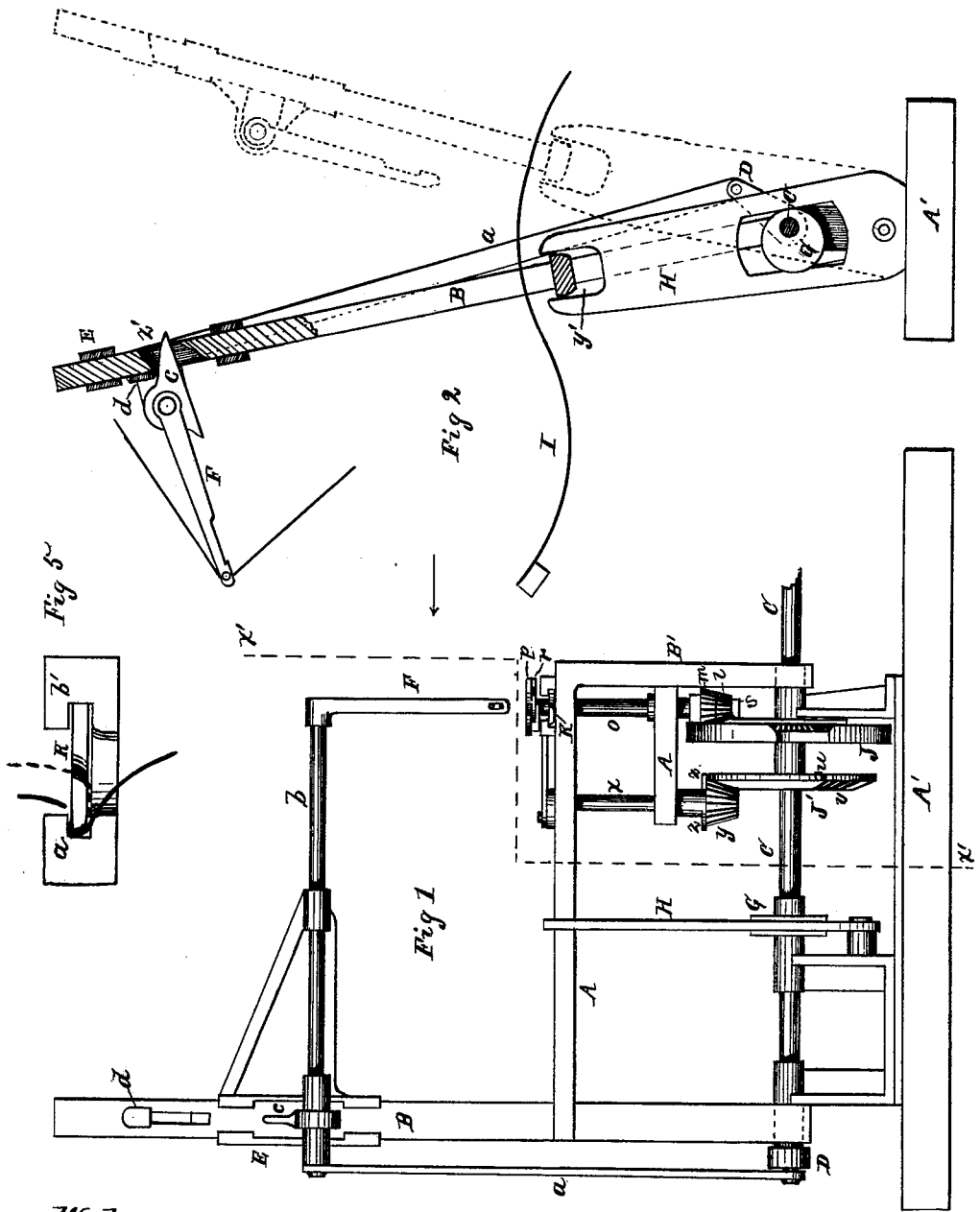
2 Sheets—Sheet 1.

D. McPHERSON.

Grain-Binder.

No. 200,868. **Patented March 5, 1878.**



Witnesses:

F. H. Clement

T. L. Turner

Inventor:

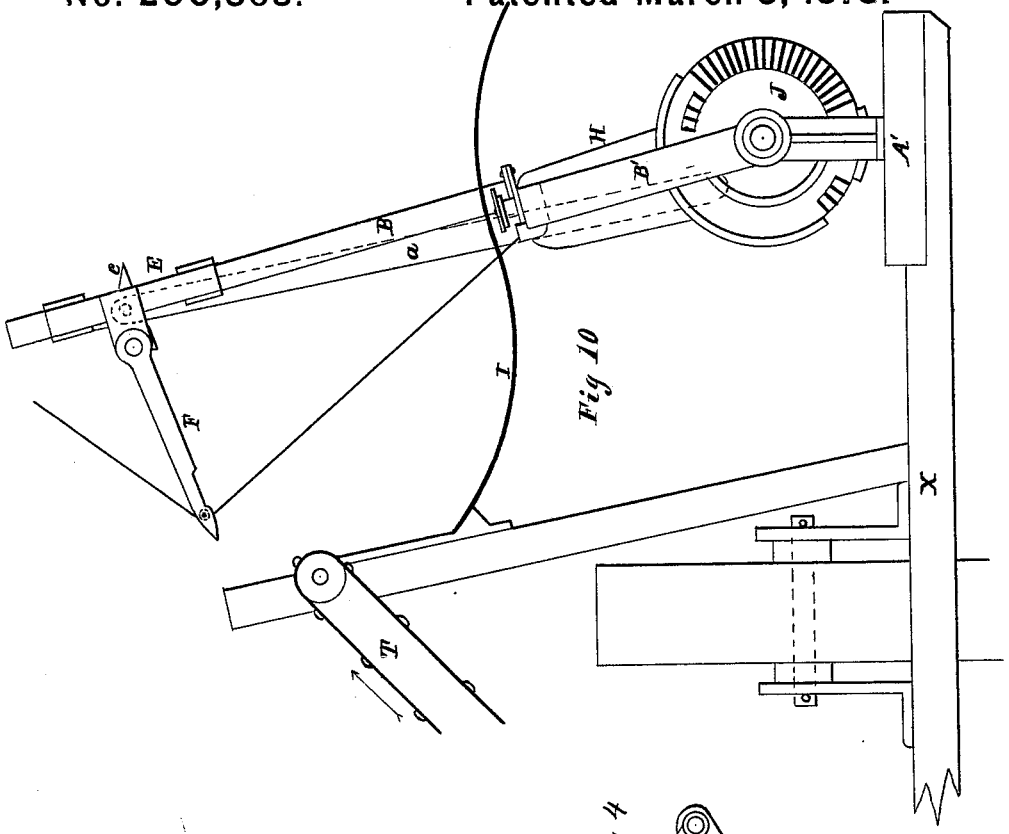
D. McPherson

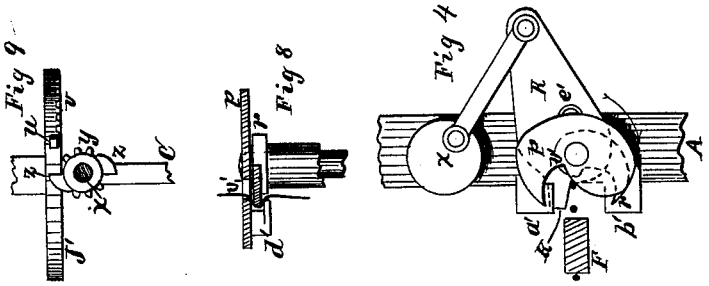
2 Sheets—Sheet 2.

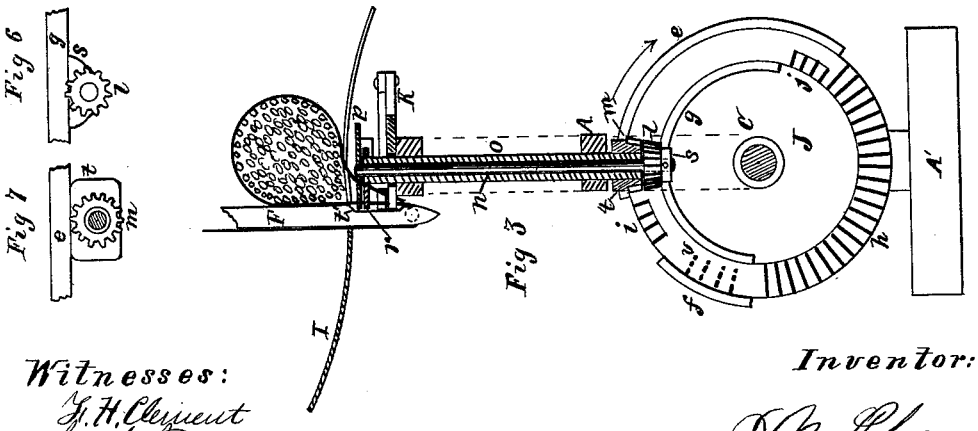
D. McPHERSON.

Grain-Binder.

No. 200,868. Patented March 5, 1878.







Witnesses:
J. H. Clement
T. L. Turner

Inventor:
D. McPherson

UNITED STATES PATENT OFFICE.

DANIEL McPHERSON, OF CALEDONIA, NEW YORK.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **200,868,** dated March 5, 1878; application filed June 25, 1877.

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 Grain-Binders, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification:

My invention relates to that class of automatic grain-binders which use annealed wire for the bands, and it is designed to be applied to a harvester in which the grain is elevated over the driving-wheel and delivered to a receiver or binding-table; and it consists, generally, in improvements upon my patents of May 2, 1876, No. 176,800; October 31, 1876, No. 183,813; and March 6, 1877, No. 188,162.

More specifically it consists in an apparatus for cutting the wire and clamping the end; and in a novel compound movement of the binding-arm, and in devices for operating the parts.

In the drawings, Figure 1 is a side elevation of my invention. Fig. 2 is an end sectional elevation, showing those parts to the left of the dotted line *x'*, Fig. 1. Fig. 3 is a sectional elevation of the twisting and cutting mechanism. Fig. 4 is a plan view of the same. Figs. 5 to 9, inclusive, are details, enlarged. Fig. 10 shows how my binder is attached to a harvester.

A B, Fig. 1, is the frame, which supports most of the parts of my binder, the vertical bars B B' of which are hinged concentrically with the main driving-shaft C, either upon the shaft or upon its boxes. This shaft and boxes are supported upon a base-timber, A', which is attached to the sills of the harvester-frame, as shown in Fig. 10.

At the outer extremity of the shaft C I secure a crank, D, Figs. 1 and 2, which operates, by a pitman, *a*, the slide E. The latter moves freely upon the guide B, which is part of the vibrating frame A B, and is planed true to receive the slide.

F is the binding-arm or needle-bar, which is secured to a rock-shaft, *b*, having bearings on the slide E, and consequently partaking of its vertical movement.

G is an eccentric, fastened to the shaft C, and H is a yoke embracing it, and pivoted at its lower extremity to the base A', or to some fixed part thereof. The upper end of this yoke is connected to the frame A B, in such a manner as to allow it to have a slight vertical and rolling movement thereon, as indicated by the slot *y'*, Fig. 2, and as the shaft C revolves the eccentric imparts a vibration to the frame, as indicated in Fig. 2 by full and dotted lines.

The crank D and eccentric G are so relatively adjusted or "timed" that when the slide E is advancing to the upper extremity of its movement the frame A B is swinging over toward the harvester-elevator T, Fig. 10. Secured to the rock-shaft *b* is a tappet, *c*, the toe of which catches under a projecting lug, *d*, on the bar B, and passes into or through a slot, *z'*, therein as the slide E rises, giving the rock-shaft a partial revolution, and consequently swinging up the binding-arm to the position shown in Fig. 2, ready on its descent to enter the grain in the receiver I near the point of its delivery from the harvester. The tappet *c* is so formed that it bears against the planed face of the bar B when not influenced by the lug *d* and slot *z'*, whereby the rock-shaft *b* is prevented from rolling at any other part of its movement except at the upper, and the binding-arm consequently held rigidly when acting on the grain.

It will be observed that by this construction the extremity of the binding-arm derives a peculiar compound movement, similar to that of the human arm, in encircling a gavel of grain for the purpose of binding.

The twisting and wire-cutting devices are located on the vibrating frame A B, in line with the vertical movement of the binding-arm, Fig. 1, and are actuated by mutilated gears J J' on the shaft C.

The gear J operates two pinions, *l* and *m*, Figs. 1, 3, 6, and 7, *l* being fast to the small vertical shaft *n*, Fig. 3, and *m* to the tubular shaft *o*, concentric with *n*, as indicated. To the other extremities of *n* and *o* are secured, respectively, the plate *p* and hook *r*, the shape and relative position of which, when at rest, are shown in Fig. 4. The plate *p* has a notch, *v'*, and the hook *r* is so formed that when it

revolves it gathers the wire into said notch. A lip, d', Fig. 8, is secured to the lower side of p, between which and the latter the hook r enters a short distance. The wire is thus "kinked" and clamped tightly, as shown.

Pinions l and m are moved as one pinion by that complete portion of the gear J marked h in Fig. 3, and consequently the hook r and plate p revolve together. The segment i moves only the shaft o and hook, while segment j only moves the plate p and its shaft. The pinions are held in a stationary or locked position by means of flanges f g e formed upon the gear J, inside and outside of the teeth, which flanges are turned true and bear against projecting hubs s t, which are correspondingly flatted, as shown in Figs. 6 and 7, s, upon one side only, and t upon two opposite sides.

K, Figs. 1, 3, 4, and 5, is the wire-cutter and clamp, located directly under the twister-hook r, and arranged to oscillate between two fixed jaws, a' b'. These latter are recessed, as shown in Fig. 5, and the cutter K, which cuts upon either edge, swings a short distance into the recesses, the under edges of the jaws and the upper edges of the knife forming shears, which operate in either direction. An arm of the cutter K extends back of the twister, and preferably around the shaft o, and is given a single reciprocation upon the pivot e' at each revolution of the shaft C by means of the vertical crank-shaft x, pinion y, and segmental gear J', which is secured to the shaft C or to the back of the gear J. The teeth of the pinion y are cut away upon opposite sides, as shown in Fig. 9, and starting pins or lugs z project from its hub just above the periphery of J', the pin u upon the latter coming in contact with them at the proper time to bring the teeth of each segment of the pinion into mesh with the segment v on the gear alternately.

The lower edges of the cutter K are rounded, together with the contiguous edges of the jaws a' b', as indicated in Fig. 5; and it will be seen that, as the wire is caught in the shear, that portion above the cutter will be severed, while the other portion will be pinched between the rounded corners or edges of the cutter and jaw, and securely held there.

The operation of my invention is as follows: Wire from a spool suitably supported is passed through the eye of the binding-arm, as shown in Fig. 2, and the latter is then made to descend by revolving shaft C, passing through, in the lower portion of its movement, a slot in the receiver I, and bringing the projecting end of the wire between the jaws a' b'. By the completion of the revolution of C the cutter K is thrown over to the opposite extremity of its movement by means of the segment v, thereby cutting off the waste bit of wire and clamping the end. The machine is now ready for binding. As the motion of C continues the binding-arm ascends, and in again descending passes around the gavel of grain lying in the receiver I, compressing it against the loop of wire, and bringing the latter, now double, down to the position shown in Figs. 3 and 4, between the cutting-jaws a' b', and into the notch v' in the plate p. At this juncture the segment i on the gear J gives the hook r half a revolution, catching the doubled wire and clamping it in the notch v', as indicated in Fig. 8. The cutter K now makes its movement, the segment v on J' being timed between the portions i and h on J, as indicated by dotted lines in Fig. 3. This releases the clamped end of the wire, cuts the doubled wire, and again clamps the end projecting from the binding-arm. Segment h now twists the ends of the band, they being securely held by the jaws p r d', at the close of which the segment j gives plate p half a turn, hook r being held by the flange e, thus opening the twister and allowing the bundle to drop off the binding-table. The parts are then in a position ready for the next gavel.

It will be observed that the oscillation of the frame A B does not affect the operation of the gearing upon the shaft C, such vibration being concentric therewith.

To insure the catching of the wires by the hook r, it will be found advantageous to provide a notch, t', Fig. 3, in the binding-arm, through which the point of the hook passes, picking up the wire which lies against the face of the binding-arm, as shown.

The cutter K need not be made with two cutting-edges; but I prefer that construction.

By giving the crank-shaft x an entire revolution the cutter will make a double reciprocation, and perform the cutting and clamping operations upon one side only, in connection with a single jaw, a'.

It may be found advisable to use a cam in place of the crank D, so as to give the binder-arm a rest at the upper or lower extremities of its stroke, or both. By this means the frame A may swing over before the binder-arm begins to descend, and when the latter is clear down a short interval of rest gives the twister time to operate.

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

1. In combination with the concentric twister-plate p and hook r, and the pinions l and m, the mutilated gear J, the latter having a continuous rotary motion, and formed substantially as shown and described, for the purpose of imparting to said twister-plate and hook unlike intermittent rotations, always in the same direction, as and for the purposes set forth.

2. In combination with the cutter K, the segmental gear J', crank-shaft x, and connected parts, arranged to operate substantially as set forth.

3. The binding-arm F, having a vertical

movement upon a guide, B, a lateral movement with its supporting-frame, and an up-upward swing by means of the rock-shaft *b* and necessary attachments, for the purposes set forth.

4. The combination of a binder-arm, F, mutilated gears J J′, concentrically-revolving twisting apparatus *p r*, and clamping wire-cutter K, substantially as and for the purposes set forth.

D. McPHERSON.

Witnesses:
WM. A. MONTGOMERY,
F. H. CLEMENT.