(Model.)

3 Sheets—Sheet 1.

G. DAVIS.

GRAIN BINDER.

No. 265,661. Patented Oct. 10, 1882.

Fig. 1

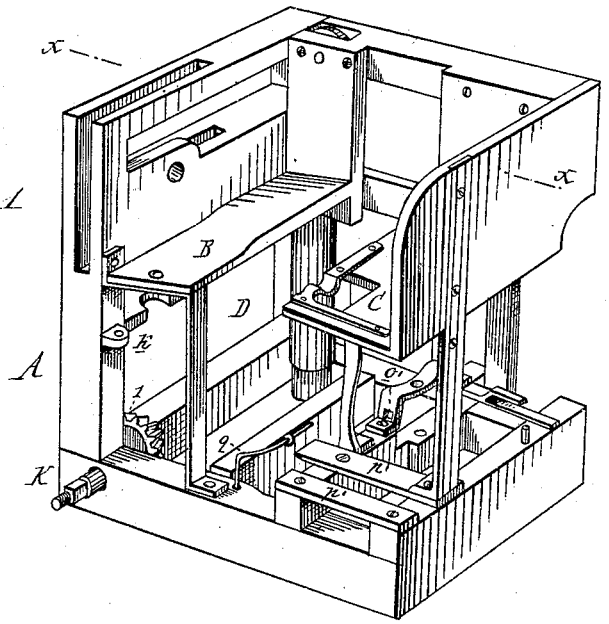

Fig. 3

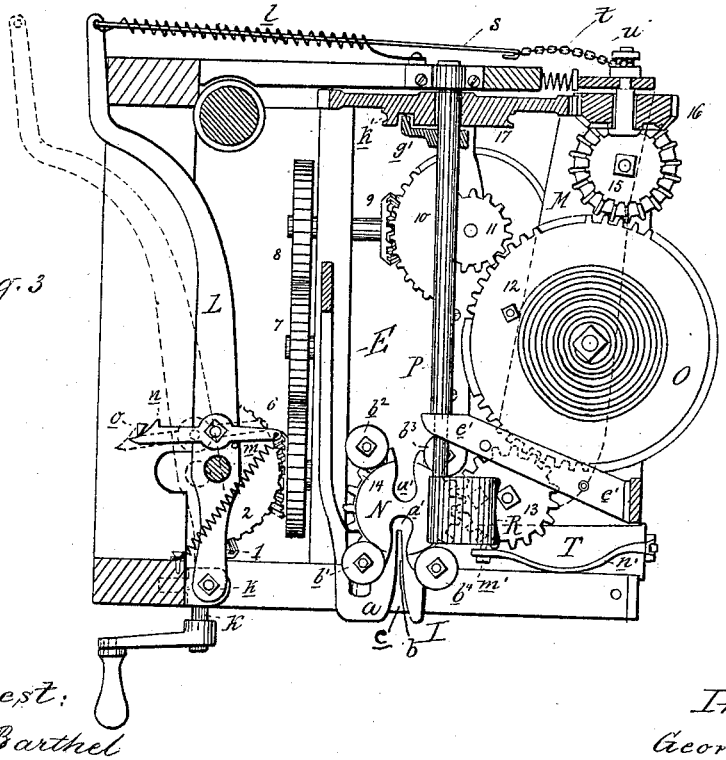

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Fig. 2

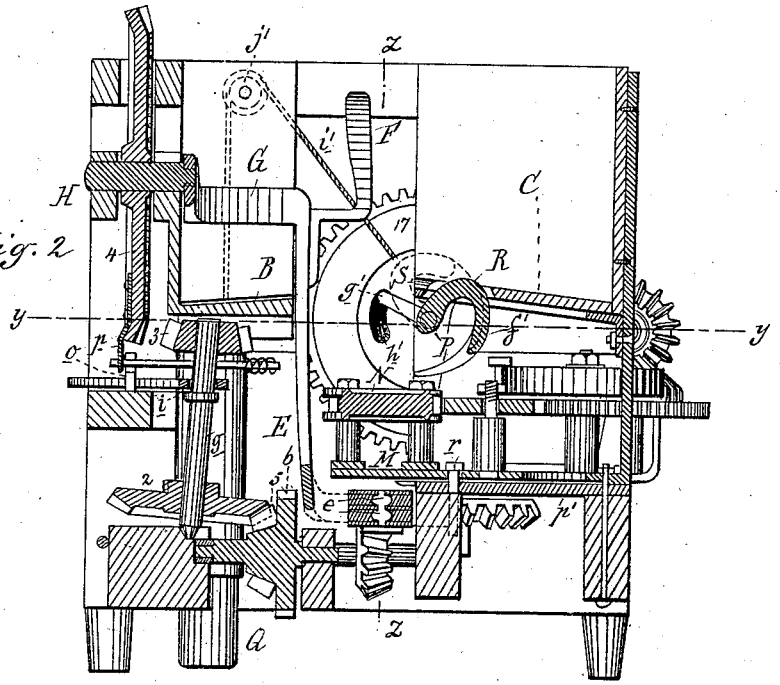
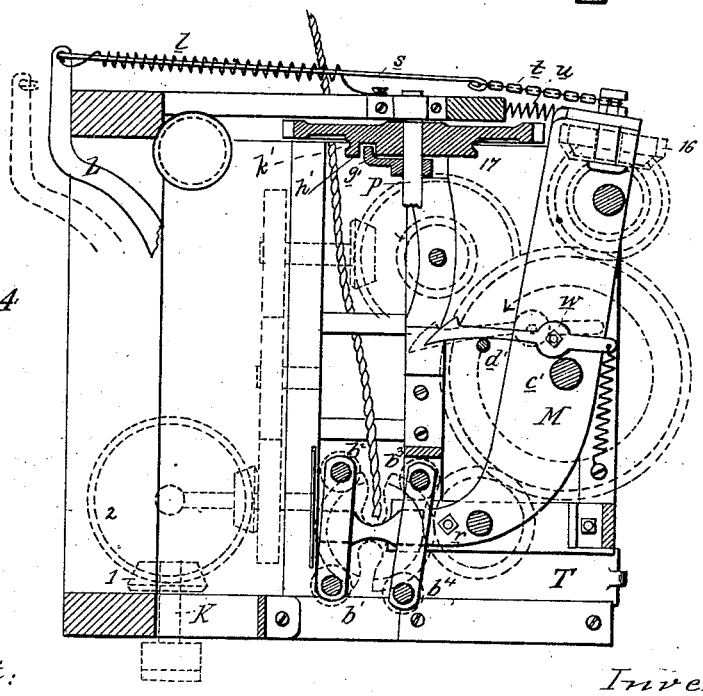


Fig. 4



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3 Sheets—Sheet 3.

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Fig. 5

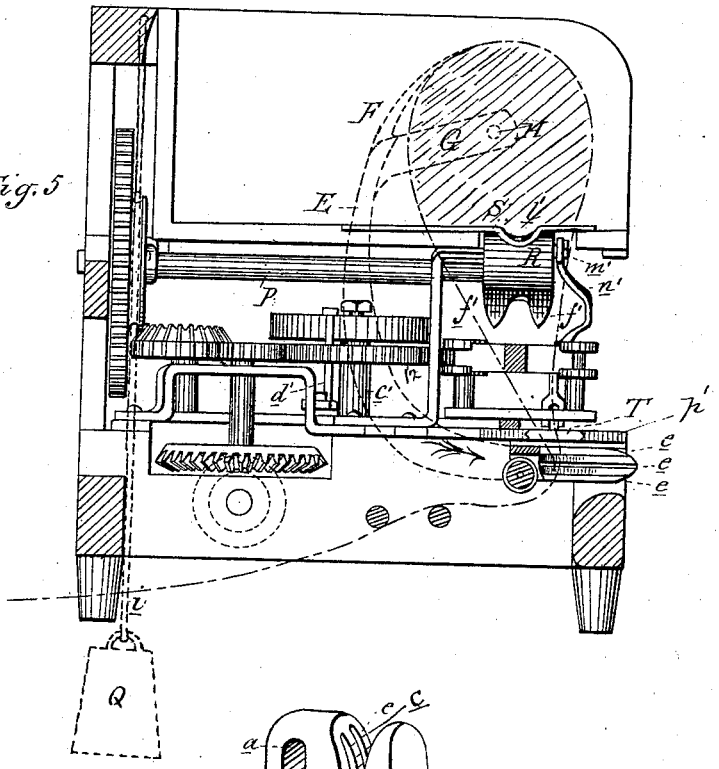
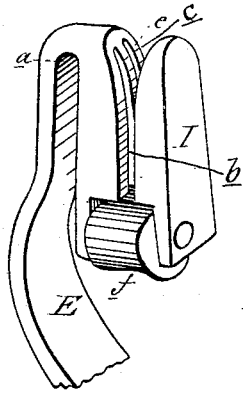


Fig. 6



Attest:
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UNITED STATES PATENT OFFICE.

GEORGE DAVIS, OF MILFORD, MICHIGAN.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 265,661, dated October 10, 1882.

Application filed September 28, 1881. (Model.)

To all whom it may concern:

Be it known that I, GEORGE DAVIS, of Milford, Oakland county, State of Michigan, have invented new and useful Improvements in Grain-Binders, of which the following is a specification.

My invention relates to that class of grain-binders where a straw band is used for binding the gavel; and the novelty consists in the construction and arrangement of parts, as will be more fully hereinafter set forth, and specifically pointed out in the claims.

In the drawings which form a part of this specification, and wherein like letters indicate like parts, Figure 1 is a perspective view of the frame of my machine with the operating parts removed. Fig. 2 is a vertical central section on line *x x* of Fig. 1, with the operating parts in place. Fig. 3 is a plan view of the machine, taken below a horizontal plane which passes through the line *y y* in Fig. 2. Fig. 4 is the same view as Fig. 3; but the train of gear-wheels which give motion to the various parts are only shown in dotted outlines, so as to expose to view portions of the machine otherwise hidden from view. Fig. 5 is a vertical cross-section of the machine on line *z z* in Fig. 2. Fig. 6 is a detail perspective view of the under side of the head of the binding-arm.

In the drawings, A represents the frame which gives support to the entire mechanism of my binding apparatus. The space contained therein is divided in an upper and lower section by the platform-sections B and C, which together constitute the grain-binding platform, and between which is an opening, D, which completely divides the two sections B and C, and is wide enough to give passage to the binding-arm. The platform-section B gives support to the grain end of the sheaf, and, for purposes hereinafter explained, it is inclined, being slightly higher on its inner edge. The platform-section C is inclined in an opposite direction, as shown in section, Fig. 2. It is also slightly raised above the platform B, and by supporting the butt-end of the sheaf the latter is firmly supported during the operation of binding. The platform-sections B and C, together with the sides of the frame A, form an inclosed receptacle, only open at top and in front, giving access thereto for feeding and discharging the sheaves.

E is the curved binding-arm, to which is adjustably secured, and forming a rear extension thereto, the spring compressor-arm F, both being connected to the crank G, secured to the shaft H, journaled in proper bearings in the frame A. The binding-arm E and compressor F form one continuous curve eccentrically to their center of motion around the shaft H, the free end of the compressor-arm having the shortest radial distance therefrom. The binding-arm E has formed on its forward end the loop *a* (see Fig. 6) and the slit head I, the slit *b* in which is provided with a flaring mouth, *c*, and its cross-section is shown in Fig. 2 as forming two or more distinct throats, *e e*, for the purpose of properly grasping and holding the straw band.

f is a roller on the under side of the heel of the head I. The pinion 1, which is secured to the main driving-shaft K, (see Fig. 1,) gives motion to all the parts of my machine. It actuates the binding-arm through the medium of bevel-gear wheel 2, bevel-pinion 3, and bevel-gear wheel 4, which is keyed upon the shaft H. The bevel-pinion 3 and bevel-gear wheel 2 are secured upon the shaft *g*, Fig. 2, which is stepped into the frame A at *h* and held at *i* by a lever, L, which, when in the position shown in dotted lines in Figs. 3 and 4, brings the bevel-pinion 3 and bevel-gear wheel 4 in engagement; but when in the position shown in full lines, which also corresponds with its position in Fig. 2, the bevel-pinion 3 is disengaged from the bevel-gear wheel 4. The lever L is pivoted at *k*, Figs. 1 and 3. Its free end is connected to the rear side of the frame A by a tension-spring, *l*, Fig. 3. Pivoted upon the lever L is the locking-latch *m*, the hooked end *n* of which engages with the stop *o* when the lever L is drawn into the dotted position shown in Fig. 3, and which operation is performed by the operator of the machine in a convenient manner by means of a lever or otherwise. As soon as the bevel-pinion 3 and bevel-gear wheel 4 are in engagement the latter will commence to rotate; but as soon as one revolution is performed the detent *p*, attached to the bevel-gear wheel 4, will release the hook *n* of the locking-latch *m* from the stop *o*, and the parts will resume their former position, owing to the tension of the spring *l*. The motion of the binding-arm E is therefore

limited to one revolution, and its direction is indicated by an arrow in Fig. 5. To prevent its moving backward accidentally, a spring, *q*, engages into the loop *a* of the binder-arm, holding it in the position shown in Fig. 5, in which the binder-arm is held when at rest.

M is a plate, pivoted at *r*, Figs. 2 and 4, to the frame of the machine on the space below the platform C. This plate M has around its pivotal point *r* a limited horizontally-oscillating movement, allowing it to assume one of the two positions shown in Figs. 3 and 4, respectively. In Fig. 4 the plate M is held in its position by the rod *s* and chain *t*, which connect its upturned rear end with the lever L, the spring *u* exerting its tension to keep the rod *s* and chain *t* taut. The plate M, when in the position shown in Fig. 3, is held therein by the locking-latch *v*, which is pivoted upon the plate M at *w*, engaging with its hooked end into the recess *o'*.

N is the pinion-twister, which is provided with two slots, *a' a'*, of ogee form, Fig. 3, opposite each other and extending from the circumference till near the center. Four friction-wheels, *b' b² b³ b⁴*, carried on cross-bars and posts upon the plate M, Fig. 4, hold the pinion-twister in place and allow it to freely rotate around its center.

In Fig. 3 is shown a train of intermediate spur-wheels and bevel-gear wheels, (marked 2 5 6 7 8 9 10 11 12 13,) which transmit motion from the main shaft and impart to the pinion-twister a rotary motion. The spur-wheel 12 is carried on a post, *c'*, upon the plate M, and carries on its upper side a volute spring, O, which during the proper rotation of the spur-wheel 12 is wound up. The under side of said wheel is provided with a pin, *d'*, Figs. 4 and 5, which, as soon as the spur-wheel has made one whole revolution, strikes the hooked latch *v*, disengages it from its stop *o'*, and thereby allows the plate M, owing to the action of the spring *u*, to assume the position shown in Fig. 4 and part its mesh with the spur-wheel 11. Instantly the action of the watch-spring O will rotate the spur-wheels 12 and 13 and pinion-twister in an inverse way and bring the latter back into its old position—that is, with the slots *a' a'* in the position shown in Fig. 3—where the binding-arm in its travel is enabled to enter the straw band into said slots. Under the inner end of the platform C is located the horizontal shaft P, journaled in the rear side of the frame and in a bracket, *e'*, which also serves as a support to the platform C.

To the front end of the shaft P is attached the tucker R (shown in Figs. 2 and 5) in the form of a two-pronged claw, the two curved prongs *f' f'* being far enough apart and in proper position to straddle the twisted straw band and tuck it into the bundle, in the same way as it is done in binding by hand, by rotating said tucker upon its shaft P from the position shown in Fig. 2 in full lines into the dotted position and back again. This oscillation of the tucker is caused by the following devices:

g' is an arm secured upon the shaft P and engaging in the segmental slot *h'* in the gear-wheel 17, Figs. 2 and 3, which sits loosely upon the shaft P and derives motion from the spur-wheel 12 through the intermediate bevel-gear wheels, 15 and 16. As soon as the spur-gear 17 begins to revolve the arm *g'* will travel through the slot *h'* without imparting any rotation to the shaft P; but as soon as the arm *g'* has traveled through the slot *h'* the shaft P and tucker R will revolve and continue so until the plate M, as afore described, passes from its position in Fig. 3 to its position in Fig. 4, when the bevel-gear wheel 16 releases its mesh with the spur-wheel 17, the latter instantly beginning to rotate in an inverse manner, being actuated thereto by a weight, Q, attached to the cord *i'*, passing over a sheave, *j'*, and attached to the spur-wheel 17, which latter, during its rotation, had wound the cord *i'* upon the sheave *k'*. This reverse movement of the spur-wheel 17 carries the tucker R back into its former position. The tucker R, during its upward rotation, will easily introduce its prongs into the sheaf, carrying the twisted straw-band ends along and tucking the same into the sheaf under the band in the well-known manner, the bar S, having loop *l'*, Figs. 2 and 5, serving as a point of resistance. The inclination of the tables B and C aids the tucker to introduce its prongs into the sheaf.

Attached to the tucker at *m'*, Figs. 3 and 5, is the rod *n'*, which connects the tucker R with the horizontally-reciprocating knife T, Figs. 3, 4, and 5. The knife T is held in position by the guides *p' p'*, and is put in such position to enable it to cut the straw band close upon top of binder-head I, Fig. 5. As soon as the tucker begins to rotate the knife T will be carried forward by its connection therewith and sever the band in advance of the action of the tucker, which in its reverse movement will also carry the knife back into its former position.

In practice, the straw band is introduced into the slit head of the binder-arm E. As soon as a sufficiently large gavel for binding is collected upon the binding-platform the lever L is thrust by the operator into the position shown in dotted lines in Fig. 3. This will, if motion is given to the machine, transmit the power from the pinion 1 to the bevel-gear wheel 4 and rotate the binding-arm, encircling the sheaf with the straw band, and entering the latter also in both slots of the pinion-twister. The detent *p* on the bevel-gear wheel 4 having unhooked the latch *m*, the binding-arm will cease its motion as the bevel-gear 3 falls out of gear, but at the same time the bevel-gear 2 falls into gear with the bevel-gear 5 and conveys motion to the pinion-twister, as the operator, by acting upon the lever L, has likewise, by the connection *s* and *t*, thrown the plate M into the position in which spur-wheels 11 and 12 are meshing. Owing to slot *h'* in

the spur-wheel 17, the tucker 2 and knife T will fall in their movement sufficiently behind the movement of the pinion-twister to give this latter ample time to start its work before the action of the knife and of the tucker begins. As soon as the spur-wheel 12 has made one revolution it will part its engagement with spur-wheel 11 and spring O, and weight Q will bring the pinion-twister, tucker, and knife each to their former positions. The bound sheaf is now ejected from the machine, and the above-described operation of binding will be repeated as soon as the operator thrusts the lever L in the proper position.

What I claim as my invention is—

1. In a grain-binder, the platform consisting of the separate tables B and C, inclined in opposite directions, as and for the purposes set forth.

2. In combination with the forked tucker R and operating mechanism, the bar S, having loop l', as specified.

3. The binder-arm E, having the compressor-sweep F, combined with means, substantially as described, for automatically stopping said arm at each rotation, as specified.

4. The binder-arm E, having binding-head I, with flaring recess c, throats e, and the roller f, combined and operating as and for the purposes set forth.

5. The binder-arm E, having loop a and head I, with throats e, combined with means, substantially as described, for throwing said arm out of operation at each rotating stroke, as set forth.

6. The mechanism for shifting the motion from binder-arm to pinion-twister, consisting of bevel-gear wheel 4, detent p, pivoted lever L, latch m, stop o, bevel-pinion 3, shaft g, and bevel-gear wheels 2 and 5, substantially as described.

7. As a means for throwing the parts of the grain-binder into gear and releasing them automatically, the pivoted lever L and pivoted plate M, each provided with a hooked spring-latch engaging with suitable stops and connected by rod s and chain t, in combination with the revolving detents p and d', substantially as described.

8. The pinion-twister having recesses a', combined with friction-rollers b' b^2 b^3 b^4, and adapted to serve as set forth.

9. In combination with the pinion-twister, the volute spring O, latch v, and detent d', whereby the pinion-twister is enabled to return in its exact position, substantially as described.

10. The claw-tucker R, having prongs f' f', combined with the arm g' and gear 17, and adapted to serve as set forth.

11. The combination of the tucker R, shaft P, arm g', slot h', and gear-wheel 17, as and for the purposes described.

12. The combination of the tucker R, shaft P, sheave k', cord i', sheave j', and weight Q.

13. The combination of tucker R, rod n', and knife T with the shaft P, arm g', gear 17, and weight Q, whereby the said knife is reciprocated automatically, substantially as described.

14. The combination of reciprocating knife T, rod n', tucker R, shaft P, arm g', slot h, and gear-wheel 17, operating substantially as described.

15. The pivoted plate M, in combination with latch v, detent d', stop o', and spring u, for throwing the pinion-twister, tucker, and knife simultaneously out of gear, substantially as described.

16. The combination, substantially as hereinbefore set forth, of the pivoted plate M, a pinion-twister mounted thereon with its actuating-gear, a locking-latch, a detent on the gear acting thereon, a fixed stop, and a volute spring for automatically releasing the pinion-twister and revolving it back in its position.

17. In a machine for binding grain, a combined binding and compressor arm performing one whole revolution around the sheaf in the action of binding it, and defining thereby alone its proper position on the grain-table, substantially as described.

18. In a machine for binding grain, the combination of a combined binder-arm and compressor, a pinion-twister, cutter, and tucker, when constructed and operating automatically substantially as described and shown.

GEORGE DAVIS.

Witnesses:
H. S. SPRAGUE,
E. SCULLY.