S. D. CARPENTER.

Grain-Binders.

No. 158,465. Patented Jan. 5, 1875.

Fig 1.

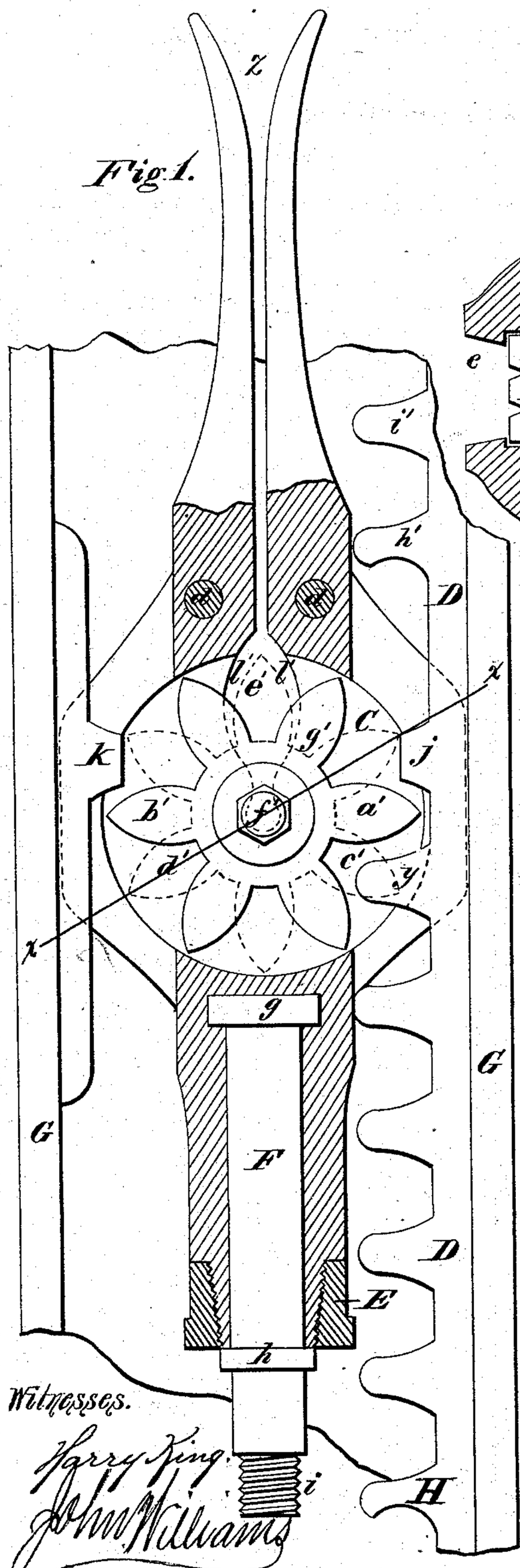



Fig 2.

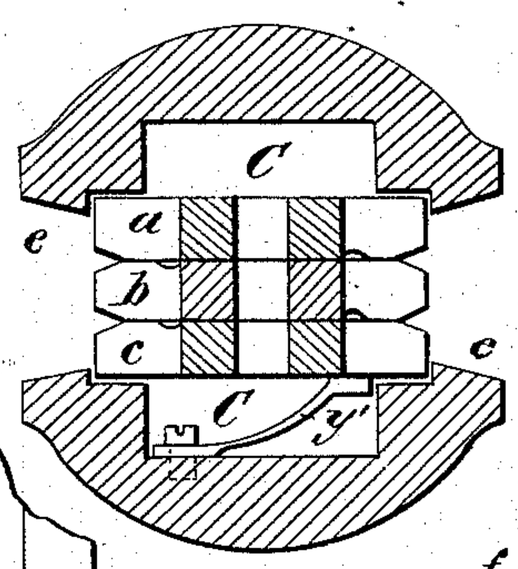



Fig 3.

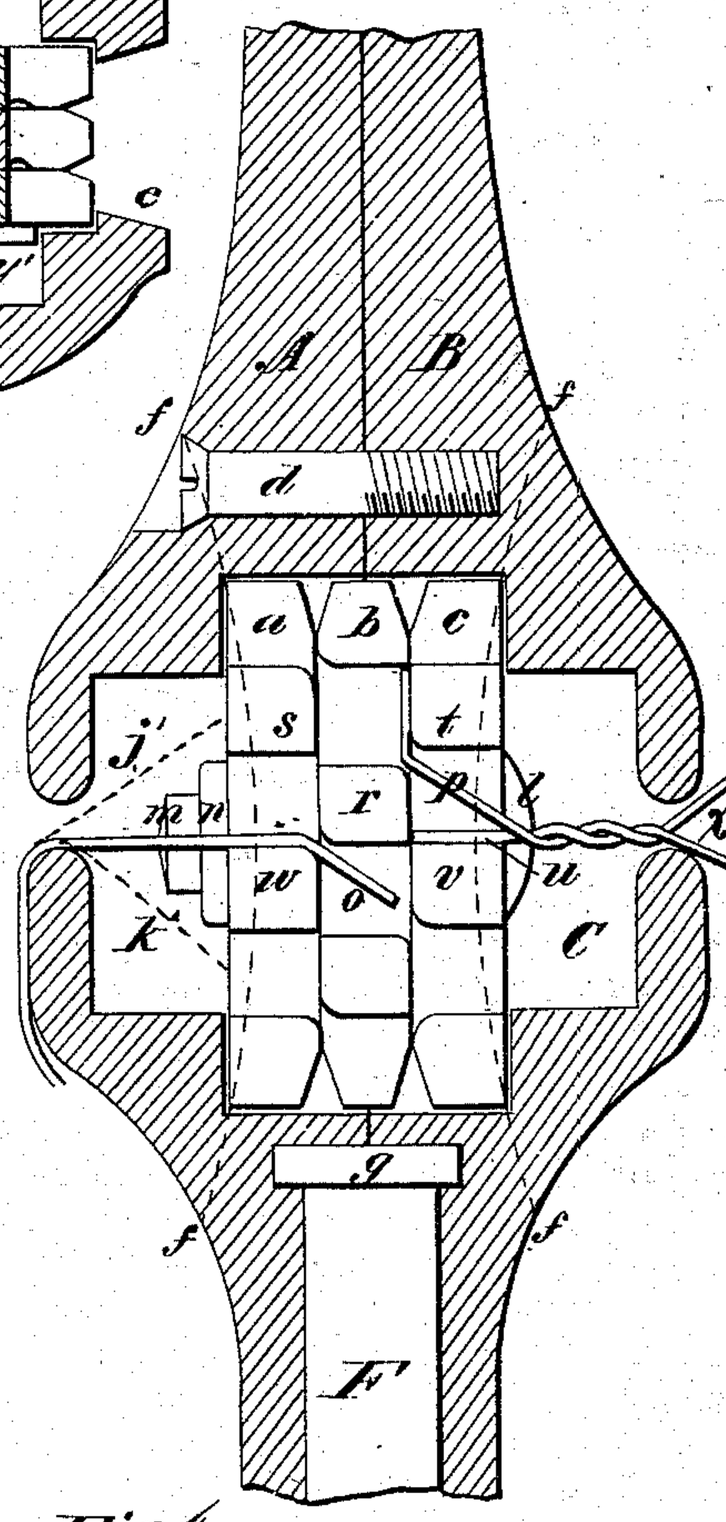
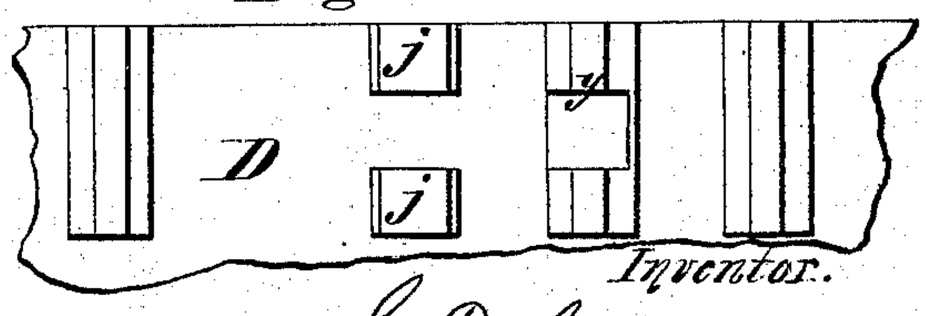



Fig 4.




Witnesses.

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# UNITED STATES PATENT OFFICE.

STEPHEN D. CARPENTER, OF MADISON, WISCONSIN.

## IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **158,465**, dated January 5, 1875; application filed December 8, 1874.

*To all whom it may concern:*

Be it known that I, STEPHEN D. CARPENTER, of Madison, in the county of Dane and State of Wisconsin, have invented certain Improvements in Band Twisting and Cutting Device for Automatic Grain-Binders, of which the following is a specification:

My invention relates to machinery for binding grain; and consists in an improved device for twisting the wire and cutting it off, being an improvement upon the device patented by me, dated December 22, 1868, and numbered 85,209, the same to be used in a machine operating on the plan described in my patent of December 22, 1868, No. 85,210, in which the shuttle is made to pass through a circular or segmental race.

Figure 1 represents a plan view of my shuttle and race, showing a horizontal section of the shuttle. Fig. 2 represents a transverse section of said shuttle cut through line *x x* of Fig. 1. Fig. 3 represents a longitudinal vertical section of said shuttle, and Fig. 4 a front view of several cogs on the side of the race.

I construct a shell or casing composed of two parts, A and B, as shown in Fig. 3. I then bore a circular recess in each half of the casing of sufficient depth to allow the three twister-wheels, *a*, *b*, and *c*, to work freely when the two halves of the casing are put together. I then bore a smaller circular recess, C, in each side, as shown in Figs. 2 and 3, to allow a free space for the wire while in the act of twisting, and also to permit a spring, *y*, to be inserted on one or both sides, with its rounded part bent upward to bear against the spurs of the twister-wheels, and to cause sufficient friction, so that the said wheels shall not rebound when they are free from the circular twisting-rack, said spring being shown in Fig. 2. The two portions of the shell or frame are held firmly together by the tapering nut E, Fig. 1, and the screw-bolts *d*, Figs. 1 and 3. This shell or casing is cut away longitudinally in a curved line, as seen at *e*, Fig. 2, and dotted curved lines *f f*, Fig. 3, to allow the circular rack D to engage with the spur-cogs of the twister-wheels. A recess is bored in the shank of the shell or casing to admit the free wrist-pin F, Figs. 1 and 3. This pin is provided with a head, *g*, and collar *h*. The head keeps the shuttle secure to the pin, and at the same time allows it to freely turn by the tension of the wire. The outer end of the wrist-pin passes through the end of the shuttle-arm, which is forced against the collar *h* by means of a nut at *i*, Fig. 1. I construct the three twister-wheels of steel, the cogs of all being exactly alike—sharp-pointed and rounded outward on their sides, as shown in Fig. 1—using each part alternately to cut and hold the wire. The two sides of each cog in the center twister-wheel *b* are beveled off a short distance from the point, while the cogs of the two outer twister-wheels *a* and *c* are beveled only on the inside in like manner. This is to avoid the exactness that would otherwise be necessary in passing the point of cutting the wire, so that the two outside wheels shall hit the opened short cog *j* of the rack D, Fig. 4, and the center wheel shall not touch said open or divided cog, but shall impinge against and be operated by the projection *k*, Fig. 1, on the opposite side of the rack, the two outer wheels passing freely by it, the one above and the other below it, all for the purpose hereinafter described. I round off, at their base, each opposite corner of the cogs on the center wheel *b*, as shown in Fig. 3, leaving the other opposite corners sharp, to act as shear edges in cutting off the wire. In like manner I round off the corresponding alternate corners of the cogs on the outer wheels *a* and *c*, next to the inner wheel, leaving the opposite edges sharp, as aforesaid, to impinge against or cut the wire, also shown in Fig. 3, it being understood that, in the act of cutting the wire, the center wheel moves one way while the outer wheels move in the opposite direction.

In my former patent I described a circular slotted steel plate inserted in each side of the twister-wheel, using the same for cutting on one side and impinging the wire on the other, depending somewhat on the spring of the plate to hold the wire. I find that this method is not so efficient as the one herein described.

I make these three spur-wheels about three-eighths of an inch in thickness each. I then provide a bolt, which is passed through the center of the wheels, having a rounded head, *l*, on one end, and provided with two jam-nuts, *m* and *n*, on the other, as shown in Fig. 3.

This enables me to set the three wheels close together, so that the friction against each other may serve as a means to hold the end of the wire firmly. That I may not weaken the strength of the wire, I cut a bedway close to the root of the cogs, in depth about two-thirds the diameter of the wire, as shown in Fig. 2. This will flatten the end of the wire slightly, and kink it at right angles between the cogs, as seen at *o p*, Fig. 3.

It will be seen that the center cog *r* of wheel *b* has passed from its position between *s* of the wheel *a* and *t* of wheel *c*, Fig. 3, and that the sharp edge of cog *r* has cut the wire *u* against the sharp edge of cog *v*, while the wire *o* leading to the spool is being grasped between the cogs *r* and *w*, the rounded edges of these cogs bending the end of wire *o*, while the end *p* is set free, and the bundle at *x'*, Fig. 3, is thrown off while the shuttle-twister retains the wire from the spool for another bundle, and so on.

Another inconvenience of my former twister-wheel is that it had only one opening for the wire to reach the cutter or holding part. The twister-wheels here described have six openings, and may contain more or less, and are so arranged that the wire cannot fail to reach the cutting and holding part, no matter in what position the twister may be.

Another inconvenience in the twister-wheel already patented is that the cutting and holding device called a "tumbler" was operated by a stop placed inside the shell or frame of the shuttle, and while its action was efficient and satisfactory it could only permit the twister-wheel to revolve four times in one direction, and unless the tension on the wire gave the shuttle a half-turn the shuttle could not pass again through the race.

If the wire should break in the process of binding a bundle, or should have "paid out," the shuttle could not obtain the half-turn, and some of the machinery was liable to break when the shuttle again struck the circular rack. To remedy this difficulty I have arranged my improved shuttle and its operation, as seen in Figs. 1, 2, and 3.

Fig. 1 exhibits the shuttle in the race, the flanges of which race are seen at G G. D represents the circular rack, the first tooth H of which has an inward curve, leaving a sharp point, so that the sharp points of the twister-wheels may not become "stalled" on said cog as the shuttle enters the race. I have eighteen twisting-cogs to the circular rack, and six spaces to the twister-wheels, which will give three twists to the wire, which I regard as ample for "short twist," though the number may be more or less. I divide the cog *y*, Figs. 1 and 4, longitudinally with the circular rack, as seen by the dotted line, to enable the cog on the middle wheel to pass through it as it is stopped by the projection *k* on the opposite side, Fig. 1. I likewise open or divide the short cog *j* for a like purpose, and the projection *k* is so placed as to engage with the cogs on the center wheel and not touch the cogs on the outer wheels. It follows that when the outside cogs at *a'* on the right, Fig. 1, strike the short divided cog *j*, the opposite center cog at *b'* on the left will strike the projection *k*, and when the shuttle passes that point, cog *a'* of the outside wheel on the right will have passed to the point indicated by the dotted lines *c'* on the right, while the cog *b'* of the middle wheel will have passed to the dotted lines *d'*, thus leaving the cogs all in line, as seen by the dotted lines of the twister-wheels, Fig. 1, all the cogs having changed half the distance of their "pitch," leaving the point of one set of cogs at *e'* just opposite the opening *z*, Fig. 1, of the shuttle-casing.

It will be seen that even in this position the wire may pass either side of the pointed cogs into the center of the casing or shell *f'*, Fig. 1. I prefer not to have the twister-wheel in this position, though it will work if it should stop there. The wire passing in at the fork on the previous round by this half-cog turn of the twister will now be held at *g'*, Fig. 1, and when the twister shall have passed the extra cogs *h'* and *i'*, Fig. 1, the twister-wheel will have been turned so that the secured wire will be nearly opposite the opening of the fork, while the other end of the wire band will enter at the proper place, thus leaving the two ends divided for a short twist, as seen by the dotted lines *j' k'*, Fig. 3. I cut away the shell or casing in a curved line, as seen at *l' l'*, Fig. 1, so as to permit the wire to pass by the end of the cog in case it should at any time stop at that point.

Having thus described my invention, what I claim is—

1. The herein-described twister, consisting of the three spur-wheels *a b c*, when constructed and arranged to operate substantially as described.

2. The shuttle-race D, provided with the cogs, constructed and arranged as herein described, whereby the twister is caused to twist the band, cut off the wire, and retain the spool end of the same, substantially as and for the purpose set forth.

3. The twister-wheels *a*, *b*, and *c* united by and journaled on a bolt which has no other support, the said wheels and bolt being fitted loosely within the shuttle, substantially as shown and described.

STEPHEN D. CARPENTER.

Witnesses:

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