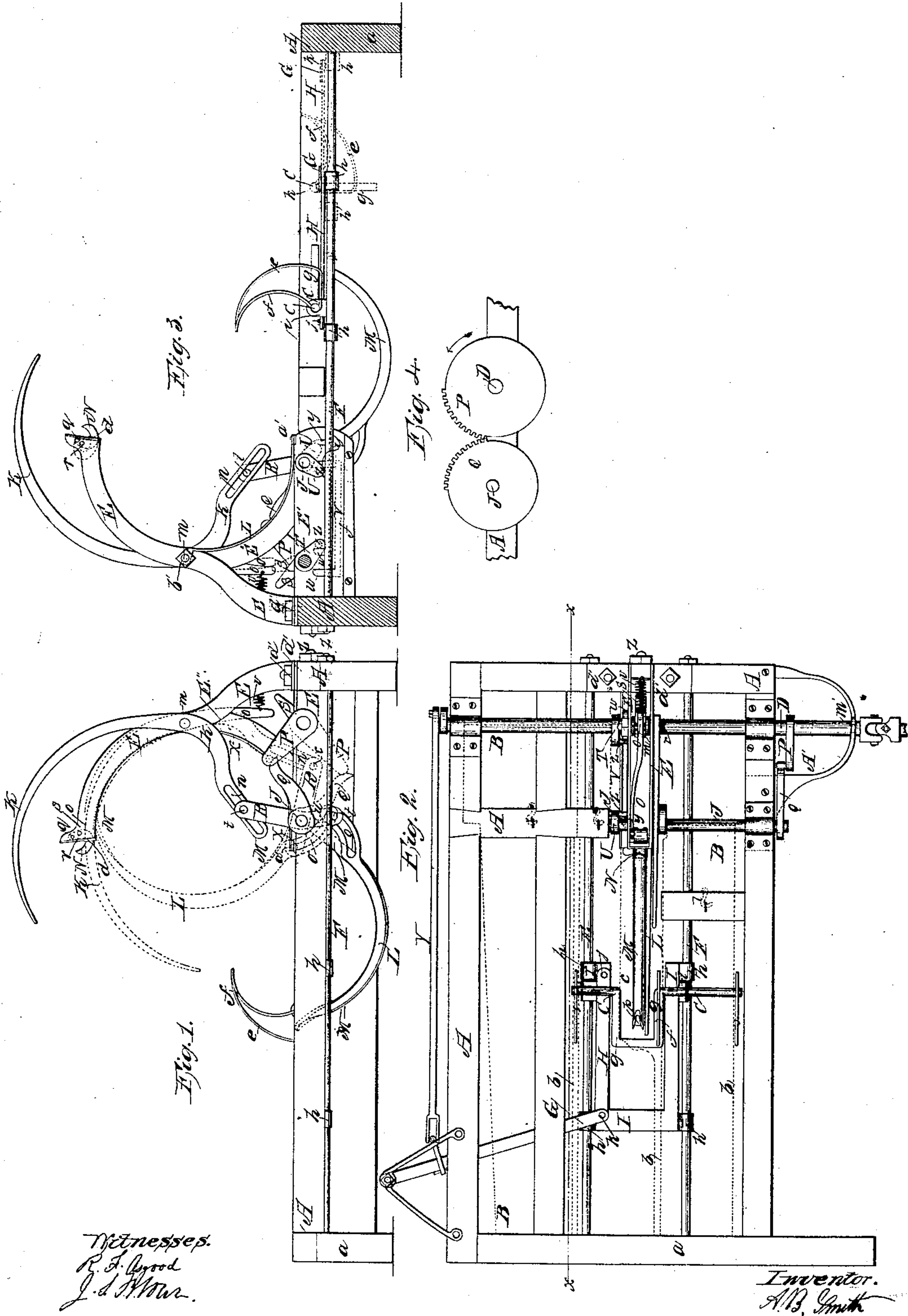


A. B. SMITH.
RAKE AND BINDER.

No. 39,358.

Patented July 28, 1863.



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A. B. SMITH, OF CLINTON, PENNSYLVANIA.

IMPROVEMENT IN RAKING AND BINDING APPARATUS FOR REAPING-MACHINES.

Specification forming part of Letters Patent No. 39,358, dated July 28, 1863; antedated January 20, 1862.

To all whom it may concern:

Be it known that I, A. B. SMITH, of Clinton, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Raking and Binding Apparatus for Reaping-Machines; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification—

Figure 1 being a front elevation of the apparatus provided with my improvements; Fig. 2, a plan thereof; Fig. 3, a vertical section thereof, in the plane indicated by the line *x x*, Fig. 2; Fig. 4, a modification of one of the parts detached.

Like letters designate corresponding parts in all of the figures.

The principal features of this invention are substantially the same as described in the specification of the Letters Patent granted to me on the 19th day of June, 1860. I employ similar compressing-arms, K L, a similar binding-arm, M, and a band constructed and operating in the same manner.

My present improvements relate to the arrangement and operation of these principal parts, and of the parts subservient thereto; and to the construction and arrangement of the raking apparatus operating in connection therewith.

The frame A, in which the parts are mounted, may be of any suitable and convenient construction, being provided with a supporting-shoe, *a*, at its outer end, and has a platform on top, (not shown in the drawings, but indicated in outline by dotted lines in Fig. 2,) upon which the grain falls as fast as cut.

The binding apparatus is secured in a separate frame-work, composed of a double-plate casting, E, a double-plate casting, E', and connecting-braces E'' E''. The castings E E', are provided with flanges *d' d'*, by which they are secured together with bolts. These same flanges, thus united, fit over the top of the side timber of the main frame A, while the body of the casting E', or a vertical flange thereon, abuts against the inside of the same timber, so that by passing a single bolt, Z,

through the flange and timber, and securing it fast by a nut and screw, the said entire frame E E' is firmly attached to the main frame A, but in such a manner as to be quickly taken off, and as quickly and easily attached again thereto. This is a very convenient arrangement, since it enables that portion of a machine to be taken off and carried separately when the machine is to be shipped or transported to a distance, and also allows it to be attached to different machines without change.

Both the binding apparatus and the rake derive their movements from a single revolving shaft, D, which is coupled to a shaft on the driving part of the machine, in the manner represented in Fig. 2.

The compressing-arms K L and binding-arm M are operated more immediately by a rock-shaft, J, which has an intermitting reciprocating movement given to it at the moment and to the extent required—first in one direction by a revolving cam, P, on the shaft D, acting upon a tappet, Q, on the rock-shaft J, as shown in Fig. 1, and then in the other direction by means of another cam, T, Fig. 3, on the shaft D, provided with a projecting pin, *z*, which strikes a projecting stud, *w*, on a sliding bar, V, thus drawing said bar along endwise, while a similar stud, *y*, projecting from the other end of the bar, strikes, in its movement, a pin, *z'*, projecting from another tappet, U, which projects from the rock-shaft J, thereby effecting the return vibration of said rock-shaft. This bar V slides in a groove formed by screwing a cast-iron ledge, *f'*, of the proper form, to the frame E'. The bar slides freely, and remains in any position in which it is left. Its return is effected by the tappet U, when the opposite movement is given to the rock-shaft J.

Instead of the cam P and tappet Q for giving one motion to the rock-shaft J, the device represented by the corresponding letters in Fig. 4 may be employed. The disk P, being provided with cogs upon the required portion of its periphery, in the course of each revolution on the shaft D gears into corresponding cogs on a portion of the periphery

of a similar disk, Q, on the rock-shaft J, and becomes ungeared therefrom, when the required extent of movement has been thus imparted to the said rock-shaft.

The upper compressing-arm K is pivoted to the frame E at *m*, as shown, and its proper movement is obtained by means of a pin, *t*, which projects from an arm, R, on the rock-shaft J, working in a suitable cam-slot, *n*, in the lower end of said compressing arm as the said rock-shaft vibrates.

The lower compressing-arm L is pivoted to the frame E at *u*, Fig. 1, and its required movement is obtained by means of another pin, *t'*, which projects from the other projecting end of the arm R, working in a cam-slot, *o*, in said compressing-arm.

The binding-arm M is secured directly to the rock-shaft J, and vibrates with it.

The relative positions of the above-described parts, when the compressing-arms are open for the reception of the grain from the rake, are exhibited in Figs. 1, 2, and 3, and the relative positions of the same parts, when the compressing-arms are closed around the bundle of grain, are indicated in Fig. 1.

The lower interior part of the frame E E' is covered with a curved shield, X, as shown in Figs. 1 and 3, so that the grain may not get tangled in the frame, and for the purpose of assisting in the compression of the sheaf or gavel.

This shield is secured at its lower end to the frame E' by screws or bolts *a'*, and the upper end is simply provided with a curved claw, *b'*, Fig. 3, which hooks around the pivot-bolt *m* in the frame E, and is held there by a nut screwed upon the end of the bolt. Thus the claw of the shield may be removed by simply loosening the nut.

I employ an improved arrangement for operating the hook N, on which the loop of the band is suspended. The bands are the same as described in my previous Letters Patent, above referred to; and the looped end is suspended from the hook N, situated at the upper end of the frame E, while the knot or button end is placed in the notch *p*, in the extremity of the binding-arm M, substantially as therein described.

The upper outer edge of the hollow or aperture in which the band-hook N works is provided with a thin projecting lip, *a*, substantially as shown in Figs. 1 and 3, so that a portion of the band is supported thereon, thereby allowing the hook N to retreat with greater facility, and preventing the entrance and wedging of the band into the space between the hook and frame E, as would otherwise be the case.

The hook N is caused to retreat into the frame E, to release the loop of the band, after the binding-arm M carries the knot end of the band through it, and is pushed out again into its proper position for holding another band by means of a lever, O, vibrating on the

pivot *m* in the frame E. The hook N is substantially of the shape shown in Figs. 1 and 3, and is freely suspended from a pivot, *q*. Below the pivot *q*, projecting from one side of the hook, is a pin, *r*, which is received into a notch, *s*, Figs. 1 and 2, in the upper end of this lever O, so that by the vibration of said lever the hook N is entirely drawn into its recess in the frame E, as indicated in Fig. 3, or moved outward into the position represented, where it is held, except at the moment of tying the band, by a spring, *v*, drawing upon the lower end of the lever, as represented. The backward vibration of the lever is effected by a cam, S, attached to the driving-shaft D, striking the heel or lower end thereof, as indicated in Fig. 3.

The rake-head C is hinged or pivoted in the bearings *i i* of a sliding carriage, I, which is provided with suitable bearings *h h*, embracing parallel rods F F. These rods serve as very suitable and cheap ways on which the rake-carriage slides.

To the forward end of the rake-carriage I a rod or link, H, is pivoted at *f*, and extends backward near to the other end of the carriage, where it is also pivoted at *k* to the vibratory driving-arm G, substantially as shown in Fig. 2. As the arm G is swung forward and backward by the connecting-rod or pitman Y, which is operated by a crank on the main shaft D, the rod H vibrates so as to adapt its position to the arc of the circle in which the arm G moves, without varying materially from the direction of the carriage's motion. Thus great freedom of motion is secured—much superior to that of the ordinary arrangement of a slot sliding on a stationary pin.

In order to gather the grain into the compressing and binding arms in the most perfect manner, the rake should advance somewhat beyond or within the ends of the arms L M, as they lie at rest beneath the platform. But since these arms, when in that position, (shown in the drawings,) necessarily lie across the pathway of the rake-head, some suitable arrangement is required to enable the rake-teeth *f f* to advance forward to the required position inside of said arms. I accomplish this by forming a crank-shaped bend, *g*, in the rake-head C, opposite to the position of the said arms L M, of sufficient length and width for the purpose, substantially as shown in Fig. 2. Thus the straight portions of the rake-head from which the rake-teeth *f f* project are allowed to advance any desired distance beyond the ends of the said arms, so as to completely gather up each bunch of grain, and prevent tangling when the arms rise around it.

Against the back of each rake-tooth *f*, I secure a guard, *e*, shaped and situated so as to be nearly or exactly concentric with the axes of the rake-head, in order that, when the rake is in the act of turning down beneath the

platform previous to its backward movement, as shown in Fig. 3, no grain may get caught beneath the back of the teeth, and thereby become tangled in the platform.

The platform (represented by dotted lines in Fig. 2) is secured at the outer end to the frame A, by slipping the ends of the boards or strips composing it into long notches or recesses in the outer edge of the frame, and fastening the other ends by staples passing up through them from the frame below, and inserting hooks or latches in the staples, as shown at *ll*, Fig. 2. Between the boards or strips of the platform are narrow spaces *bb*, for the rake-teeth *ff* to pass through, and a larger space, *c*, is left for the arms L M to descend through. This space or opening also serves as a recess for the bands, as they are freely suspended from the hook N, to hang exactly in the right shape and position beneath the surface of the platform, and thus insure their being brought directly around the sheaves or gavels. Otherwise, if lying loosely and irregularly on the platform, or in a hollow thereof, they would be caught in the tangled grain, and could only be brought straight around the sheaves by drawing upon them with considerable force, and then not perfectly. Thus an unnecessary strain on the bands is obviated.

The frame A is provided with an arm or brace, A', projecting forward as nearly under the center of the reaper as practicable. This brace has an eye or a staple, *m'*, by which the frame A is suspended from the reaper at this point. Thus the weight of this part of the platform is sustained nearly at the center of

the reaper, where most desirable, and the motion of the shaft D is but slightly affected by the rising and falling and other irregular motions of the reaper.

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

1. The arrangement of the parts E E' E'', composing a separate and complete frame, and so as to be attached to the main frame A by a single bolt, Z, substantially as and for the purpose described.

2. The combination and arrangement of the cam T, sliding bar V, and tappet U, substantially as set forth, for the purpose of producing the return vibratory motion of the rock-shaft J to open the compressing and binding arms by a positive movement.

3. The combination and arrangement of the vibrating lever O, its notch *s*, and the pin *r*, for operating the band-hook N, substantially as herein specified.

4. The thin lip *a*, projecting closely over the hook N, in the manner and for the purpose set forth.

5. Carrying the rake forward beyond or within the ends of the arms L M by means of the crank-shaped bend *g* in the rake-head C, or any equivalent means, for the purpose specified.

6. The guards *ee* behind the rake-teeth *ff*, or their equivalents, operating substantially as set forth.

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Witnesses:

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R. F. OSGOOD.