4 Sheets—Sheet 1.

D. McPHERSON.

GRAIN-BINDER.

No. 183,813. Patented Oct. 31, 1876.

Fig. 1.

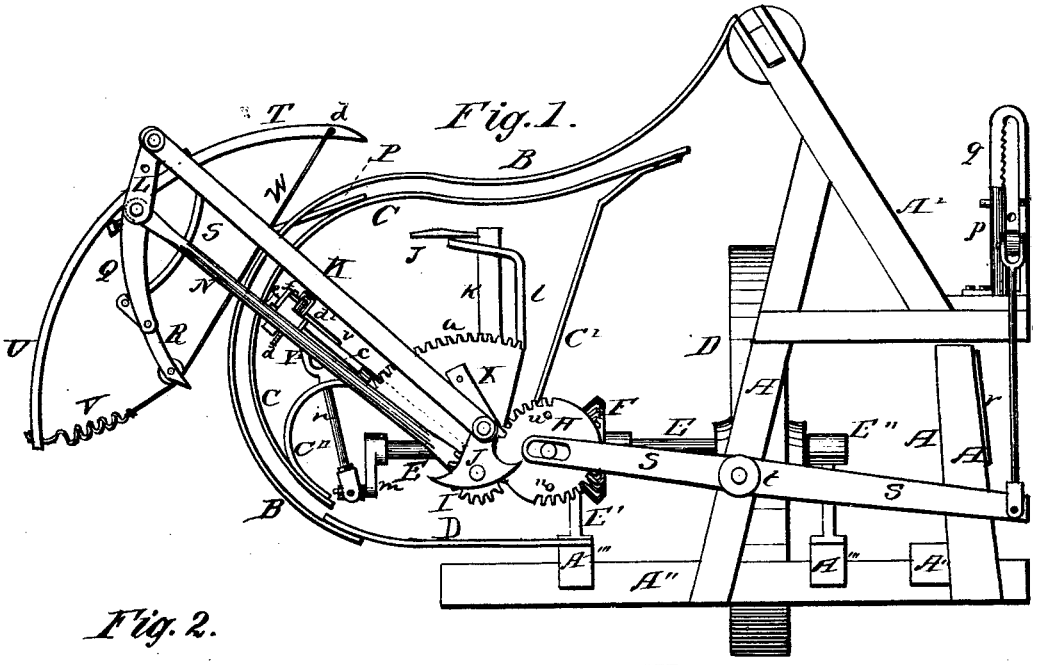
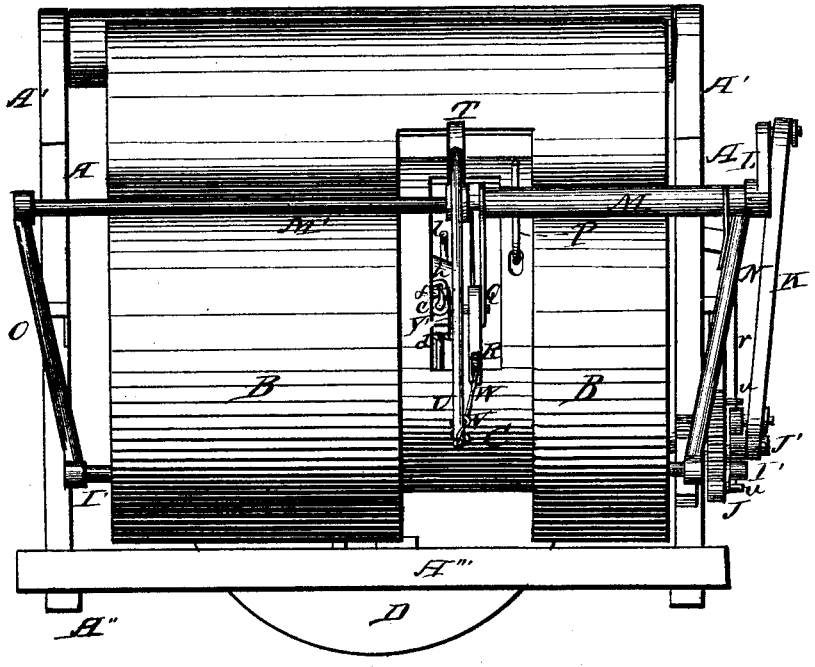


Fig. 2.



Witnesses:
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C. J. Bond

Inventor:
Daniel McPherson
Per: Hill & Bond Attorneys.

4 Sheets—Sheet 2.

D. McPHERSON.

GRAIN-BINDER.

No. 183,813. Patented Oct. 31, 1876.

Fig. 3.

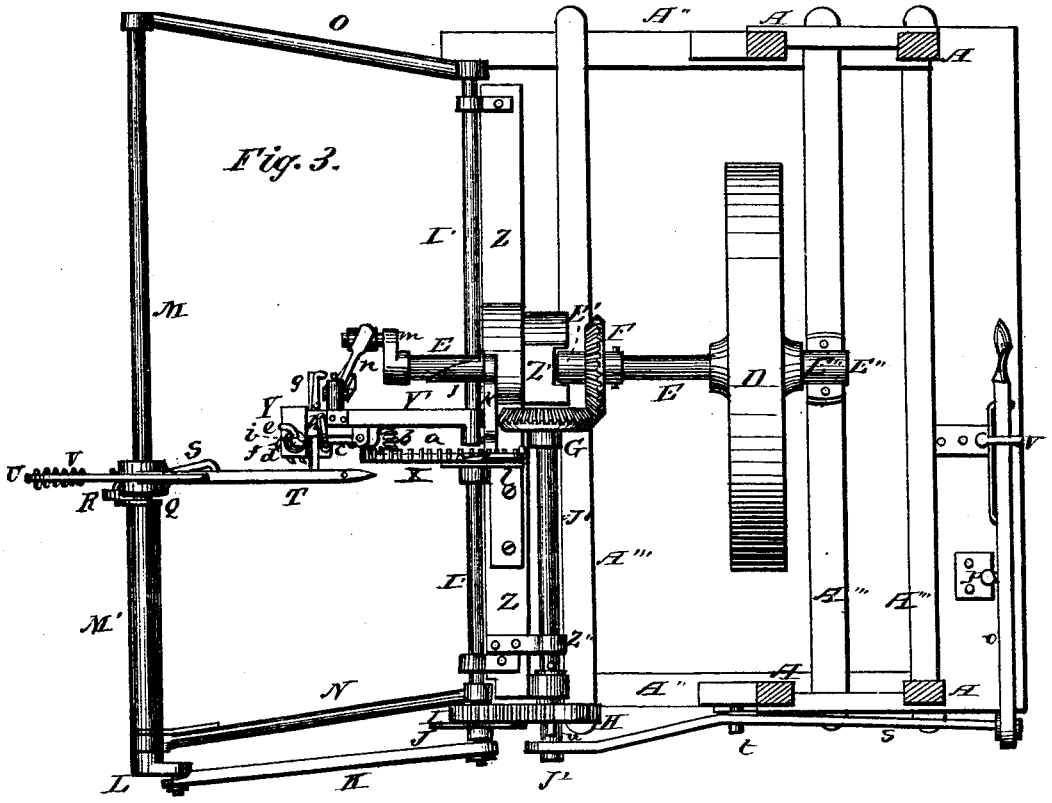


Fig. 4.

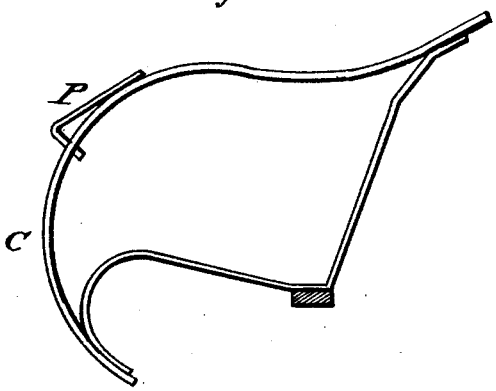
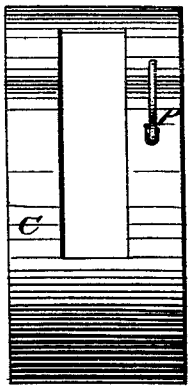


Fig. 5.



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4 Sheets—Sheet 3.

D. McPHERSON.

GRAIN-BINDER.

No. 183,813. Patented Oct. 31, 1876.

Fig. 6.

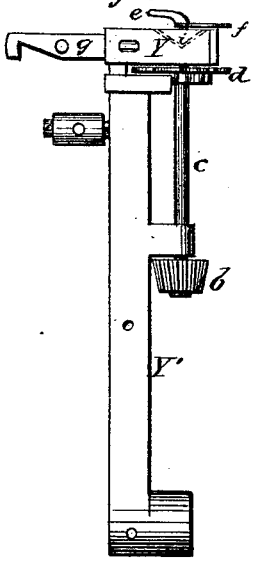


Fig. 7.

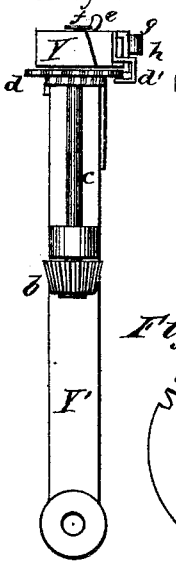


Fig. 8.

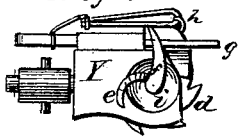


Fig. 9.

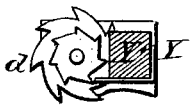


Fig. 10.

Fig. 11.

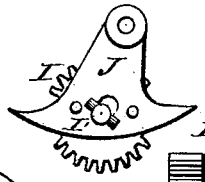


Fig. 12.

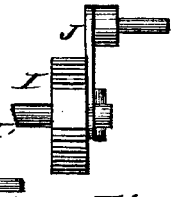


Fig. 13.

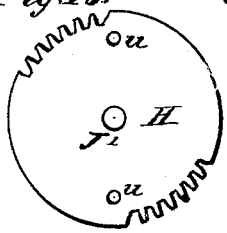


Fig. 14.

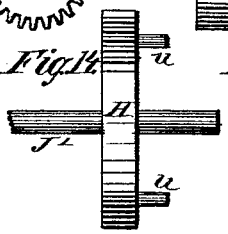
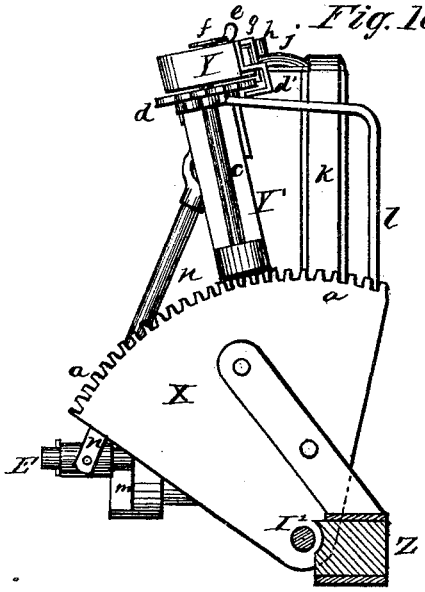


Fig. 15.

Fig. 16.



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4 Sheets—Sheet 4.

D. McPHERSON.

GRAIN-BINDER.

No. 183,813. Patented Oct. 31, 1876.

Fig. 17.

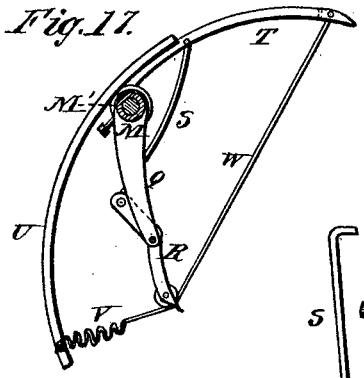


Fig. 18.

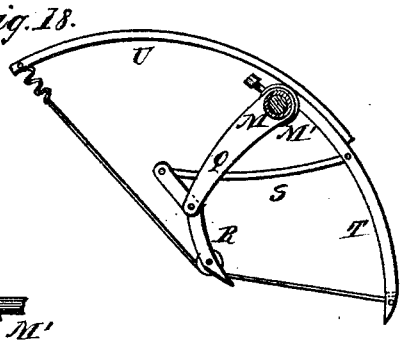


Fig. 19.

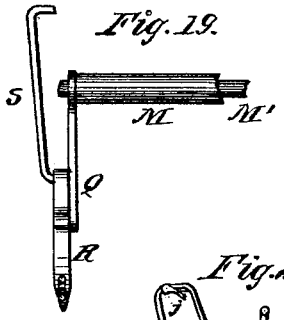


Fig. 20.

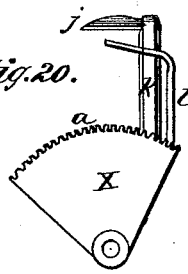


Fig. 21.

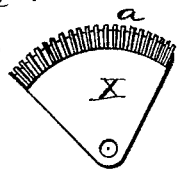


Fig. 22.

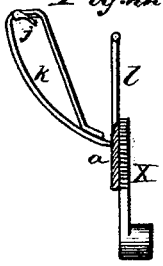


Fig. 23.

Fig. 24.

Fig. 25.

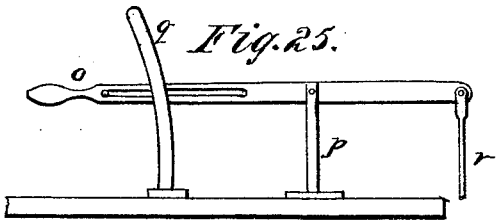
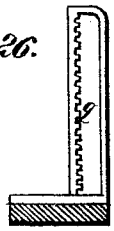


Fig. 26.



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UNITED STATES PATENT OFFICE.

DANIEL McPHERSON, OF CALEDONIA, NEW YORK.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **183,813**, dated October 31, 1876; application filed February 3, 1876.

To all whom it may concern:

Be it known that I, DANIEL McPHERSON, of Caledonia, Livingston county, State of New York, have invented new and useful Improvements in Binders for Harvesters, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation; Fig. 2, a side elevation; Fig. 3, a plan view with the receivers removed; Figs. 4 and 5, details of the secondary receiver; Figs. 6, 7, 8, 9, and 10, details of the twisting and holding devices; Figs. 11, 12, 13, 14, and 15, details of the devices for operating the needle-frame; Fig. 16, a detached view of the sector, with the twisting devices in their forward position; Figs. 17, 18, and 19, details of the compressing devices; Figs. 20 and 21, back and face views of the sector; Figs. 22, 23, and 24, details of the devices attached to the sector; Figs. 25 and 26, details of the adjusting-lever.

The object of this invention is to simplify and improve the construction and operation of automatic or self-binding attachments to harvesters, and it is more particularly adapted to the use of wire for bands; but many of its parts may be usefully employed in the construction of cord-binders.

Its nature consists of the parts and combination of parts hereinafter set forth and claimed as new.

In the drawings, A A^1 A^2 A^3 represent the frame-work; B, the fixed or main receiver; C, the adjustable or secondary receiver; C^1 C^2, the supports of the secondary receiver; D, the driving or main wheel; E, the main shaft or axle; F G, the miter-wheels; H I, the spur-wheels, the peculiar construction of which is hereinafter more fully described; I′, the shaft of the spur-wheel I; J, the plate provided with spurs for forcing the wheel I into gear with the wheel H; K, the pitman; L, the crank on the shaft M′; M, the collar or tube on the same shaft; M′, the shaft of the needle or arm; N O, the swinging supports for the shaft M′; P, the spring-bar on the secondary receiver C; Q, the arm or bracket at the inner end of the collar M; R, the bar pivoted to the lower end of said bracket; S, the rod connecting the upper end of the bar R with the arm or needle; T, the arm or needle; U, the rearward extension of the needle T; V, the spring attached to the extension U; W, the cord permanently attached to the spring V at one end, and to the needle T at the other; X, the sector-wheel; Y, the head containing the twisting and holding devices; Y′, the supporting-post of the head Y; Z, the cross-bar, supported on the axle E, to which the binding devices are attached, and upon which they are supported, so that in tilting they may all move together and operate properly in whatever position they may be placed; J′, the shaft of the wheels G H; Z^1 Z^2, the journal-bearings of the shaft J′; *a*, the teeth on the sector-wheel X; *b*, the pinion for operating the twisting, holding, and cutting mechanism; *c*, the shaft of the pinion *b*; *d*, the wheel on the shaft *c*, provided with undercut teeth or projections for holding the wire; *d′*, the shoulder or loop, against which the wire is held after it is cut; *e*, the twister; *f*, the cutter; *g*, the sliding bar, for holding the wire up to the cutter *f* and releasing it when it is being drawn out; *h*, the spring for returning the bar *g*; *i*, the concave opening in the twister-head Y, in which the wire is twisted; *j*, the incline for drawing out the bar *g*; *k*, the post upon which the incline *j* is supported; *l*, the arm for moving the wheel *d* one step; *m*, the crank on the end of the axle E; *n*, the pitman for advancing and receding the twister and cutter-head Y; *o*, the lever for adjusting the position of the binding devices; *p*, the supporting-post, to which the lever *o* is pivoted; *q*, the guide-post, provided with notches or catches for retaining the lever *o* in the position in which it may be placed; *r*, the link or bar for connecting the lever *o* with the cross-lever *s*; *s*, the cross-lever; *t*, the pivot of the cross-lever *s*; *u*, the pins on the wheel H; *v*, the blank sections of the wheel H; *w*, the openings or breaks in the pinion I.

The frame-work is made in any suitable manner to be applied to a harvesting-machine which is provided with a grain carrier and elevator, which may be of any of the forms now in use, and are not, therefore, shown or described. The part of the frame shown at A^1 may be used as a part of an elevator-frame

if desired. The main wheel D may be supported upon brackets E^1 E^2 provided with journals, as shown, or in any other suitable manner.

The cross-bar Z is supported upon the axle E of the main or drive wheel D near the bracket or support E^1, and to this cross-bar Z the binding devices are attached. At the side of this balanced bar Z are attached the journal-bearings Z^1 Z^2 of the shaft J, and they are so arranged that the wheel G will maintain its proper gear in whichever direction the bar Z may be tilted.

On the opposite side of this tilting bar Z is attached a bar or shaft, I′, by means of suitable bearings. At or near the ends of this shaft I′ pivoted bars N O are attached, which support the upper shaft M′. The shaft M′ is provided with a crank, L, to which the pitman K is attached; and also with a collar, M, to which the arm or bracket Q is attached. This collar M is permanently attached to the bar N, to prevent its turning, and the spool or wire reel is placed on this collar or tube M, when the machine is constructed for use.

The penetrating arm or needle T is firmly attached to the shaft M′, as shown, and is extended to the rear by a separate bar, U, which may, however, if desired, be made of one piece with the needle, or as an extension thereof. At the lower end of the bar U is permanently attached a spring, V, to which spring, and to the front end of the needle, a cord or wire, W, is permanently attached, as shown, which wire passes through the pivoted arm R, which may be provided, if desired, with an anti-friction wheel, to prevent the wearing of the cord. The bar S is pivoted to the arm T, and to the upper end of the bar R, so that, as the arm Q does not move, the depression of the needle T will advance the lower end of the bar R, when the needle is brought forward, so as to bring the points of support of the compressing-cord W up to the sides of the bundle, in which position it remains until the bundle is bound, and carried back ready to be discharged, when it again opens or returns to the position shown in Fig. 3.

The object of this device is to compress the bundle into shape, by a separate and distinct mechanism, so as to avoid the strain upon the binding-wire, necessary for that purpose. When the bundle is compressed by the binding-wire, very strong devices are necessary for holding the wire for that purpose, which greatly increases the difficulty of twisting and cutting the wire. By compressing the bundle by a separate device, but very little strain comes upon the binding-wire, so that it can be held in position with a slight gripe, and twisted without the difficulty heretofore encountered, when the binding-wire was used as a compressor. The spring V prevents the device from being too rigid, and enables it to adapt itself to different-sized bundles, so that it will properly compress either large or small bundles, so that all sizes of bundles will be bound with about the same compression, and give the binding-wire about the same strain in each.

If the binding apparatus was permanently fixed in any given position, the receiver B would be sufficient for all the purposes of receiving grain; but it is desirable that the gavel should be bound as near the middle as is practicable, and, as grain varies in its length, no rigid fixture can bind the different lengths suitably.

To avoid this difficulty, I have made a large opening, as shown, in the receiver B, and placed immediately below this opening a secondary removable receiver, C, which is provided with an opening only sufficient for the operation of the binding devices. This secondary receiver C is permanently attached to the tilting bar Z, and it moves from side to side of the large opening in the receiver B, according to the tilting of the bar Z. The tilting of the bar Z is controlled by the lever *o*, which is located conveniently to the driver's seat, and as the outer end of the lever *o* is depressed it depresses the end of the lever *s*, with which it is connected by the link *r*, and thereby raises the front end of the bar Z through the shaft J′, to which the lever *s* is connected, as shown in Figs. 1 and 2. This throws the secondary receiver C and the binding devices back for binding long grain.

When the grain is short, the operation of the lever *o* and the other parts is reversed, which throws the secondary receiver C and the binding devices forward, thus making the operation of binding long or short grain easily adjustable by the driver, who can shift the device from time to time as the various growths of straw may require.

The main receiver B is carried sufficiently far around to protect the tying devices, and to insure the delivery of the bundles upon the ground. It is supported at its lower end by the bars *x*, attached to the main frame at A^3. These bars *x* may, if desired, be considerably longer, and thereby shorten the closed portion of the receiver B.

The secondary receiver C is provided with a spring-bar, P, which springs down as the bundle passes over it, and returns to position as soon as the bundle passes, thereby preventing the return of the bundle or its sticking, so as to interfere with the compressor or other parts of the machinery.

The frame upon which the compressor and needle T are supported consists of the shaft M′ and bars N O. This frame is advanced and withdrawn by means of the crank *m* at the extreme end of the axle E, which crank *m* is connected to the post Y′ by means of the pitman *n*, which is connected at its bearings by devices similar to those known as universal joints. This post or bar Y′ is firmly attached to the shaft I′, as are also the bars N O, so that when the post Y′ is lifted by the

pitman *n* the frame supporting the compressor is advanced, and it advances and recedes according to the revolution of the crank *m*.

As the post Y′ is advanced, the pinion *b* is made to revolve upon the fixed teeth *a* of the sector X, which operates the twisting and cutting devices, and as it advances the pitman K, operating upon the crank L and the crank-section of the plate J, depresses the needle T, and causes it to pass through the opening of the secondary receiver C, and to come in contact with the tying devices in the head Y. The advance of the parts also brings the opening of the spring bolt or bar *g*, for holding the wire out of the twister when it is advanced over the sector, in contact with the incline *j*, which draws the bar back and permits the wire to pass it. Near its farthest point of advance the bent post or stop *l* comes in contact with one of the projections of the wheel *d*, and turns the wheel one step, in which position it remains until another advance is made, when it is advanced another step, and so on, for the purpose of folding the wire so it will pay off from the reel, instead of slipping from the twister.

The head Y′ of the tying devices is provided with a concave, *i*, in which the twisting device revolves. The twister *e* lies close against this concave opening *i*, and holds the end of the wire while it is being paid out for a second operation.

In order to give the needle T a positive movement, and to apply sufficient force to the compressor as the needle or arm T passes around the bundle, an extra movement is given to the pitman K by means of the wheel H I. The wheel H has two blank spaces or sections, as shown at *v*, Fig. 1, and two sections of teeth. At the commencement of each toothed part there are side projecting pins *u*. These pins engage alternately with the points of the plate J, which plate is attached to the shaft I′ of the pinion I, and has the pitman K pivoted to it at a distance from its own attachment, as shown in Fig. 1.

As the wheel H is revolved by means of the miter-wheel G one of the pins *u* strikes the projecting point of the plate J, which draws the pitman K forward, and continues the movement until the pin passes the point, when the motion is continued by the pinion I, to the shaft of which the plate J is firmly attached. This imparts a downward movement to the needle or tying arm T by means of the crank L, which is continued until the needle is brought close against the tying-head Y, at which point the blank sections *v* of the wheel H reach the openings *w* of the pinion I, which are made by leaving out two or three of the cogs, so that the needle remains in its position until the second pin strikes the opposite projection of the plate J, when the crank L is elevated, and during which time the tying and compressing devices are returned to the position shown at Fig. 1. By cutting out the sections *v* of the wheel H the pinion I may be left entire; but to insure uniformity and certainty in its action I prefer to make the wheels as described.

The receiver B, if desired, may be made in strips its entire length, instead of closed, as shown, and it may be considerably shorter. The secondary receiver C should be made to fit as close against the main receiver B as is practicable and not interfere with its tilting movements.

In operation, as the machine is drawn along the cut grain is delivered, by means of an elevator, over on the receiver B. As the machine advances the crank *m* tilts the frame upon which the compressing device and the needle-arm T are supported, and advances it forward to position, when the plate J and wheel I operate to drive the needle T through the accumulated grain, and bring it around to the twister. The wire or cord W passing over the grain acts as a compressor, and, with the described operation of the bar R, brings it into compact shape for binding. The binding-wire passes from the reel at M′ through the opening or eye, near the point of the needle, to a point just below the head Y. As the head comes in contact with the arm *l* the spur-wheel *d* advances one step and holds the wire over one of its projections in the form of a loop. The first movement of the twisting-finger grasps the ends of the wires and holds them by friction between said finger, and the concave *i* of the head Y, when they are cut by the blade *f*, and the twist completed by the continued revolution of the twister, when the bundle is ready to be discharged. The binding-wire being looped over the point of the wheel *d*, as the compressor and needle recede, sufficient wire is drawn out for the next bundle, and the operation is repeated at each revolution of the main wheel D.

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

1. The tilting bar Z, for changing the position of the binder without changing the relative position of the parts, substantially as specified.

2. The combination of the rocking receiver C with the main receiver B, substantially as and for the purposes specified.

3. The combination of the needle T with the twisting devices, supported upon a tilting base adapted to tilt them in either direction, so as to bring the bands or ties in a proper position around the bundles, substantially as set forth.

4. The combination of the needle T, provided with an extension, U, with the cord W and spring V, substantially as set forth.

5. The combination of the arm Q and pivoted bar R with the link or rod S, needle T, and cord W, for compressing the bundle, substantially as specified.

6. The combination of the needle T and frame M′, N, O, and I′, with the crank *m*, pit-

man *n*, and post Y′, for advancing and receding the needle, substantially as specified.

7. The wheel *d*, in combination with the loop or opening *d′* for holding the wire while it is drawn out, substantially as described.

8. The concave opening *i* in the twister-head Y, in combination with the close-fitting twisting-hook *e*, substantially as and for the purpose specified.

9. The combination of the wheel *d* and sliding bar *g* with the twisting-hook *e* and cutter *f*, for holding, twisting, and severing the wire, substantially as described.

10. The wheels H and I, in combination with the plate J, pitman K, and crank L, and shaft M′ for tilting the needle and forcing it through the grain, substantially as set forth.

11. The combination of the wheel H, provided with the cogged and blank sections, with the wheel I, similarly provided, pins *u u*, and plate J, for giving intermittent movements to the pitman K, substantially as specified.

12. The combination of the lever *s* with shaft J′ and bar Z, for tilting the binding apparatus in either direction, substantially as specified.

13. The combination of the lever *o* with the guide-post *q*, link *r*, tilting bar Z, and lever *s*, for bringing the tilting within the control of the driver, substantially as specified.

14. The spring or yielding arm P, in combination with platform B C, for preventing the return of the bundles, substantially as specified.

DANIEL McPHERSON.

Witnesses:
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F. J. CADDINGTON.