(No Model.)

2 Sheets—Sheet 1.

J. F. STEWARD.

GRAIN BINDER.

No. 272,598. Patented Feb. 20, 1883.

Fig. 2.

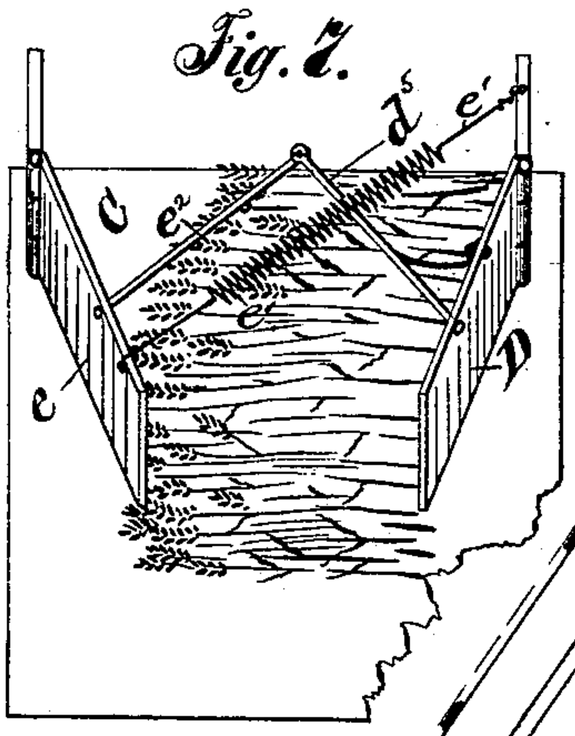

Fig. 1.

Fig. 3.

Witnesses:
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(No Model.)

2 Sheets—Sheet 2.

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GRAIN BINDER.

No. 272,598.

Patented Feb. 20, 1883.

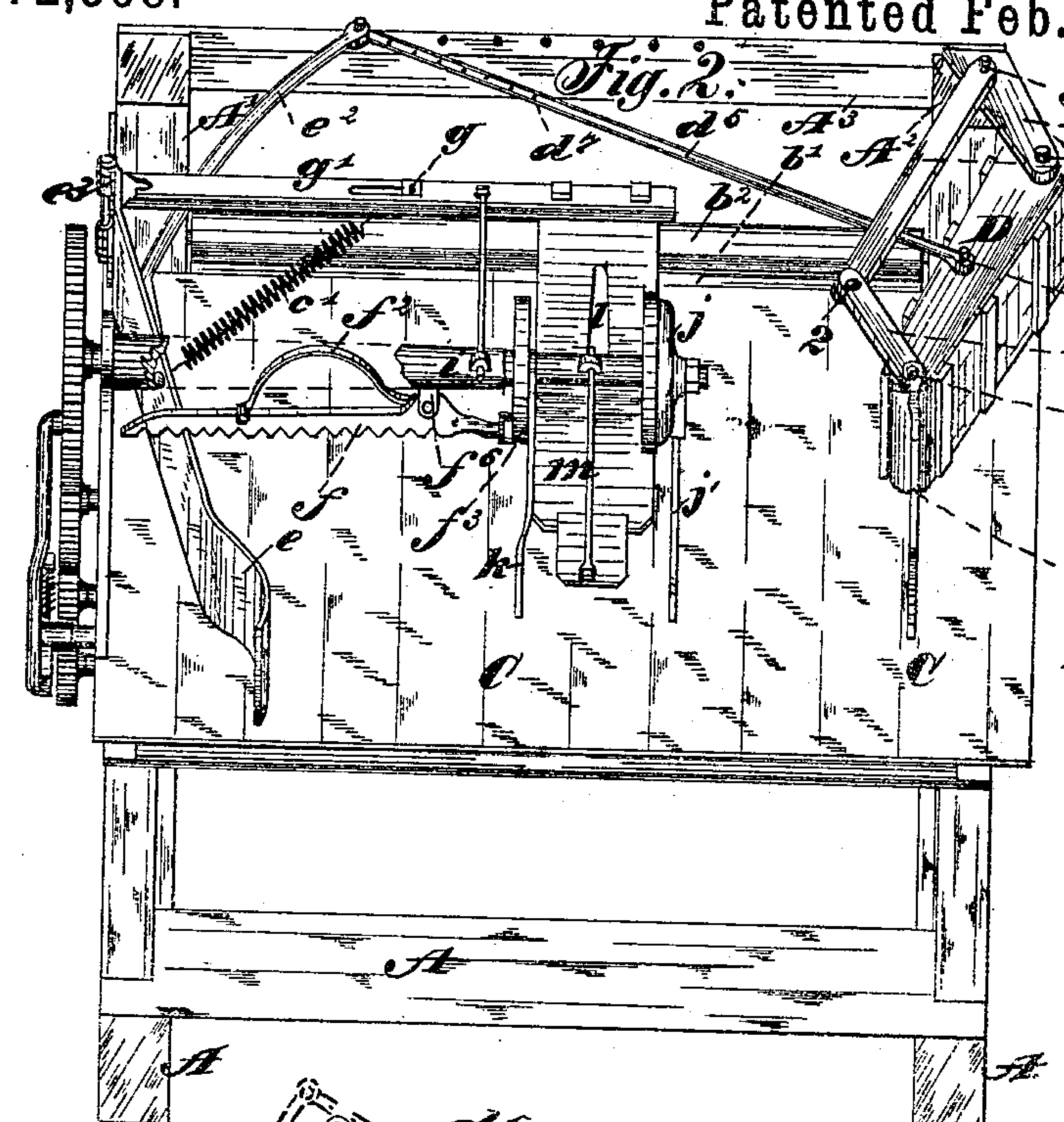

Fig. 2.

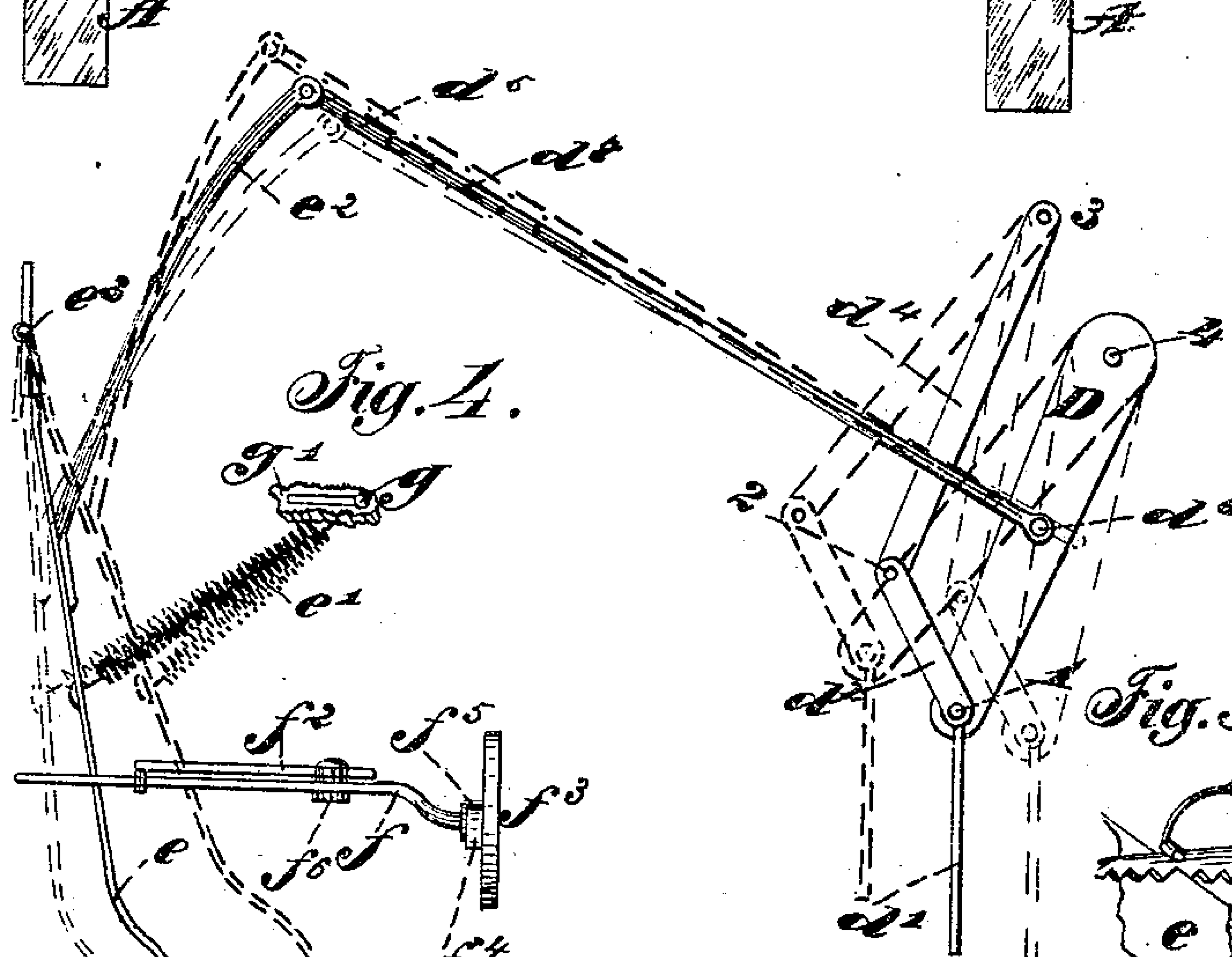

Fig. 4.

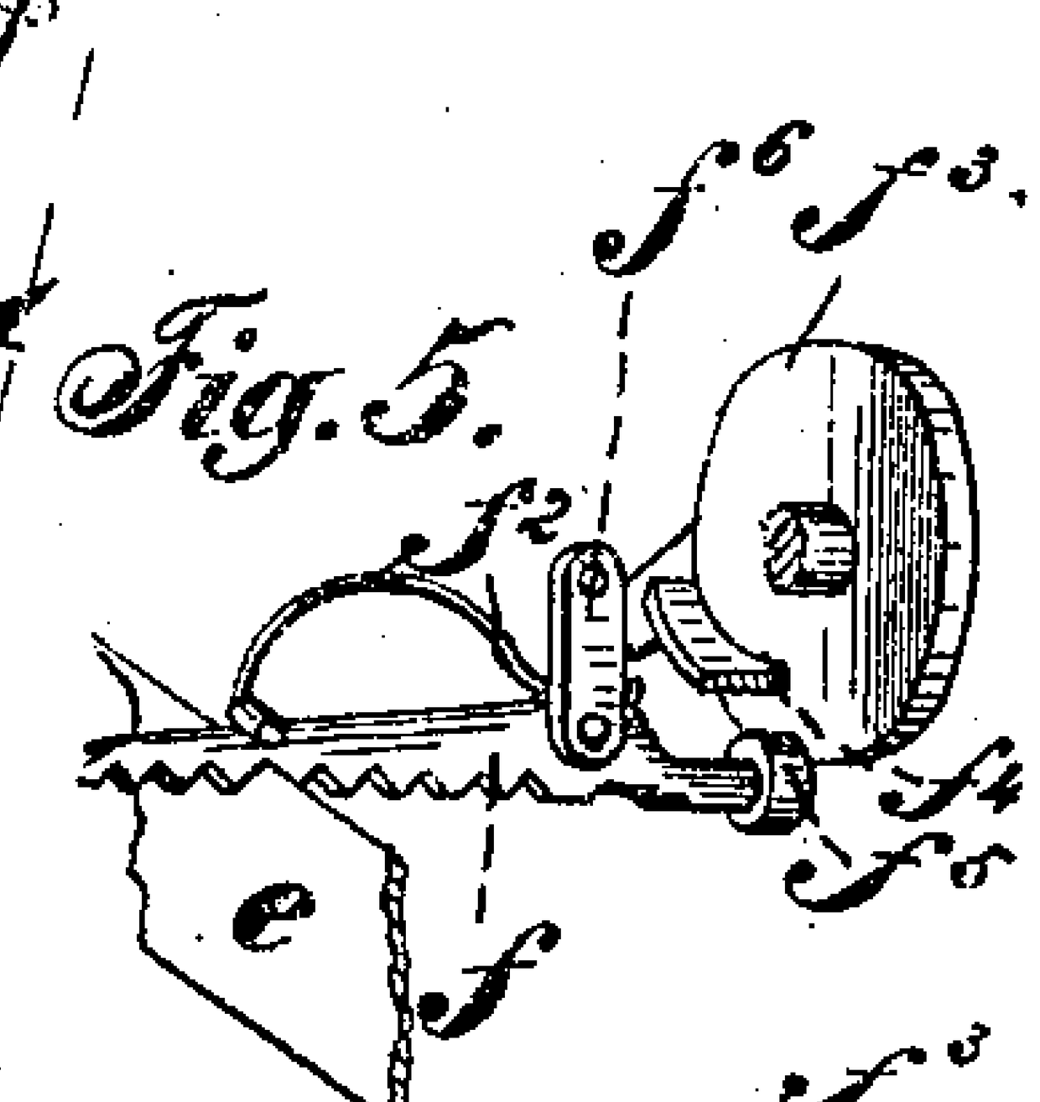

Fig. 5.

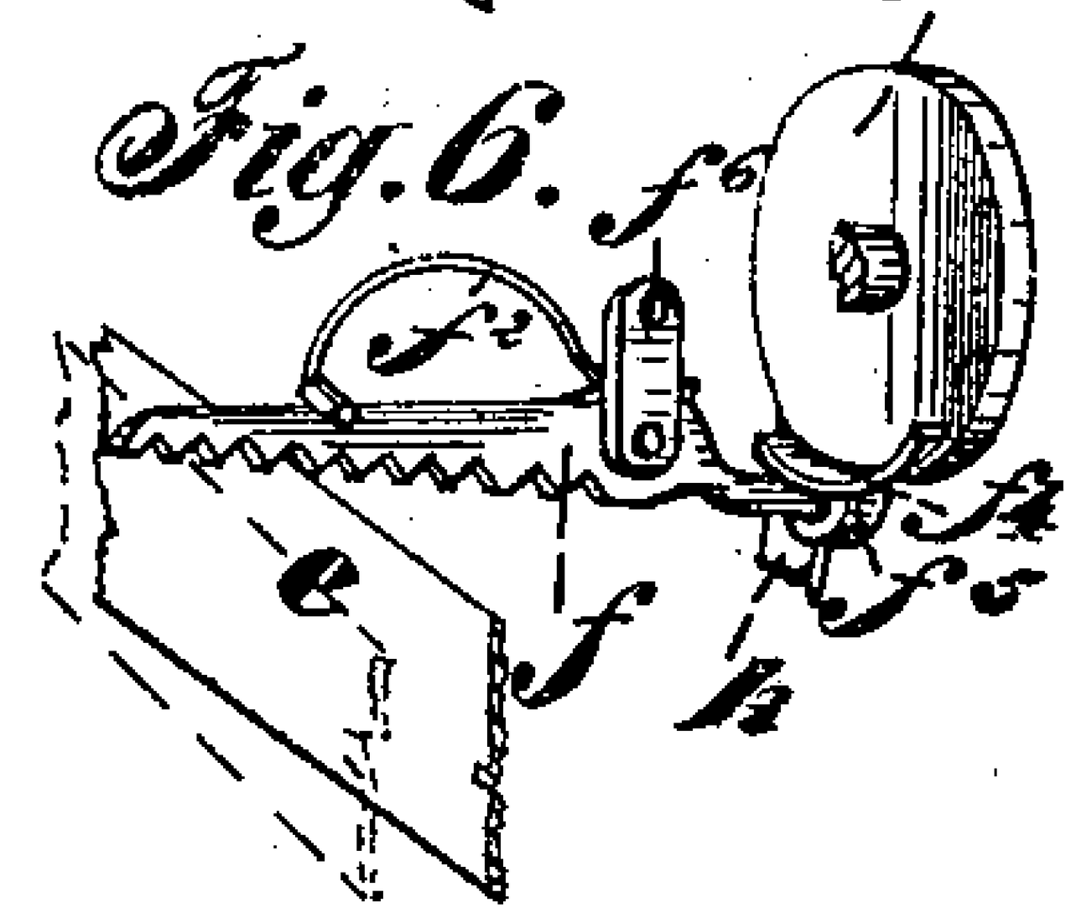

Fig. 6.

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UNITED STATES PATENT OFFICE.

JOHN F. STEWARD, OF CHICAGO, ILLINOIS.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 272,598, dated February 20, 1883.

Application filed October 9, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. STEWARD, of the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Grain-Binders, of which the following is a full specification, reference being had to the accompanying drawings, in which—

Figure 1 is a rear end view of the frame-work of the harvester, showing the binder in its proper relation thereto. Fig. 2 is an outer or stubble side view of the same. Fig. 3 shows the parts as viewed from a point above and in a line at right angles to the decking of the binder. Fig. 4 shows the various positions assumed by the parts that constitute my invention. Figs. 5 and 6 are details. Fig. 7 shows a modification.

The object of my invention is to provide means that, combined with an automatic grain-binder, shall make it automatically regulate the position of the band on the gavel—that is, shall automatically place the band upon the gavel in its proper position relative to the length of the grain without any aid or attention from the operator; and its nature consists in locating, in such a position as to be influenced by the heads of the incoming grain, or gavel or bundle, a device to be moved thereby, the said device connected with means for adjusting the relative positions of the said grain and the binding mechanism. Under the principle involved many methods may be resorted to to attain the result. I have selected and developed what appears to me to be the most feasible plan. Several subordinate ends are reached by the different elements of the device, which will be pointed out.

My invention is capable of being applied to any form of binder, but I here show it applied to one now much used. I will describe the binder only so far as is necessary to a correct understanding of my improvement.

In the drawings, A is the frame-work of the harvester, upon which the binder is mounted; *b*, the platform-canvas; *b'* and b^2, the elevating-canvases.

C is the chute-board or decking, onto which the grain is deposited in a loose state by the elevators, and it is slotted to permit the packers and needle to work through it.

D is the grain-adjusting mechanism, consisting of a frame carrying a roller at each end, around which rollers is drawn the endless canvas *d*. The larger or upper roller is driven from the gearing of the harvester in the usual manner, and moves in the direction indicated by the arrow in Fig. 3. The adjuster-frame vibrates on the axis of this upper and driving roller. So far the adjusting and butting mechanism does not differ from many in use, and constitutes no part of the present invention, only as combined with other elements.

d^3 is an arm secured to the top of the post A^2, overreaching the decking parallel therewith, and to this arm above and to the deck below is pivoted the swinging frame D.

d' is a thin board or plate of metal, as wide as the adjusting-canvas, and pivoted to the frame of the latter at its lower extremity. From this board reaches upward and inward (see Fig. 3) an arm, d^2. The board and arm are as one piece; but the board itself is made in two parts, so that its greater portion (which is the lower) can be removed.

Near the end of the arm d^2 is pivoted the bar d^4, connecting the arm d^2 with the overreaching arm d^3 near its top. In this arrangement we have four pivots, numbered 1, 2, 3, and 4. The distance between 1 and 2 is equal, or nearly so, to that between 3 and 4, and the distance between 1 and 4 to that between 2 and 3. In effect, then, the parts D, d^2, d^3, and d^4 describe a quadrilateral having substantially equal and parallel sides, so that to whatever point the frame D is swung in its adjustment the arm d^2 will remain parallel with the fixed arm d^3, and the board *d'* will always remain parallel with the edge of the decking, close to and over which the whole vibrates.

d^5 is a connecting-rod pivoted at d^6 to the frame D, the adjustment of which it controls, and reaches upward and backward over the decking, passing near the top rail A^3 of the harvester-frame. It is provided with the holes d^7 at a point where it passes the top rail, in which latter holes are also provided, so that by means of a pin passing through one and entering the other the whole device can be secured in any position; but it must be remembered that this means for securing the parts in place is but for use in special cases, which will be hereinafter pointed out.

The board d' is of such length as to reach as low as the accumulating gavel and prevent the grain forming it while accumulating from working or jarring forward. The butting or adjusting mechanism is given an amount of variation in its adjustment from a line parallel with and over the front edge of the chute-board to a point so far backward as to carry short grain sufficiently far back to be bound centrally. Three positions are shown in Fig. 4.

e is a board or plate of metal, nearly equal in width to that of the adjusting-canvas d. It is pivoted to the post A' of the harvester by any suitable means. I show it hinged to a plate, e^3, bolted to the said post. It lies in a position to the deck or chute-board corresponding with that of the adjusting-canvas. This board or plate is nearly straight from the pivotal point downward to nearly its lower extremity, where it curves forward toward the bundling devices and then backward. The form may be much varied, but I consider the curvature here given best. When the gavel is in the position to be bound it is still just above the curve in the plate, as seen in Fig. 3.

e' is a spring secured at one end to the upper edge of the board e, at about the middle of its length, the other end of the said spring being attached to a bolt, g, adjustable in a slot in the bar g' of the frame-work of the binder. By this means the plate e is caused to press elastically toward the grain, when not restrained by locking mechanism hereinafter explained, and the elastic pressure is adjustable as circumstances may require.

e^2 is an arm secured to the board e at its upper edge and near its top or hinged end, the said arm reaching upward over and parallel with the decking and connecting by a joint with the rod d^5. By this means the movement of the board or plate e is transmitted to the adjuster D, so that it moves in a reverse direction. In other words, the two parts, operating one on the heads and the other on the butts of the grain, are so connected that they approach or recede from each other when one is moved. These parts, because of their weight, are inclined to swing apart, and also, because of the tendency of the motive power on the canvas d, to swing its frame outward, and hence the spring e' must be strong enough to overcome these tendencies, and as much stronger as is wished to have the parts moved quickly by the said spring when it is at liberty to move them.

With the above-described parts in the positions shown in Fig. 3, and the bundle as there shown, it is plain that if the bundle is quickly ejected it must engage the curved part of e and force it out of its way, and hence backward, and the butting-canvas being connected thereto it will be moved forward. Two forces then are apparent—the bundle to force the parts opposing its head and butt from each other, and the spring to retract them. In order that each bundle shall leave the parts fixed for the time being in any position it may have caused them to assume, I provide a locking device that shall at all times retain the parts, except just while the head of each bundle is passing the curve on the plate e, which device is constructed as follows:

From the arm i of the binder-frame (cut away in Fig. 2 to show the latching device) I depend a support, f^6. To this is pivoted the lever f, which lever is notched upon its lower edge. The position of this lever is such that its notched edge rests upon the upper edge of the plate or board e. From its pivotal point this lever reaches forward a short distance to the disk f^3, and is provided with an anti-friction roller, f^5, which is engaged and moved by the cam f^4 on the said disk, the latter being keyed to the knotter-driving shaft, which makes one complete revolution to each operation of the binding mechanism. The lever is thus lifted from off the plate e once in each revolution for an instant. The time of this lifting is made to correspond with the action of the discharge-arms j' and k, so that when they have engaged the bundle to eject it the plate e shall be free to respond to any pressure of the bundle while the latter is passing its curved end.

f^2 is a spring acting upon the latch-lever f to return it quickly to its place for engagement with the plate e after being acted upon by the cam f^4.

m is the breast-plate between the tying mechanism (not shown) secured to it and the grain being bound. l is a slot for the passage of the needle. j is the knotter-rotating gear, to which is secured the discharge-arm j'. To the disk f^3 is secured the discharge-arm k.

Before describing the operation of the parts conjointly, I wish to state that certain parts of my invention are capable of use singly as well as conjointly, and I will first point out such independent action, believing that their joint action will be more quickly understood. First, if the pivot-bolt connecting e^2 and d^5 and the locking device be removed, and a pin is inserted into the holes in the top rail and through the holes d^7 in the connection d^5, I have an adjustable butting mechanism supplemented by the board d' for preventing the gavel from working forward by the jarring of the machine, which shucking out of position is often very great in grain that is heavy at the butts; secondly, with the same parts removed, I have an elastically-swinging board for directing scatterings caused by imperfect adjustment of the reel of the harvester or any other cause into the gavel, whether the grain be long or short, and especially when short, as without this board there is a clear space between the heads of the gavel and the rear limit of the chute, where scattering may pass freely to the ground.

With the parts all connected, as best shown in Figs. 2 and 3, I have, as before stated, a device for regulating the position of the grain

relative to the binding mechanism, the operation of which I will now describe.

The use of the canvas *d* and the board *e* produces a new and beneficial result in their joint action upon the grain. In grain that stands thin on the ground, and hence is of that condition which always passes up the elevators head first, the butts are advanced by the revolving canvas and the heads are retarded by the contact with the board *e*, and thus reach the binding-receptacle in much better condition than when the old devices, or none, are used. The cut grain falls on the platform-canvas and is conveyed to and elevated by the elevating-canvases and delivered in a loose state onto the table, when it is engaged by the usual pushing mechanism and forced forward to the binding mechanism, where it is bound, and from which it is finally ejected by the discharge-arms or other means. With the butting mechanism, and the board or plate *e* in their positions nearest approaching each other, we will suppose the grain first acted upon to reach them. If the grain is long, the head of the bundle, when discharged, will press forcibly against *e*, more especially against its curve, and force it backward, it being at the proper instant permitted to move by being unlocked by the action of the cam f^4. The first bundle thus bound may be carried too far backward in its approach to the binding mechanism, and hence bound too near the butt; but when it is discharged the butt-adjusting device acts under the influence of the plate *e*, and is hence moved forward to a position more nearly in keeping with the requirements, and the next bundle will be bound farther from the butt. If when going into a field of short grain the butt-adjusting mechanism and plate *e* are wide apart, the first bundle will be deposited too far forward in the receptacle, and hence bound too near the heads; but upon its discharge the board *e* will be permitted to jump or swing with a quick movement to a position as far forward as the position of the bundle at that instant will permit, and hence the butting mechanism will be set for short grain. If the device is set to proper position for the first bundle before going into the grain, it will be properly bound, and it will leave the parts in position for the succeeding one.

For the sake of clearness, I will further say the butt-adjusting mechanism in all cases directs the grain to the binding devices, (except litterings that are thrown backward.) The position to which the butt-adjuster is swung determines the relative position of the gavel to the binding mechanism. The passage of a bundle so long or far backward that its head will forcibly move the swinging plate when the latter is unlocked will cause the butt-adjusting mechanism to move forward and deposit the succeeding grain in a position farther forward in relation to the binding devices. If grain of decreasing length passes, the spring *e'* will cause the plate *e* to jump, when unlocked, until it meets the heads of the same, and the butt-adjusting mechanism thus be moved to deposit the grain of each succeeding shorter gavel a little farther back in relation to the binding mechanism.

It may seem to those theoretically versed in the art, yet unfamiliar with the operation of harvesting machinery in actual work, that the adjustments will not be perfect; but when the fact is taken into account that the change of length of grain which the machine advances to meet is generally gradual, and that the gavels increase and decrease in length gradually, the movement imparted to the regulating device will be competent to do its work, which it does in practice to a remarkable degree.

The modifications that may be made in this arrangement are almost unlimited. For instance, the butting device may be of any kind competent to give the swath direction into the receptacle, or it may be of the kind that moves the gavel bodily endwise. The board or plate *e* may be connected with the butting mechanism in various ways, and the plate *e* itself may be varied, yet should any device be used capable of being influenced by the heads of the grain, whether in swath, gavel, or bundle, for the purposes set forth, I should consider it an equivalent. The spring *e'* may be connected with the butting mechanism direct as to any of the moving parts. The locking arrangement may be varied, and even dispensed with under some circumstances. These suggested modifications are shown in an additional figure—that numbered 7. In this the grain is shown as operated at each end by the two plates or boards, and it is plain that as the distance between these boards at their delivery end is regulated by the length of the grain, the butt-board will be caused to deliver the incoming grain properly. This would be used in that class of binders where the grain accumulates in the receptacle in a free state, and is taken bodily therefrom by the needle. The plate *e* may be located upon the elevator and connected with the adjusting or butting mechanism and produce the same effect.

In the modification shown in Fig. 7, C is the deck, and D the butt-adjuster. *e* is the swing-board, located so as to be influenced by the heads of the grain. c^2 and d^5 are stiff arms, reaching from their respective boards and meeting in a joint, being so connected if one moves the other must do so, but in a reverse direction. Now, if the spring *e'*, or any spring, is attached as shown in Fig. 3, the boards will be drawn together with a slight stress, and any body of grain passing through will spread them apart at their lower extremities. It is plain that whatever the length of grain passes, its center will always be at the same place

What I claim is—

1. In a grain-binder, the combination of the butt-adjuster with means, substantially such as described, for setting the butt-adjuster for

operation on the flowing grain, said means being adapted to be operated by the grain, as and for the purpose described.

2. The combination of the adjusting mechanism of a grain-binder with means, substantially such as described, for automatically setting the adjuster for directing the grain into the binding mechanism, as set forth.

3. The combination of the swinging revolving canvas for advancing the butts of the grain with the board *e* for retarding the heads of the same.

4. The combination, with the delivery apparatus of a harvester, of a self-setting plate, *e*, on the binder-table, adapted to be operated by the grain for directing scattering grain into the succeeding gavel, substantially as described.

5. The combination, with the harvester delivery apparatus, of the self-setting plate *e* and the spring *e'*, adjustable in its tension, substantially as described.

6. The combination of the board *e*, spring *e'*, bolt *g*, and slotted bar *g'*, substantially as described.

7. In a grain-binder, mechanism for adjusting the butts of the grain, said mechanism adapted to be adjusted by the action of the grain.

8. The combination, with the harvester delivering apparatus and the elastically-yielding butt-adjusting mechanism, of means, substantially such as described, for varying the stress of elasticity, as set forth.

9. In combination with the bundle-discharging mechanism of a grain-binder, the board *e*, for the purposes set forth.

10. The combination of the discharge-arms, the board *e*, and the butt-adjusting mechanism, substantially as described.

11. The combination of the self-setting board *e*, and locking mechanism, substantially as set forth.

12. The plate or board *e* and connecting mechanism as means for transmitting the power exerted by the spring *e'* and swath or bundle of grain to the butt-adjusting mechanism, substantially as described.

13. The combination of the spring-latch with the board *e*, substantially as described.

14. The combination, with the board *e*, of the butt-adjusting mechanism and the board-locking mechanism, substantially as described.

15. The combination of the board *e* and butt-adjusting mechanism with intermittently-operating mechanism for locking the board *e*, substantially as described.

16. The elastically-yielding butt-adjusting mechanism, in combination with locking mechanism, substantially as described.

17. The combination, with the self-setting butt-adjusting mechanism, of the latch *f* and cam f^4, substantially as described.

18. The combination of the board *e*, arm e^2, connecting-rod, d^5, butt-adjusting mechanism, and board *d'*, substantially as described.

19. The combination of the board *e* and board *d'*, substantially as described.

20. The combination, in a grain-binder, of moving butt-adjusting mechanism and the board *d'*, substantially as described.

21. The combination of the swinging butt-adjuster, the arms d^2, d^3, and d^4, and the board *d'*, pivoted to the swinging butt adjuster, substantially as described.

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