

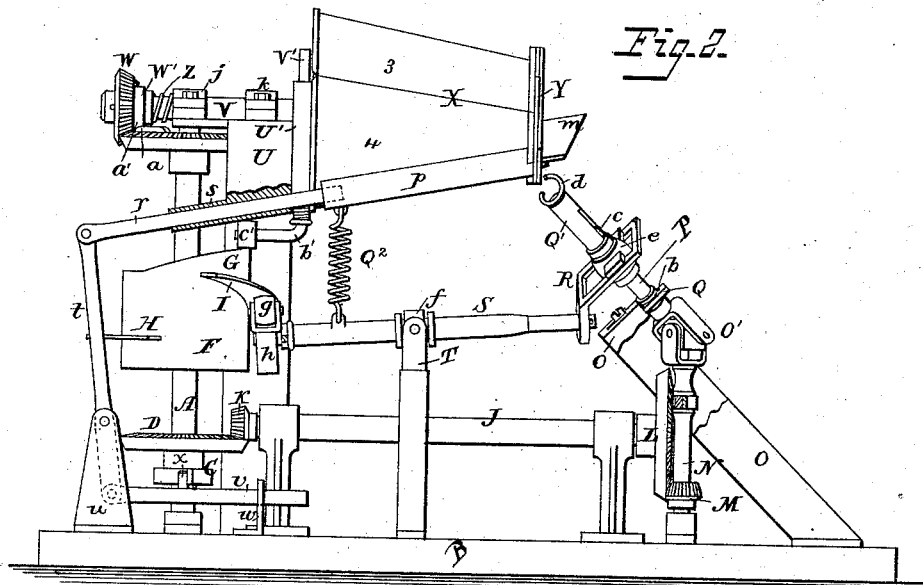
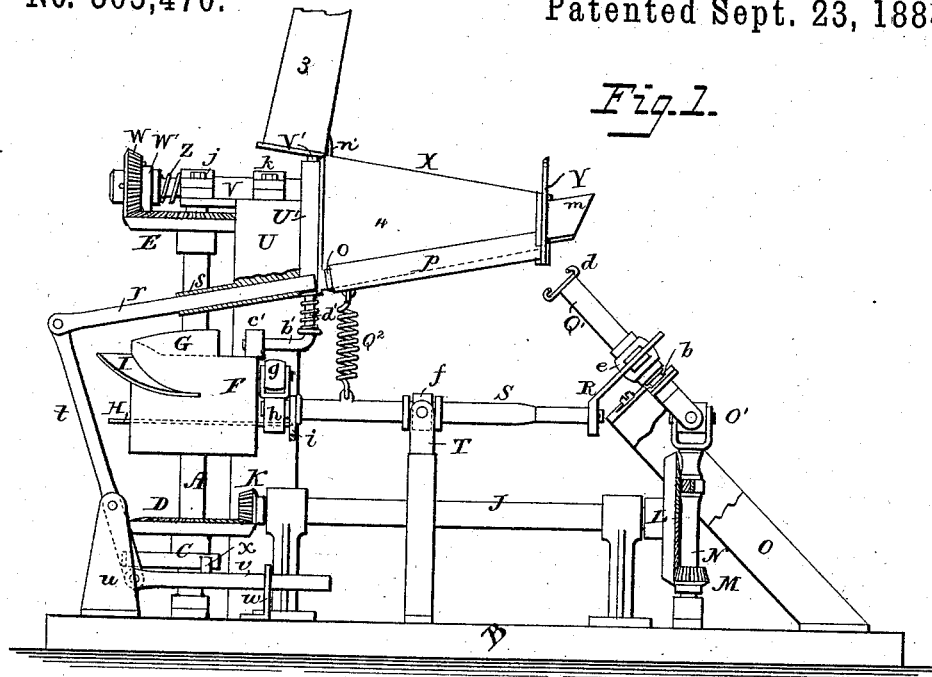
(Model.)

3 Sheets—Sheet 1.

J. A. PAIGE.  
GRAIN BINDER.

No. 305,470.

Patented Sept. 23, 1884.



Attest:  
C. A. Cooper,  
A. E. Hannemann.

J. A. Paige Inventor:  
By Charles E. McKim  
att'y

(Model.)

3 Sheets—Sheet 2.

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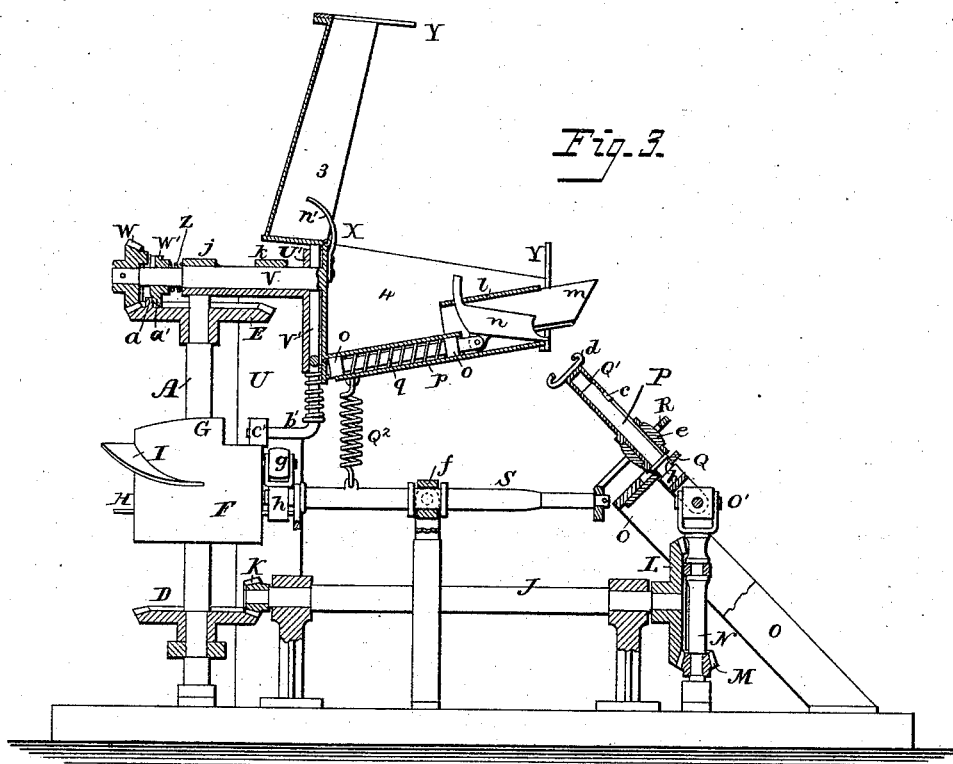


Fig. 3.

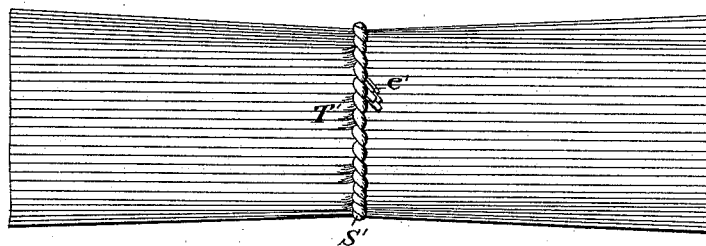


Fig. 5.

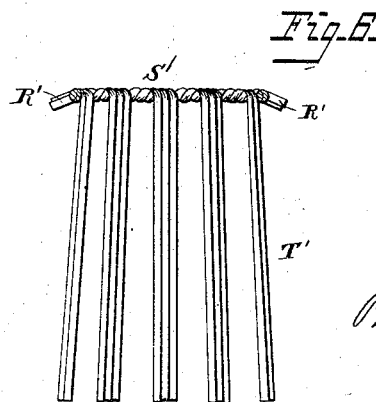


Fig. 6.

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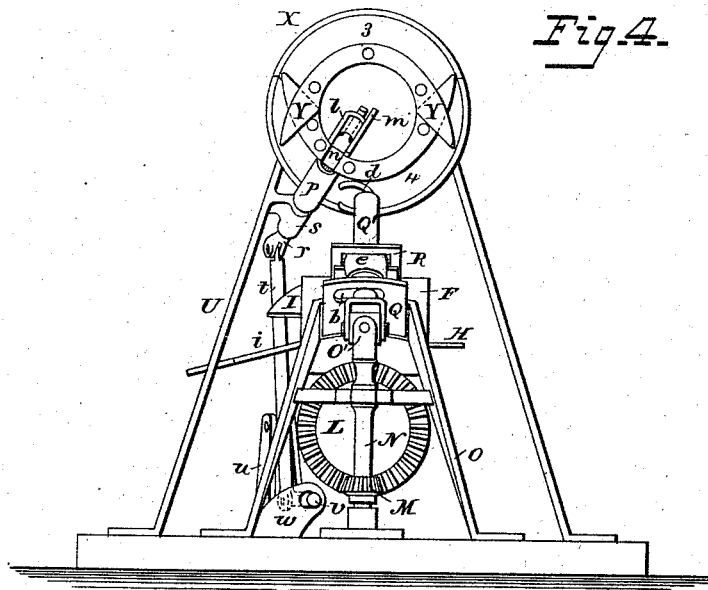
(Model.)

3 Sheets—Sheet 3.

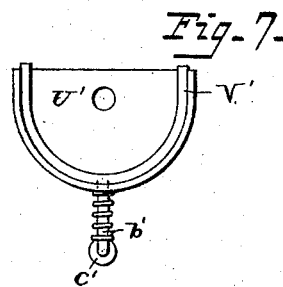
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*Fig. 4.*



*Fig. 7.*

*Attest:*  
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*H. E. Tansmann*

*J. A. Paige*  
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# UNITED STATES PATENT OFFICE.

JEREMIAH A. PAIGE, OF WARNER, NEW HAMPSHIRE.

## GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 305,470, dated September 23, 1884.

Application filed May 7, 1883. (Model.)

*To all whom it may concern:*

Be it known that I, JEREMIAH A. PAIGE, of Warner, Merrimack county, New Hampshire, have invented certain Improvements in Grain-Binders, of which the following is a specification.

My invention relates to grain-binders; and it consists in means for revolving the bundle while being bound, and also in means for forming the entwining band from a part of the straw forming the bundle, carrying the band around the bundle, and securing it thereto, all of which will be hereinafter particularly specified.

In the drawings, Figure 1 is a side elevation with parts of the supporting frame or standards broken away, showing the position of parts at the commencement of the binding operation. Fig. 2 is a similar view showing the position of parts at the close of the binding operation. Fig. 3 is a longitudinal section through Fig. 1. Fig. 4 is an end view. Fig. 5 is a view of the bound bundle, and Fig. 6 is a view of the band detached from the bundle. Fig. 7 is a detached view of the flanged segmental plate and spring-actuated fork.

In the accompanying drawings, the letter A indicates a vertical shaft stepped in the base B, and provided near its lower end with a cam, C, and above the cam with a bevel-gear, D, while the top of the shaft carries a bevel-gear, E, which has a cam, *a*, formed on its top face. The same shaft has keyed or otherwise secured to it between its ends a cylinder, F, which has on its top a beveled flange or cam, G, and on its sides a horizontal flange, H, and inclined flange I, all as illustrated.

A horizontal drive-shaft, J, supported in suitable bearings, has a pinion, K, at one end, which meshes with gear D, and a bevel-gear, L, at the opposite end, with which meshes a pinion, M, keyed to the vertical shaft N. This shaft is braced by a cross-bar extending from a frame, O, and is connected at its upper end by a universal joint, O', with a shaft, P, which swings laterally in a slot, *b*, formed in a plate, Q, adjustably secured to the frame O. The shaft P, by reason of its universal connection with shaft N, is free to revolve and have a universal movement, and it fits into a sleeve, Q', which is slotted longitudinally to receive a pin, *c*, on the shaft, so that the sleeve will

revolve with the shaft, and at the same time be free to slide longitudinally thereon. The sleeve is provided at its free end with a worm, finger, or hook, *d*, and is journaled at its lower end in a box, *e*, which slides in a frame, R. This frame is rigidly connected to one end of an oscillating and partially rotating or rock shaft, S, which is journaled in a box, *f*, swiveled in frame T, and which has connected to its other end a friction-roller, *g*, and a downwardly-extending cam, *h*. The purpose of connecting the sleeve Q' to the shaft S is to communicate to the former the movement of the latter, which is a rising and falling and side movement.

A spring, Q<sup>2</sup>, connected to the oscillating shaft and to any suitable part of the binder, may be employed to throw up the end of the shaft next to the cylinder on shaft A, so that when the flange H reaches cam *h* it will strike the latter, and by pressing against its under face turn the shaft so as to throw the frame R and revolving sleeve Q' at the opposite end from one side to the other. The same result will follow without the use of the spring; but the spring insures it.

A rod, *i*, may extend from shaft S to the leg of a standard, U, so as to prevent the shaft from being forced too far to one side; but its employment is not essential. The frame R and revolving sleeve Q' and its shaft are thrown back to the opposite side, and at the same time upward, by cam I on the cylinder F striking against and bearing down on the friction-roller *g*. As soon as the cam I passes from off the roller the spring already referred to or the preponderance of weight of the frame end of the shaft lowers the sleeve Q' and elevates the opposite end of the shaft S sufficiently for the cam to be struck by the flange H on the cylinder F, as before.

A horizontal shaft, V, journaled in boxes *j* and *k*, resting on standard U, is provided at one end with a loose pinion, W, which meshes with the bevel-gear E, and is rigidly connected at the opposite end to one section of a sectional conical gavel-holder, X. This conical gavel-holder is divided longitudinally into two parts, one section, 3, being hinged to one end of the section 4, which is secured to the shaft V. The shaft V has feathered to it at the end next to loose pinion W a clutch, W',

which is held in connection with pinion W by a spring, Z, so that the holder will revolve with the pinion, except when cam *a* of the bevel-gear E comes in contact with a lug, *a'*, on the clutch and forces the clutch away from the pinion, when the holder will remain stationary till the cam passes from the lug and allows the spring to force the clutch back into connection with the pinion. To the forward end or mouth of the conical gavel-holder spurs Y are secured, which overlap each other when the sections or jaws of the gavel-holder are closed. Secured to the inside of the lower section or jaw of the gavel-holder is a tube, *l*, with one side prolonged and extending out of the mouth of the gavel-holder to form a finger, *m*, and within the tube is a finger, *n*, pivoted to a rod, *o*, which slides in a tube, *p*, secured to the outside of the gavel-holder. The finger *n*, when projected, is thrown upward into tube *l* and outward alongside of finger *m*, and is retracted by a spring, *q*, coiled around the rod *o*. The rod *o* is moved forward once in every revolution of the holder by means of a rod, *r*, striking its end and pushing it forward, the rod *r* resting in a guide, *s*, and being hinged at one end to a lever, *t*, which is pivoted or hinged in a bracket, *u*, and jointed to a rod, *v*, which slides in a keeper, *w*. The rod *v* is provided with a pin, *x*, against which the cam C strikes and moves the rod once in every revolution of shaft A. The rod *r* strikes rod *o* while the sectional gavel-holder is at rest, so that the tucking-finger *n* will be projected at that time. At such time the hinged section of the holder is on top, and would be thrown open by a spring, *n'*, on the inside of the holder, were it not held closed by the prongs of a fork, V', the lower arm, *b'*, of which is curved, and provided on its end with a friction-roller, *c'*, and encircled by a spring, *d'*. The prongs of the fork are held up across the hinged section of the gavel-holder by the cam G, pressing up against the friction-roller *c'*, and when the cam passes from under the roller the spring *d'* throws the fork downward and away from the hinged section, so that the section may be thrown open by the spring inside the holder. The gavel-holder remains at rest, after the fork has receded and the tucking-finger retracted, long enough to permit the bound bundle to be ejected from the holder and straw enough for another bundle to be placed therein. At the end of that time the clutch on the shaft of the gavel-holder connects with the loose pinion, and the holder carrying the gavel begins again to revolve. The hinged section of the gavel-holder is closed and held closed during its rotation by a flanged segmental plate, U', secured to the standard U. This plate, through which shaft V passes, does not extend above the hinge-joint of the two sections of the gavel-holder X, and consequently permits the hinged section of the holder to be thrown back, and will also hold the sections closed just as soon as the holder revolves far enough to bring the

hinged joint obliquely below the top line of the segment. The flanges of the plate serve to hold the prongs of the fork V' in place.

A pinion-shaft (not shown in the drawings) will connect bevel-gear D with the reaper, so that motion will thereby be communicated to the shaft A. A reel (not shown in the drawings, but journaled in suitable bearings, so as to revolve, and adapted to have motion communicated to it from the reaper, and to receive the straw from some suitable elevating mechanism,) will deliver the straw into the open gavel-holder X. The straw may be placed in the holder by hand, and the device operated by power received from any other source than the reaper.

In operation the straw is fed into the conical gavel-holder while its upper section is raised, with the heads next to the closed end of the holder and the butts extending out of its mouth, the several parts of the binder being in the position shown in Figs. 1 and 3. The shaft A is now set in motion, when the gavel-holder revolves, and the hinged section is closed by the joint passing down next to the segmental plate, and the spurs Y made to clasp the straws and hold them tightly, so that none will fall out of the holder. At the same moment that the holder begins to revolve the sleeve at the end of the oscillating shaft begins to turn, and the finger *d* on the sleeve takes hold of a portion of the straws and twists them into a band. The holder, as it continues to turn, carries with it the bundle inclosed therein, while the straw band is formed around the bundle. As the ends of that portion of the straws first grasped and twisted by the revolving finger and passed partially around the bundle by its rotation are nearly reached, the worm-finger on the sleeve catches up other straws from the bundle and entwines them with what remains of what was first taken up, so as to make a continuation of the band, and so on until a band long enough to reach around the bundle is formed and the worm-finger brought to its first or starting position. The revolving sleeve turns in its starting position until the inclined flange or cam I on the side of the cylinder F strikes the friction-roller *g* on the end of the oscillating shaft, when the sleeve Q' is thrown outward to one side, carrying with it the worm-finger and straws held by the same, where it revolves, while it is raised upward by the cam I, pressing down the inner end of the oscillating rock-shaft until the worm, with the band, is at a point where the tucking-finger *n* in the tube on the gavel-holder is projected by the impelling-rod, so as to strike and take the end of the band out of the finger on the sleeve and tuck it under the other portion of the band, which is wound round the sheaf or bundle. The impelling-rod *o* is moved by means of rods *r*, *t*, and *v*, operated at the proper time by the means hereinafter described. As soon as the end of the band is tucked, the tucking-finger is retracted by the spring *q*, the impelling-rod

7 assumes its first position, and the bound bundle is ejected either by hand or by an automatic device. (Not shown.) In the meanwhile the horizontal flange H on the main shaft-cylinder F has struck the cam h on the oscillating and vibrating shaft, so as to lower the sleeve and worm, finger, or hook and throw it inward to its first position, ready to form the band for the next bundle. By the time that the band is tucked the cam G on the top of the main-shaft cylinder has passed from under the fork-arm V' and the latter has been forced down from behind the hinged section of the gavel-holder, so that the section may be thrown back, after which straw enough for the next bundle is fed into the holder, the latter revolved, and the hinged section closed, and the parts operated as in the first instance.

The band detached from the bundle appears as in Fig. 6 with the straws T' taken up from the bundle at intervals and united by twisting together, so as to form a band, S', with ends R extending therefrom. As these ends form part of the bundle and entwine more or less with the other straws of the bundle, they will assist very greatly in holding the band on the bundle. The tuck or tie of the band appears as seen at e'.

I have described the form which I consider best for the gavel-holder and other parts; but other forms may be used instead without departing from the spirit of my invention.

Having described my invention and set forth its merits, what I claim is—

1. The combination of the revolving sectional gavel-holder, the revolving, sliding, and laterally-moving hook, located, as described, near the mouth of the holder, and supported in suitable bearings, means for revolving the hook and moving it laterally and longitudinally to form a band, and a device for taking the end of the band from the twister and tucking it into the material in the gavel-holder, substantially as set forth.

2. The combination of the main drive-shaft provided with lower bevel-gear, the horizontal shaft provided with the bevel-pinion at one end and the bevel-gear at the other end, the

upright shaft having the pinion at its lower end and a rod connected to its upper end by a universal joint, the sleeve provided with the hook at one end and connected to the universal jointed rod, so as to revolve therewith and slide thereon, the oscillating rock-shaft provided with the frame at one end and cam and friction-roller at the other end, and connected with the hooked sleeve by a sliding box, the horizontal and inclined flanges on the main driving-shaft, and the gavel-holder operated from the main shaft, substantially as and for the purpose set forth.

3. The combination of the sectional gavel-holder, the segmental plate at the rear thereof, the spring-actuated fork between the segmental plate and rear end of the holder, and the cam on the main drive-shaft for raising the fork, substantially as and for the purpose set forth.

4. The combination of the sectional gavel-holder, the shaft for revolving the same, provided with the loose pinion and the clutch, the spring-actuated fork at the rear end of the holder, and the main drive-shaft having a cam to operate the said fork, and a bevel-gear provided with a cam to operate the said clutch and pinion, substantially as set forth.

5. The combination of the revolving gavel-holder, the tucking-finger connected thereto, the lever and rods for projecting the finger, and the cam on the main drive-shaft for operating the lever, substantially as and for the purpose set forth.

6. The combination of the sectional gavel-holder provided with the spurs at the mouth thereof, and the tucking-finger, the spring-actuated fork at the rear of the holder, and means for revolving the cylinder, operating the said fork, and projecting the said finger, substantially as and for the purposes set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

J. A. PAIGE.

Witnesses:

LEWIS W. CURRIER,  
RUFUS WEBSTER.