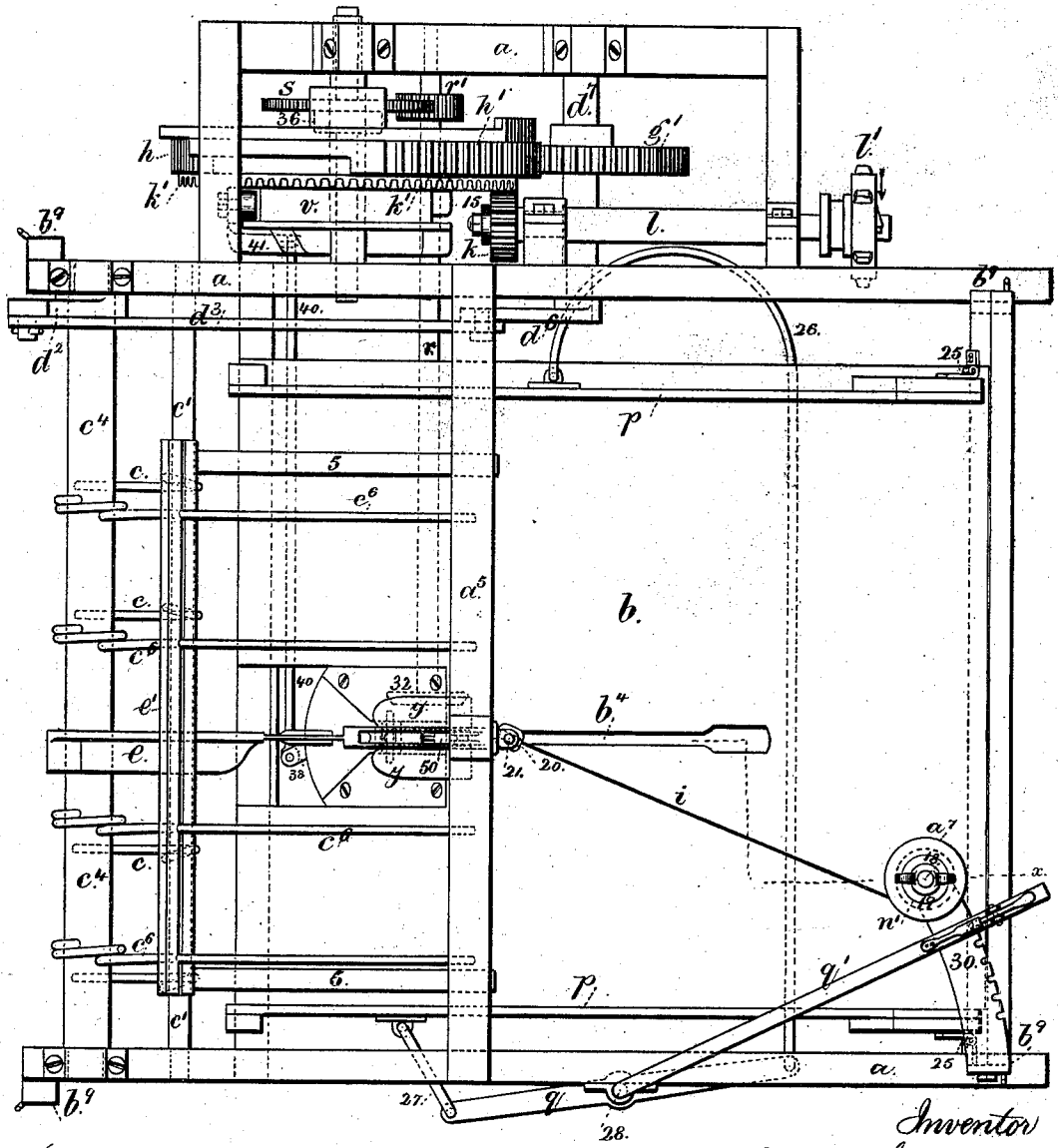
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E. CHAPMAN.

GRAIN-BINDER.

No. 192,150. Patented June 19, 1877.

Fig. 1.



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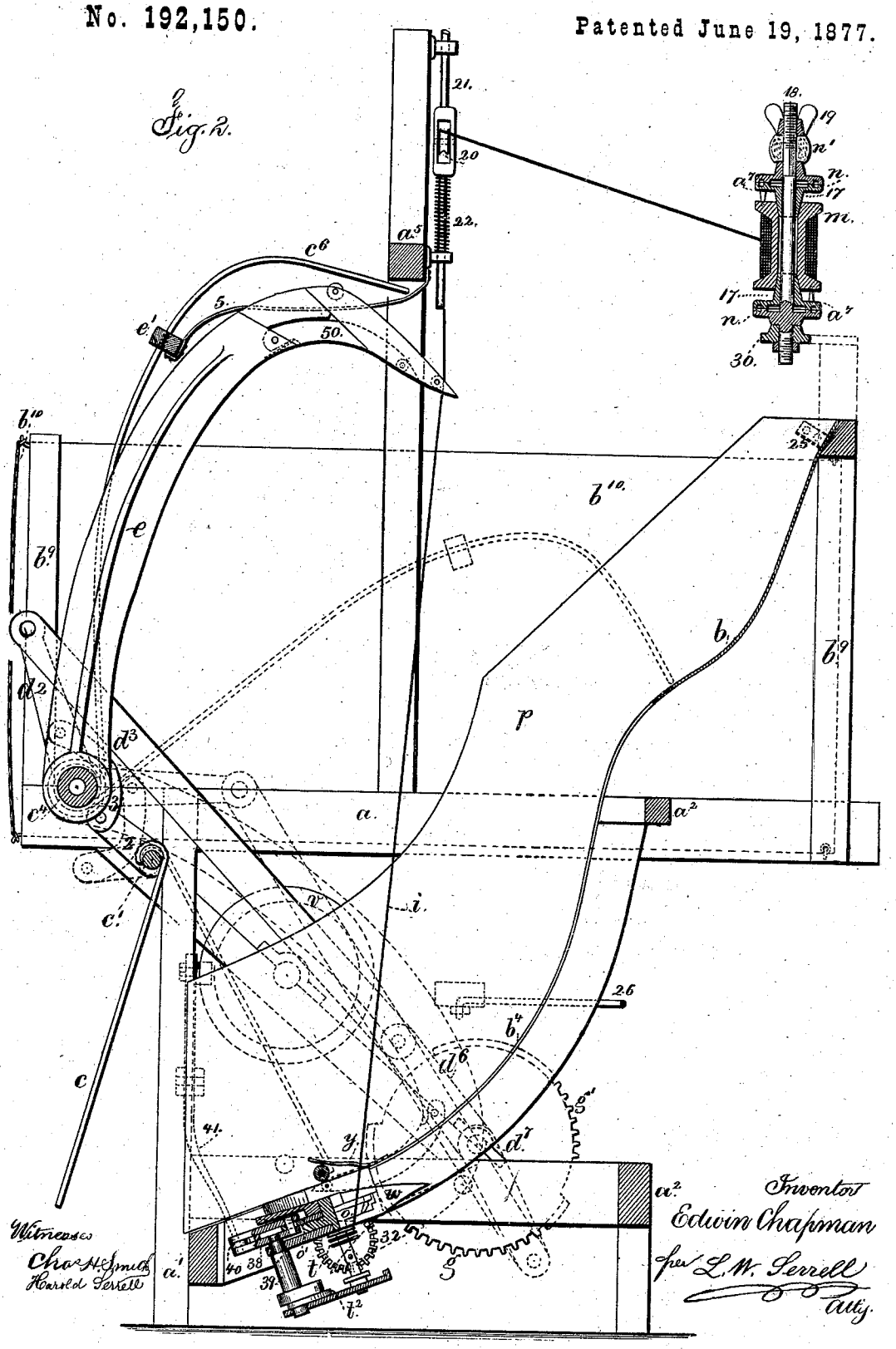
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No. 192,150. Patented June 19, 1877.

Fig. 2.



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Fig. 3.

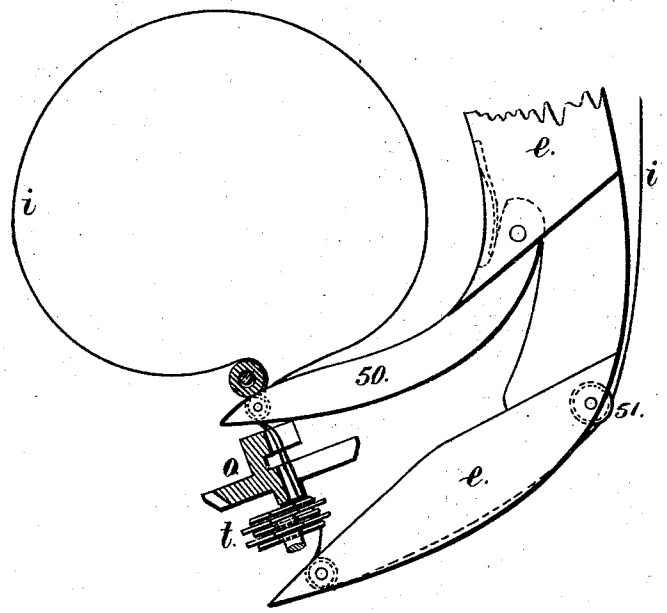


Fig. 5.

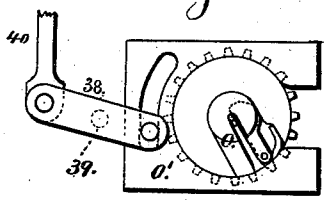


Fig. 6.

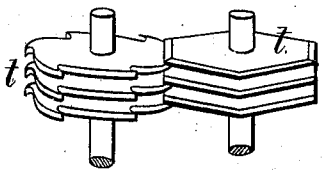
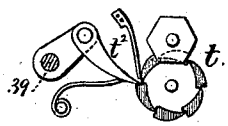


Fig. 4.



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UNITED STATES PATENT OFFICE.

EDWIN CHAPMAN, OF ROCHESTER, MINNESOTA, ASSIGNOR TO CHAPMAN BINDER COMPANY, OF SAME PLACE.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **192,150**, dated June 19, 1877; application filed February 16, 1876.

To all whom it may concern:

Be it known that I, EDWIN CHAPMAN, of Rochester, in the State of Minnesota, have invented an Improvement in Binder Attachments for Harvesters, &c., of which the following is a specification:

My invention is adapted to the reception of the loose grain from any harvesting-machine where the grain is sufficiently elevated to be delivered into the machine; or this binder may be employed for binding grain under any circumstances wherever available.

The binder attachment which I have represented in the drawings is of a character especially adapted to the harvester known as the "Elward harvester."

In my machine the grain is received from any ordinary elevating apparatus upon an inclined curved platform, and passes down the same, and is arrested by the binding-wire and compressor-fingers. An arm descends, carrying the wire with it around the bundle, the wire is caught, the bundle compressed, the wire twisted and cut, and then the bundle discharged, and the compressing-arm rises, leaving the end of the wire held by a rotary jaw. During these movements the grain that is supplied to the machine is held up out of the way by wire fingers, that are lifted as the arm rises, and the grain descends, and the next bundle is formed.

The special features of improvement relate to a means for preventing the wire from being broken by the sudden pull before the reel can commence to turn; to the construction of the compressing and wire-carrying arm; to the means for holding and cutting the wire; to the fingers for holding up the grain combined with the platform and arm; and to the combination of the various devices and mechanisms for performing the respective operations.

In the drawing, Figure 1 is a plan of the binder. Fig. 2 is a vertical section of the same at the line *x x*. Fig. 3 is a diagram in larger size, illustrative of the means for holding the wire and twisting the same. Fig. 4 is a detached plan of the rotary holding and cutting jaws, and Fig. 5 is a plan of the twisting-jaws.

The frame of the machine is made of the timbers *a a*, that are especially adapted to be connected to the harvester, and the vertical posts a^1 and transverse timbers a^2 are framed together, and adapted to receive the other parts of the machine.

The grain receiver or platform *b* is inclined and curved, substantially as shown in Fig. 2. It has a narrow vertical slot, b^4, for the end of the arm carrying the binding-wire to pass through, as hereafter described, and this slot is narrow, so that grain cannot enter thereinto.

The grain is delivered upon the upper part of this grain-receiving platform by any suitable elevating-apron, or otherwise, and it falls down the same, and is arrested by the compressor-fingers *c* and binding-wire *i*, that occupies nearly a vertical position while the grain is being received.

The fingers *c* are upon the cross-shaft c^1, that has a crank-arm, 2, and link 3 to the crank d^1 upon the cross rock-shaft c^4, having upon it the wire-carrier arm *e*, also the spring-volutes of the wire-fingers c^6.

These wire fingers c^6 are connected by a cross-bar, e', with suspending-straps 5, to the cross-head bar a^5.

The crank-arm d^2 has a connecting-rod, d^3, to the crank d^6, that is revolved periodically, a half revolution being given, then a pause, then the next half-revolution more rapidly, and then another pause, and so on. To effect these movements, differential stop-motion gear-wheels are used similar to those in my Patent No. 123,237, the gear-wheel upon the shaft d^7 of the crank d^6 having a larger segment, *g*, of teeth, and a smaller segment, g^1, of teeth, with intermediate blank spaces, and the teeth of *g* are driven by the segment *h* upon the larger wheel, and the teeth of g' by the segment h'. There are intermediate portions of the wheel $h\ h'$, that are plain, so that the pauses in the movement of the crank d^6 occur at the times when the plain portions are passing the spaces between the teeth segments $g\ g'$.

I remark that the power to drive the wheel $h\ h'$ may be derived from any suitable source. I have shown for this purpose the bevel-wheel k' and pinion *k*. The pinion *k* is upon the end

of the shaft *l*, and it is confined in place by a collar and nut, 15, and turns by the frictional contact, the object being to allow the pinion to slip if there is any obstruction to the movement of the other parts, so as to prevent injury.

Upon this shaft *l* is the chain-wheel *l'*, from which a chain passes to the bull-wheel of the harvester, and this wheel *l'* may be fitted as a clutch-wheel and moved endwise upon a shaft, so that the mechanism is set in motion at the proper intervals to suit the supply of grain to form a sheaf or bundle. The wire is upon the reel or spool *m*, (shown sectionally in Fig. 2,) and this spool is centered by the cones 17 upon the vertical stud 18. These cones are provided with disks a^7, having grooves in their surfaces in contact with friction-plates *n*, and a spring, *n'*, and nut 19 serve to regulate the friction applied to the spool. The annular grooves in the friction-plates retain the lubricating material, and render the friction more uniform than that derived from flat or conical disks.

The wire from the spool *m* passes over the grooved wheel 20 upon the vertically-sliding bar 21, that has a spring, 22, which yields to a sudden pull upon the wire, and prevents the wire from being broken before the inertia of the spool or reel can be overcome.

The wire *i* passes through the end of the arm *e*, and down to the holding device, hereinafter described. The end of the arm *e* is made of two thin steel plates, terminating in a point, so as to require but a narrow slot in the grain-receiving platform, and there is a small grooved roller in the point to lessen friction upon the wire.

The operation of the parts thus far described is as follows: As the grain slides down the platform or receiver it stops against the wire *i*, and when the binding mechanism moves, the fingers *c* move up against the lower side of the grain as the binding-arm *e* descends, and the grain is pressed between them. At the same time the movement of the arm carries the wire around the bundle into the position shown in the diagram, Fig. 3, ready to be twisted by the means hereinafter described.

As the movement of the rock-shaft c^4 brings the arm *e* down, it lowers the fingers c^6, and their ends rest upon the platform *b*, or else they are suspended by the straps 5 from the head-beam a^5, and the ends of these fingers arrest the further passage of the grain down the platform until the reverse movement raises the arm *e* again, and by the cross-bar *e'* lifts these wire fingers of the way.

These fingers are each preferably twisted to form a spring-eye around the rock-shaft c^4, and the end inserted into such rock-shaft. Hence the fingers form springs that aid in sustaining the weight of the arm *e* as it is moved down below them and then raised again; but such fingers may be loose at the rock-shaft, and not made as springs, if so desired.

In order to guide the grain as it falls down the inclined receiver, and place the grain in position for the wire band to come at the right place, I make use of the guide-boards *p p*, that are hinged at 25, and connected by the links 26 and 27 to the lever *q*, that is upon a vertical shaft, 28, and provided with a lever, *q'*, at the upper end, having a latch to take holes or teeth in the segment 30. By moving this lever *q'* the guide-boards *p* will be brought nearer together or moved farther apart, as the length of the straw may require.

Beneath the platform, at the place where the wire is twisted, there is a revolving wheel and holding-jaw, *o*, substantially similar to that set forth in my Patent No. 126,520, and the clamp-operating slide *o'* is also similar.

The revolving wheel and jaw *o* are moved at the proper time by a bevel-wheel, 32, on the shaft *r*, that is provided with a pinion, *r'*, driven by a wheel, *s*, that receives its motion from the pinion 36, that is operated upon by a segment of teeth upon the wheel *h*, and turned once by that segment, and then held during the remainder of the revolution of the wheel *h*. This produces several turns of the twisting-wheel *o*, and in order to operate the clamp *o'* of the wire-twisting jaw, I use the crank-arm 38, that acts in a slot in said clamp *o'*, and this crank-arm is upon a short vertical shaft, 39, that is rocked by a link, 40, to the lever 41, that receives its motion from the cam *v* upon the wheel *h h'*.

Beneath the revolving twisting-wheel *o* are the revolving jaws and knives *t t*, that are geared together at their lower ends and moved around progressively by a pawl, t^2, and arm on the shaft 39. (See Fig. 4.) These jaws are made as polygonal plates, those on one of the vertical studs coming opposite the spaces between the plates on the other, and the upper pair of these plates act as cutters and the lower ones as holding-jaws.

There are hooked angles to the polygonal plates of one of the jaws, as shown more clearly in Fig. 6, so as to catch the wire and carry it into the jaws.

The parts are so timed that after the wire *i* has been brought down by the arm *e* into the twisting-wheel *o* and laid between the two jaws *t*, as illustrated in Fig. 3, the link 40 is moved to clamp the wires in the revolving wheel, and the jaws *t* are simultaneously turned to seize the wire between the polygonal edges, and the upper pair of plates cut off such wire, leaving the twisting-wheel to act in twisting the wire together as such wheel is revolved.

Upon the bed contiguous to the revolving twisting-wheel is a slotted tongue or fork, *w*, and in the wire-carrier there is a hinged tongue, 50, that has a roller near the end. This is kept within the plates at the end of the arm *e* by a spring, so as to pass freely through the grain with the wire, but this tongue 50 runs over the fork *w* as the wire-carrier completes

its downward movement and forces the wire home into the revolving twisting-wheel.

A roller at 51 lessens friction upon the wire, and at *y* there are springs projecting from the surface of the platform, which springs are drawn down in twisting the wire, but when the wire is liberated from the twister by drawing back the clamping-plate *o'* these springs draw the wire out from the twisting-wheel, and cause the delivery of the bundle.

There are vertical posts 69 at the angles of the machine, and around these there is a canvas curtain tightly secured, as at b^{10}, (see Fig. 2,) so as to keep wind from blowing the grain away from its position in the binder.

I do not claim an arm passing through the slotted platform and carrying the wire. In machines that have been made the slot is necessarily wide, and the grain falls through and becomes clogged in the mechanism.

I claim as my invention—

1. The wire-carrier arm *e*, made with a metal plate at the end thereof passing edgewise through the narrow slot b^4 of the grain-receiving platform *b*, in combination with the hinged tongue 50, fork *w*, twisting-wheel *o*, rock-shaft c^4, and actuating mechanism, substantially as set forth.

2. The combination, with the wire-carrier arm and its rock-shaft, of the stop-motion wheel *g g'*, crank d^6, connecting-rod d^3, and arm d^2 upon the rock-shaft c^4, substantially as specified.

3. The fingers c^6 upon the rock-shaft c^4, and connected by the cross-bar e^1, in combination with the wire-carrier arm *e*, substantially as set forth.

4. The friction-plates *n*, with grooves in their surfaces, and the cones 17 for centering the spool or reel of wire, in combination with the spring and frictional adjusting-screw 18, as specified.

5. The sliding rod 21, sheave 20, and spring 22, in combination with the wire-holding spool *m* and wire-carrying arm *e*, for the purposes and as set forth.

6. The frictional pinion *k* upon the driving-shaft *l* and the chain-wheel *l'*, in combination with the stop-motion wheels and binding mechanism, substantially as set forth.

7. The combination, with the grain-receiver *b*, of the hinged side boards *p* and adjusting mechanism, substantially as and for the purposes set forth.

8. The combination, with the twisting mechanism, of the springs *y* upon the surface of the platform, for the purposes set forth.

9. The polygonal holding and cutting jaws *t*, constructed of steel plates, and operating substantially as set forth.

10. The combination, with the polygonal holding and cutting jaws *t*, of the revolving twisting-wheel *o* and its clamp *o'*, substantially as set forth.

11. The rock-shaft 39 and its actuating mechanism, in combination with the revolving holding-jaws *t*, the twisting-wheel, and the clamping-plate *o*, substantially as specified.

12. The combination, with the grain-binding mechanism, of the inclined platform or receiver and a canvas or equivalent inclosure, b^{10}, for protecting the grain from wind, as set forth.

Signed by me this 20th day of January, A. D. 1876.

EDWIN CHAPMAN.

Witnesses:
C. H. BLISS,
T. H. MCCONNELL.