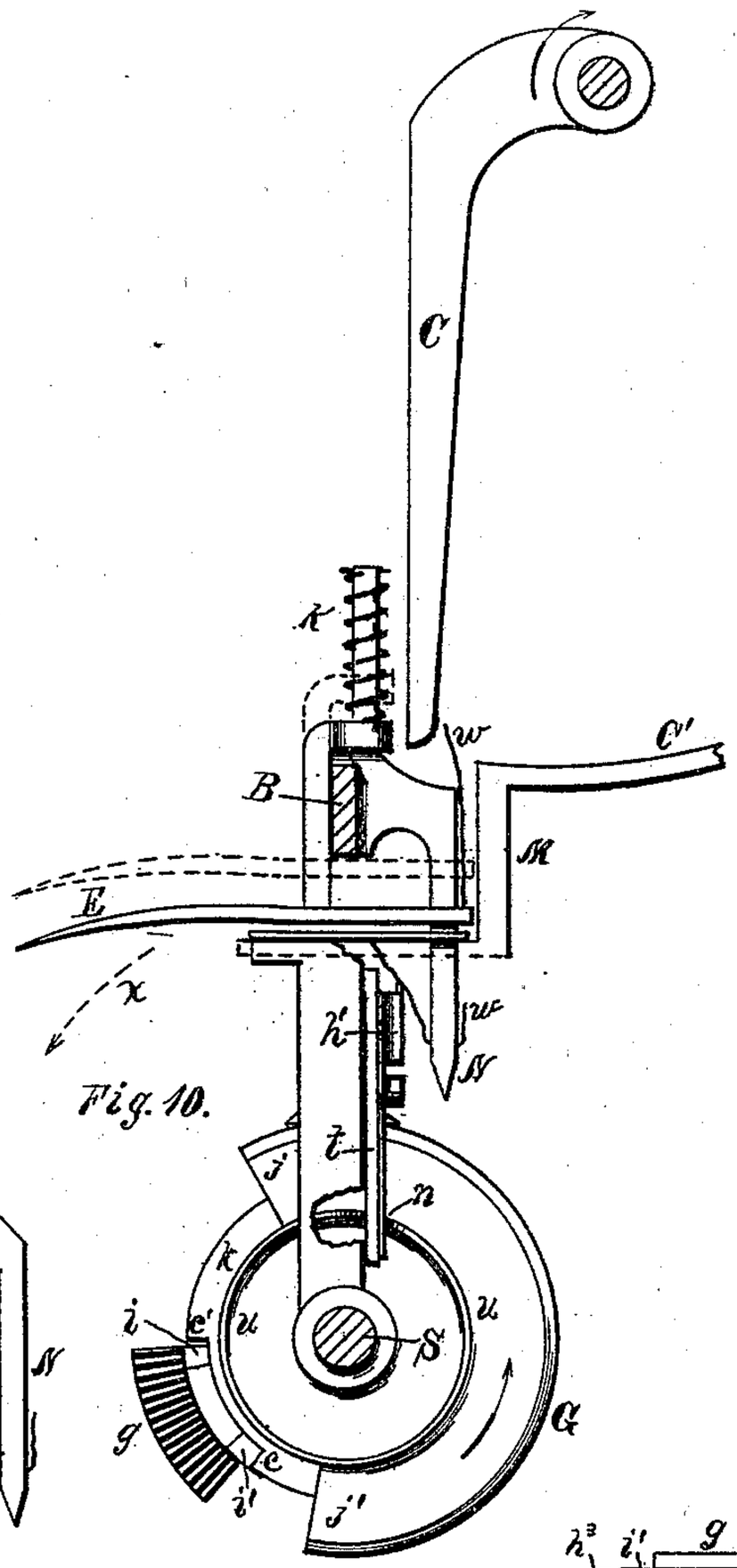

Fig. 10.

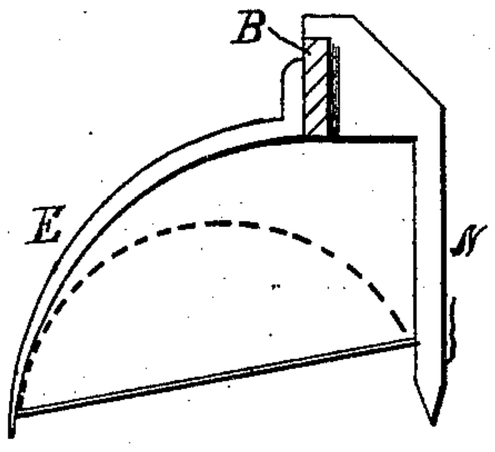

Fig. 13.

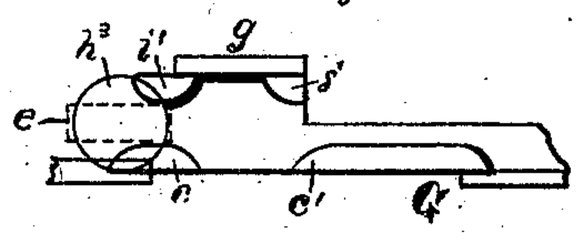

Fig. 12.

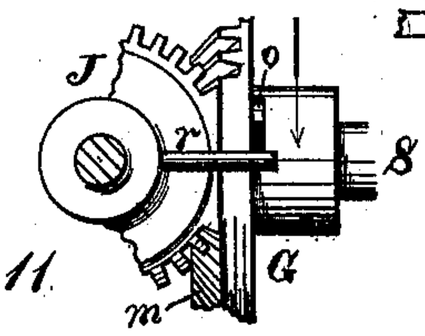

Fig. 11.

Witnesses:
E. B. Whitmore
A. H. Chevrier

Inventor:
D. McPherson
By Wm. S. Loughborough.
Atty

UNITED STATES PATENT OFFICE.

DANIEL McPHERSON, OF CALEDONIA, NEW YORK.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **176,800**, dated May 2, 1876; application filed July 30, 1875.

To all whom it may concern:

Be it known that I, DANIEL McPHERSON, of Caledonia, in the county of Livingston and State of New York, have invented certain new and useful Improvements in Self-Binding Harvesters; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is an elevation of the right-hand end of the harvester, having my improved binder attached. Fig. 2 is a rear elevation of the right-hand portion of the reaper-frame, with the binding-apparatus attached. Fig. 3 is a reverse elevation, enlarged, of the twister-frame and gear from that shown in Fig. 1. Fig. 4 is a top view of the same. Figs. 5 and 7 are top views, enlarged, of the twister-shaft *s*, and pawl *p* hinged thereto, showing the pawl in different positions. Fig. 6 is an elevation of the same. Fig. 8 is an inverted view of the wire-clamping jaw *d*, showing the slot *g'*. Fig. 9 is the top plate L over the twister. Fig. 10 is a front sectional elevation of the gaveler, binder-needle, and twister-wheel. Fig. 11 is a top view of the mutilated gear-wheels for giving the intermittent movement to the gaveler. Fig. 12 is a plan view of the governing lug under the twister-pinion, and the cam-walls for controlling it, represented on a flat serface. Fig. 13 is a modification of the compressor.

The nature of this invention will be better understood by reference to the drawings and specification.

My invention is more especially applicable to that class of harvesters in which the grain is elevated over the carrier-wheel, and the binding apparatus is arranged upon the opposite side of said wheel from the cutter-bar.

The wire-carrier or needle N is attached to the horizontal binder-bar B, which is provided with suitable bearings on the rods H, upon which it is reciprocated vertically by means of the pitmen P and cranks I from the shaft S. This shaft is driven from the main wheel W by bevel-wheels Q. The feet of the twister-frame F rests upon journal-bearings on the shaft S, and the upper portion is secured to the bar or beam T of the frame by the brace-bar D. Between these bearings is keyed upon the shaft the mutilated or compound gear-wheel G. This gear-wheel is constructed as shown in Figs. 1, 3, 4, and 10. About three-eighths of the circle is cut away, as seen in Fig. 10, and a segment of the gear, containing one-half the number of teeth there is in the twister-pinion h^3, is arranged with the teeth to face in the opposite direction, and relatively between the termini of the longer segment, as shown in Fig. 10, and sufficiently offset, as shown in Fig. 4, to gear into opposite sides of the pinion alternately, the gear-wheel G revolving continously in the same direction. This wheel is provided with a rim, *k*, below or within the circle of the teeth, on each segment, and the pinion h^3 has an oblong rectangular lug *e*, Figs. 1, 2, and 12. By means of this lug, when the point *j'* of the segmental gear is leaving the pinion, in passing through between the raised points *c* and *i'*, the teeth of the pinion are forced to register to those of the opposite segment *g*, and after that passes around, the pinion is similarly retained in position by one of the long sides of the lug bearing against the raised face of the track *k*; after said lug passes between the points *i* and *c'*, to register to the end or point *j* of the long segment, when the lug *e* is released from the raised portions of the track *k*, and the pinion permitted to turn.

It will be seen that one revolution of the shaft S gives several revolutions to the twister, one-half of a reverse turn, and then an interval of rest. This latter occurs while the wire-carrier or needle N is completing its downward stroke, which movement places the second end of the wire band across the two sets of jaws. The tongue or plate *b'* closes upon and grasps between it and the head *d* both wires, and cuts them off between the grasp. At about the same instant the lower jaw h^1 is opened to discharge the cutting and grasp the end of the wire before the wire-carrier rises to receive the next gavel.

The twister-head is constructed as shown in Figs. 4 and 8, and is composed of the main wire cutting and clamping jaw *d* and swinging tongue or clamp *b'*, the former being provided with a radial slot, *g'*, in its under face. The clamp *b'* is mortised into the head *d*, and is

provided with a square central opening which is fitted to the square section *b* of the pinion-shaft *s*. Just below the square section *b* the shaft is provided with a projection to which the pawl *p* is hinged at *a*. The pawl is provided with a stud or lug, *a'*, that acts in the groove *g* of the head. The head is fitted to turn loosely upon the shaft, but it is driven by it, in either direction, by the clamp *b'* upon the square section and the pawl *p*. The pawl is fitted to fold in, so as to rotate with the cylindrical recess formed in the top of the twister-frame, shown in Figs. 5, 6, and 7, at *r'*. When the shaft turns backward the clamp *b'* is opened by the point of the pawl striking the spring-point *f*, which causes said head to assume the position shown in Fig. 5. The pivot or lug *a'* standing in the groove or slot *g'* forces the head to the position indicated by the dotted lines; and when the shaft is again driven forward, the clamp *b'* being the driver of the head *d*, the point of the pawl strikes the spring-point *f'*, thus causing the clamp and head to be firmly clamped together, as indicated in Fig. 7, grasping between them and cutting off the two ends of the wire encircling the bundle and constituting the band, and twisting them together. The ends of the wire band reach from the bundle down through the opening *y* in the top plate L, Fig. 9, while the twisting is going on.

The wall of the circular recess *r'* forms nearly a full circle, but is open on the side opposite the wire-carrier, and a short section, formed by a spring on each side of the opening, is made to have its points *f* and *f'* reach slightly within the circle, so as to catch the point of the pawl *p*, when the rotation of the shaft is reversed in either direction.

The gaveler is composed of two or more arms, C, Figs. 1, 2, and 10. They are fixed to the shaft S^1, which is driven by the shaft S through the shaft S^2 and suitable gearing. The gaveler is given an intermittent rotary movement by means of the mutilated gear-wheels G^1 and J. They are constructed as shown in Figs. 1, 2, and 11, the wheel G^1 being an ordinary blank bevel, having teeth formed in only a portion of its circumference, something less than half. The face of the blank portion *m*, it will be seen, is left flush with the edge of the teeth, and the pinion J is shaped on one side to fit upon this surface, as shown in Fig. 10. The pinion J has a lug, *r*, projecting beyond the opposite face of the wheel G^1, which has a lug, *o*, so arranged as to strike the lug *r* and force the pinion to turn and the teeth of the two wheels to register. One revolution is thereby given to the pinion, and also to the gaveler. A similar lug, *o*, may be fixed upon the opposite side of gear G^1 to prevent breakage of the parts if the machine should happen to be moved backward at any time.

At the lower edge of the gaveler-concave C' I provide a binding-shelf or apron, M, sufficiently depressed to permit the beam B to move below the sweep of the revolving gaveler-arms C, and thus allow them to revolve over the bar, directly after which the latter rises again to its upper or open position preparatory to receiving the next gavel from the revolving arms C.

I use a spring compressor, which may be applied to the reciprocating binder-bar B, as shown in Figs. 1, 2, and 10. One or more guards, G^2, for the grain, while being elevated and delivered to the concave receiver C', may be used. One end is fixed to the seat-plank, where the wire-reel R is placed, and the other end is hung loosely to the shaft S^1. There may be ribs attached, vertically, upon the concave C' for the ends of the gaveler-arms to sweep between.

The wire *w* passes from the reel R (shown in dotted lines) through the loops *l*, and the eye in the end of the wire-guide h^2, thence down to and through the eye in the point of the needle N, Fig. 3. The compressor E is permitted to yield more or less, according to the size of the bundles, by means of the spring K.

The ordinary wind-board Q^2 may be applied at the front end of the gaveler-concave.

Instead of the spring-points *f* and *f'* the wall may be made rigid, and a spiral spring, or rubber or other cushion, put into each side of the lug, to which the pawl *p* is hinged, to start it outward as either reverse movement commences.

The operation of my invention, briefly stated, is as follows: The cut grain is delivered from the elevator A into the gaveler-concave C'. When the binder-bar B, to which the wire-carrier or needle is attached, is in its upward position, the wire is stretched from between the lower clamping-jaws *h* and h^1 to the point of said needle or wire-carrier N. The gaveler-arms C' are then revolved, taking in what grain may have been deposited in the concave, and forcing it against the wire. The gavel is thereby carried beyond the vertical line of travel of the wire-carrier N, (reeling off the necessary amount of wire to form the band,) and as it descends the wire is made to encircle the gavel, and that end or portion of the wire is also delivered to the grasp of the head *d* and jaw *b'*, by which they are firmly clamped, cut off, and twisted together. While this is being done, and before the bar B rises, the lower clamping-jaw h^1 opens and discharges the end or cutting just formed, and closing immediately upon the end just presented to its grasp by the last descent of the needle N. The bar B and needle now rise again and deliver the bundle just bound, when the several operations of gaveling, &c., are repeated.

What I claim as my invention is—

1. In combination with the intermittently-rotating gaveler C, vertically-reciprocating arm B, and wire-carrier N, the depressed section M at the edge of the gaveler-concave, whereby the gaveler-arms are permitted to

pass over the bar B in making their rotations, as set forth.

2. In combination with the wire-twister of self-binding harvesters, the compound bevel-wheel G, composed of two segments of teeth, so arranged as to gear into the pinion on opposite sides of the twister-shaft, for the purpose of rotating it alternately in opposite directions, with an interval of rest.

3. In combination with the compound bevel-gear wheel G, constructed substantially as shown, and bevel-pinion *h*, the rectangular lug *o* and bearings *i* and *i'* and *c* and *c'*, for the purpose of insuring the registry of the teeth of the pinion with those of the two segments of the gear-wheel G, when the pinion is passing from one to the other, as the wheel G revolves.

4. In combination with the revolving wire-clamping head *d*, constructed, substantially as shown, with a cutting-edge, *v*, the revolving clamp *b'*, acting conjointly to grasp, cut, and twist together the two ends of the wire forming the band.

5. In combination with the head *d* and clamp *b'*, the former provided with the radial slot or groove *g'*, the governing-pawl *p* and pin *a'*.

6. In combination with the loose head *d* and latch or clamp *b'* fixed to the twister-shaft *s*, the pawl *p* hinged to the latter, and provided with the adjusting-pin *a'*, for the purposes set forth.

7. In combination with the head *d*, clamping-jaw *b'*, and swinging pawl *p*, the circular recess *r'* and spring-points *f* and *f'*, having an opening between them, for the purposes set forth.

8. The combination, with the fixed jaw *h* and pivoted or swinging jaw h^1, the spring *t* and annular track *u*, provided with the cam-notch *n*, for the purposes set forth.

D. McPHERSON.

Witnesses:
WM. S. LOUGHBOROUGH,
E. B. WHITMORE.