2 Sheets—Sheet 1.

# A. ROSS & S. J. PARKER.

## Grain-Binder.

No. 207,821. Patented Sept. 10, 1878.

Fig. 1.

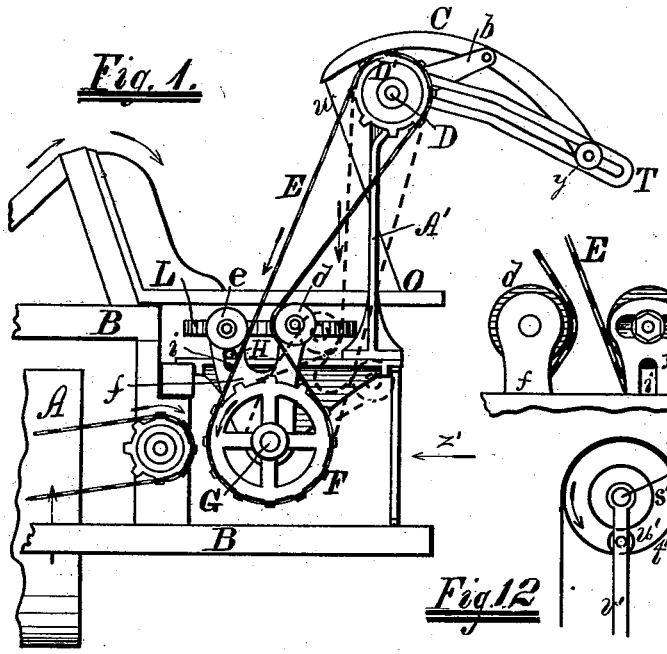






Fig. 9.

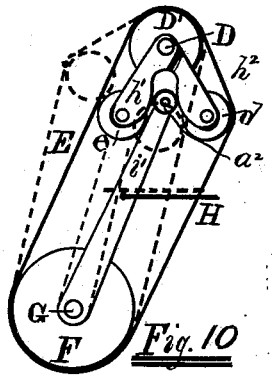
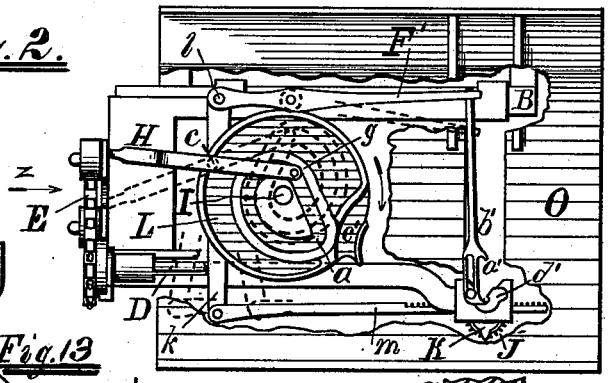



Fig. 10.




Fig. 12.

Fig. 2.



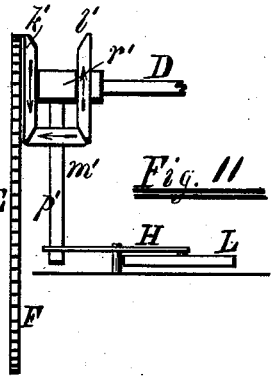




Fig. 11.


Fig. 13.

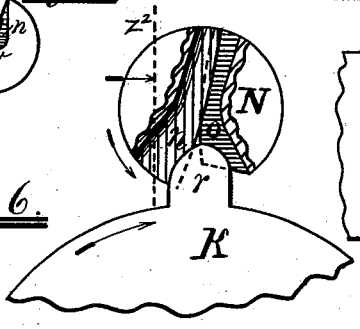



Fig. 6.

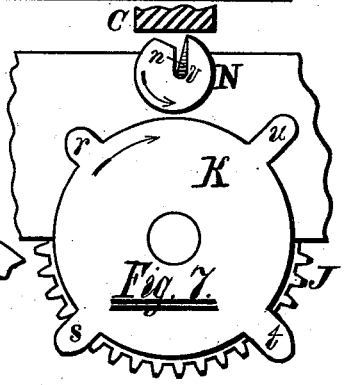



Fig. 7.

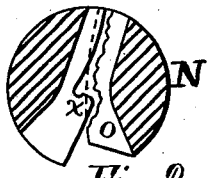



Fig. 8.

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By E. B. Whitmore, Atty.

2 Sheets—Sheet 2.

# A. ROSS & S. J. PARKER.

## Grain-Binder.

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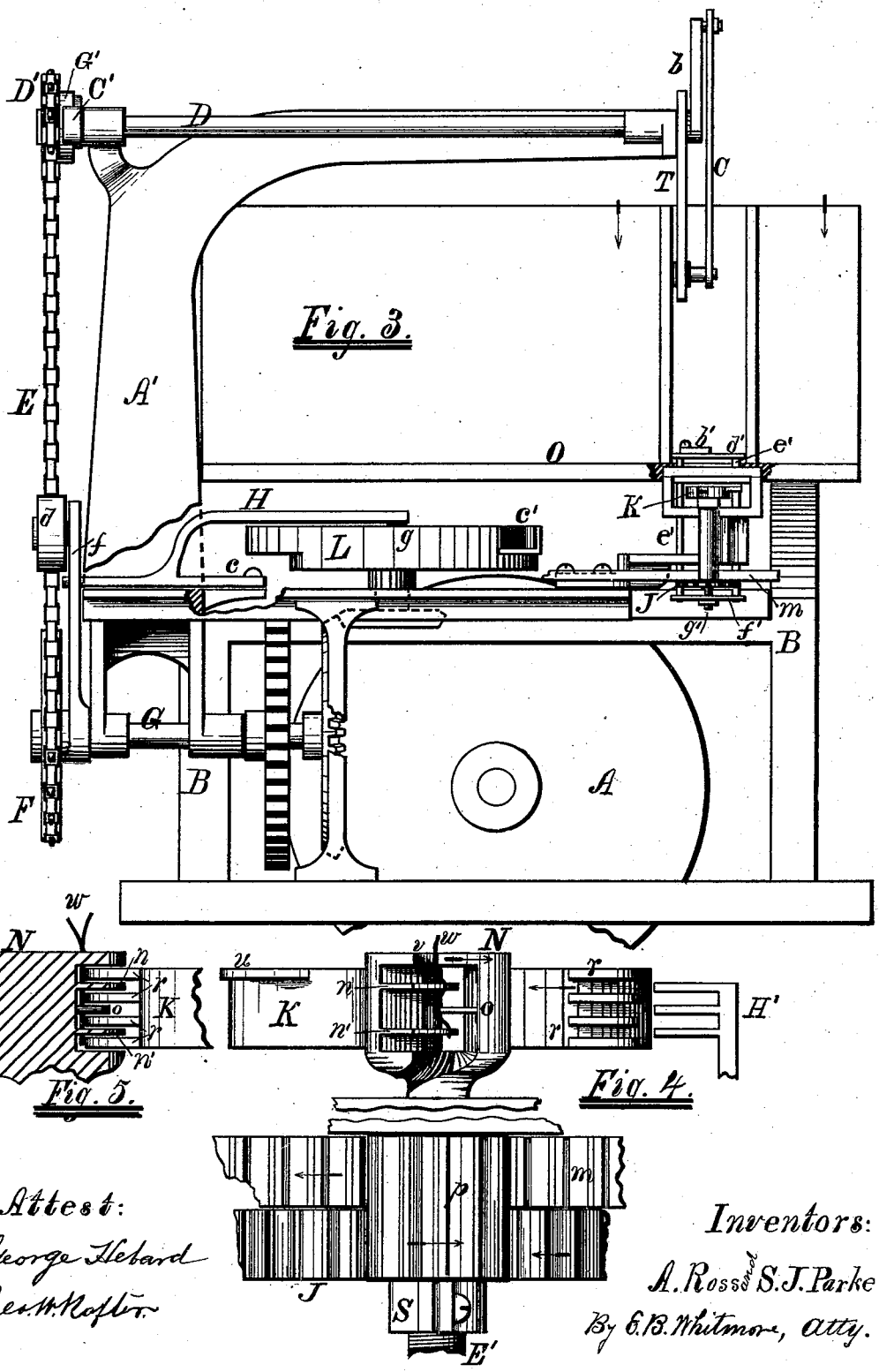


Fig. 3.

Fig. 5.

Fig. 4.

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Inventors:
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# UNITED STATES PATENT OFFICE.

ALEXANDER ROSS AND SAMUEL J. PARKER, OF ROCHESTER, NEW YORK.

## IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **207,821**, dated September 10, 1878; application filed January 24, 1878.

*To all whom it may concern:*

Be it known that we, ALEXANDER ROSS and SAMUEL J. PARKER, both of Rochester, in the county of Monroe and State of New York, have invented a new and useful Improvement in Grain-Binders, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a rear-elevation view, indicated by arrow *z* in Fig. 2; Fig. 2, a plan; Fig. 3, Sheet 2, a side-elevation view, indicated by arrow $z^1$ in Fig. 1; Fig. 4, an elevation of the wire holding and twisting apparatus; Fig. 5, a portion of same, sectioned on line $z^2$ in Fig. 6; Fig. 6, a plan of a portion of the twister; Fig. 7, a plan, (reduced size,) showing the normal and relative positions of the twister and tucker; Figs. 8 and 9, detached views; and Figs. 10, 11, 12, and 13, modifications explained farther on.

Our invention relates to automatic wire grain-binding attachments to harvesters, the object being, mainly, to construct the driving mechanism of the binding-arm so the latter will briefly dwell near the twister at each operation of binding, to produce a new wire twisting and holding device and friction-lock to prevent a reverse motion of the machinery.

In the drawings, B, Fig. 1, is the rear of a portion of the frame, and A the driving-wheel, of a reaper provided with a binding attachment, of which C is the binding-arm.

The supporting-bracket A′ carries the shaft D, the crank *b* of which carries upon its pin the said arm, the reverse end of which runs in the guide or track T.

The chain E, which drives the shaft D, reaching around sprockets F and D′, is of excessive length, the slack being taken up or held by the tightening-rollers *e* and *d*, held at the extremities of the shifting tightener *f*, turning on the shaft G.

The said piece *f* is moved upon the center G by means of the lever H, Figs. 2 and 3, operated by the cam L, said lever being pivoted at *c*, and having an end entering a vertical slot, *i*, of the piece *f*. The cam moving the lever H is so shaped that the piece *f* is caused to move gradually from left to right, as it appears in Fig. 1, but to return comparatively rapidly from right to left, the quicker movement occurring while the roller *g* of the lever is carried along the straight portion of the cam from *a* to *g*.

The cam L rotates once to each complete operation of the binding-arm, and the two are relatively so timed that the roller *g* reaches the point *a* in the cam at the moment the binding-arm returns the wire to the twister. At this juncture the shifting tightener *f* is at its extreme right position, as shown in dotted lines in Fig. 1, the slack in the chain E being wholly on the downward-moving or draft side of the same.

Now, as the cam rotates and carries the roller *g* from *a* to *g* the shifting tightener will be moved from right to left, causing the roller *e* to yield the slack in the chain to the draft upon the same, caused by the rotating sprocket F, the result being that for a few seconds of time, and while the tightener is moving from right to left, the shaft D will cease rotating and the binding-arm remain at rest, although the sprocket F continues to rotate uniformly.

Instead of fully stopping the binding-arm, the cam L may be so shaped as to reduce its motion to a very slow rate. This dwell or slow motion of the arm occurs while the wire is being twisted, and is important as facilitating said twisting of the wire.

Fig. 9 shows the reverse of the rollers *e* and *d* enlarged, and showing a transverse slot, *h*, by means of which the roller *e* may be adjusted to regulate the amount of the slack in the chain E.

Fig. 2 shows a lever, *k*, pivoted at *l*, underlying the cam L, by which it is operated, by means of which the rack *m* is reciprocated. This rack engages a pinion, *p*, secured to the lower end of the twister-spindle E′, Fig. 4. This pinion turns the gear J, at the top end of the vertical shaft of which is secured the wire-tucking wheel K, at a level and acting conjointly with the twister-head N.

The cam L, by a projection from its under surface acting upon a roller of the lever *k*, causes the rack *m* to rotate the twister at the proper time, as above described.

The twister-head N is made hollow, the cavity, opening out at opposite sides of the head, being provided with parallel horizontal ledges or wire-crimpers *n n′ o*, projecting from the opposite walls.

Fig. 7 shows the twister N and wire-tucker

K in their normal position, reduced size, their relation to the other parts of the machine being understood from Fig. 2, in which they occupy the same position.

The tucker K is provided with blades *r s t* and a wire-cutter, *u*, projecting from its periphery, and the time of its rotations, compared with that of the twister, is as four to one, the two being so put together that as they rotate the projecting blades *r s t*, and finally the cutter *u*, successively enter the cavity of the twister-head, as shown in Figs. 5 and 6, which show the twister as having made a half-revolution from the position shown in Fig. 7. A complete rotation of the twister from the position shown at Fig. 6 will bring the blades *s* into the cavity, a second the blades *t*, and a third the cutter *u*.

The blades, as shown in Figs. 4 and 5, are in clusters of four each, those of each cluster being uniform, but increasing in length in the clusters from *r* to *t*, as shown.

As the blades enter the head they alternate with the crimpers *n n' o*, and crowd the wires between the overlapping crimpers, as shown in Figs. 4 and 5, each succeeding group of blades forcing the wires nearer the axis, and the final cutter *u* shearing the wires against the side of the slot *v* in the upper plate of the twister. A reverse motion of the rack *m* brings the twister and tucker K back to the position shown in Fig. 7. The longest group of tucking-blades *t* push the wires back of the notch or hook *x* in the lower crimper, *n'*, Fig. 8, and the cutter *u* severs the wires after the twisting is accomplished. When the twister is rotated the single wire extending from the same down to the point of the arm is allowed to wind around the spindle under the head, and unwind as the motion is reversed. When the arm rises, the wire, bent to a zigzag shape over the edges of the crimpers, as shown in Fig. 4, and back of the hook *x*, by means of which it is held, is drawn across the under side of the hook and up through the slot *v*, and returned by the arm, after having encircled a gavel, to a position in front of the opening in the twister-head, into which it is carried by a hook, $a^1$, of the wire-gathering bar *b'*. The bar *b'* is operated by means of the lever F' and cam L, as shown in Fig. 2, the depression *c'* in the cam causing the gatherer *b'* to carry the returned wire into the head N and hold it during the period of twisting.

The blades of the tucker K, alternating with the crimpers in the twister, render it essential that the two should closely register. To effect this adjustment, we employ a spring clamp-nut, S, finely threaded, upon the spindle E', as shown in Fig. 4, which may be set with a common screw-driver at position desired.

*d'*, Figs. 2 and 3, represents a small plate, held parallel to and slightly above the upper surface of the twister by the rods *e'* reaching down to connect with a yoke, *f'*. This yoke is provided with a vertical threaded hole at the middle to receive the screw *g'*, which is an extension of the twister-spindle; and when the twister is rotated the yoke, and consequently the plate *d'*, is carried gradually down with the wires as they are drawn down by the operation of twisting, the design being to prevent the abrasion of the wires by causing the part against which they press to move with them, instead of allowing them to rub and chafe, as they otherwise would.

Fig. 10, Sheet 1, shows a different method of tightening the loose chain E, the rollers *e* and *d* being held by pendent hangers $h^1$ $h^2$ inside of the chains. The inner opposing faces of these hangers are made cam shape, against which a roller, $a^2$, of the lever *i'* presses. The swaying of the lever *i'* by the connection H causes the shifting of the hangers, as shown, the cam-faces being so shaped as to keep the chain uniformly taut at all positions of the hangers.

Fig. 11 shows a second modification of the manner of stopping the binding-arm, in which a tight chain is used in connection with bevel-gears *k' l'* and intermediate *m'*. *k'* and *m'* are loose, *l'* tight. So long as the cam L, with the lever H, holds the shaft *p'* to place the shaft D will be rotated by the chain E and loose gear *k'* by means of the intermediate *m'*; but should the shaft *p'*, which is suspended from the loose sleeve *r'*, be allowed to swing in the direction of rotation of *k'*, the gear *l'* and shaft D would rest during the period of said swinging.

Fig. 12 shows a third modification, in which a tight chain, E, is used in combination with internal and external gears *t'* and *s'* upon the shaft D, with an intermediate, *u'*. If *s'* is fast to D and *t'* loose, D will be rotated by the chain as long as *u'* is held in position; but if allowed to move with *t'*, D immediately stops.

Fig. 13 shows a modification of the manner of tucking the wires in the twister-head. The piece P, from which extend tucking-blades R, similar to those of the wheel *k*, is caused to move endwise, the blades entering the head N alternating with the crimpers of the same, as above described.

In Fig. 4 is shown a comb, H', stationed in a position to have the teeth clear away straw or other extraneous matter that might lodge in the spaces between the blades *r*, &c., of the wheel K as the latter rotates.

We claim as our invention—

1. Wheels F and D', provided with a loose chain, E, and oppositely-acting shifting tighteners *e d* for the chain, in combination with shaft and crank D and *b* and grain-binding arm C, substantially as shown and described.

2. The combination, with the binding mechanism of a grain-binder, of shaft D, wheels F and D', chain or cord E, shifting tightener *f*, provided with rollers *e* and *d*, and suitable automatic operating mechanism for said tightener, substantially as set forth.

3. In combination with a binding-arm, C,

crank *b*, shaft D, and chain E, a cam, L, lever H, and shifting device *f*, substantially as shown.

4. In combination with the arm C, crank and shaft *b* and D, sprockets D′ and F, and chain E, a shifting tightener, *f*, provided with an adjustable roller, *e*, by which to regulate the tension of the chain E.

5. In an automatic grain-binding attachment to a harvester, the combination of a rotating wire-twister, N, and tucking-wheel K with suitable driving mechanism for each, substantially as shown and described.

6. A wire-twister, N, of a grain-binder, having a threaded stem, E′, provided with a slit clamp-nut, S, for adjusting the twister to position, in combination with the rotating tucking-wheel K, substantially as described and shown.

7. The cutting-blade *u*, projecting from the rotating tucking-wheel K, acting in concert with the wire-twister head N to sever the wire, substantially as described and shown.

8. In combination with the twisting-spindle E′ of a grain-binder, a yielding plate, *d*′, rods *e*′, and piece *f*′, substantially as set forth.

9. A hollow wire-twister head, N, provided with a ledge or blade, *n*′, having a notch or hook, *x*, for the purpose of catching and holding the spool end of the wire after the same has been severed, constructed substantially as shown and set forth.

10. In combination with a rotating twister, N, of a grain-binder, a rotating wheel or piece, K, provided with groups *r s t* of projecting blades, caused to enter successively the cavity of the head, the blades forming the groups increasing in length from first to last, substantially as described.

11. A sliding rack, *m*, rotating a pinion, *p*, of the wire-twister of a grain-binder, in combination with said pinion and twister, gear J, and tucker-wheel K, substantially as described.

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Witnesses:
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