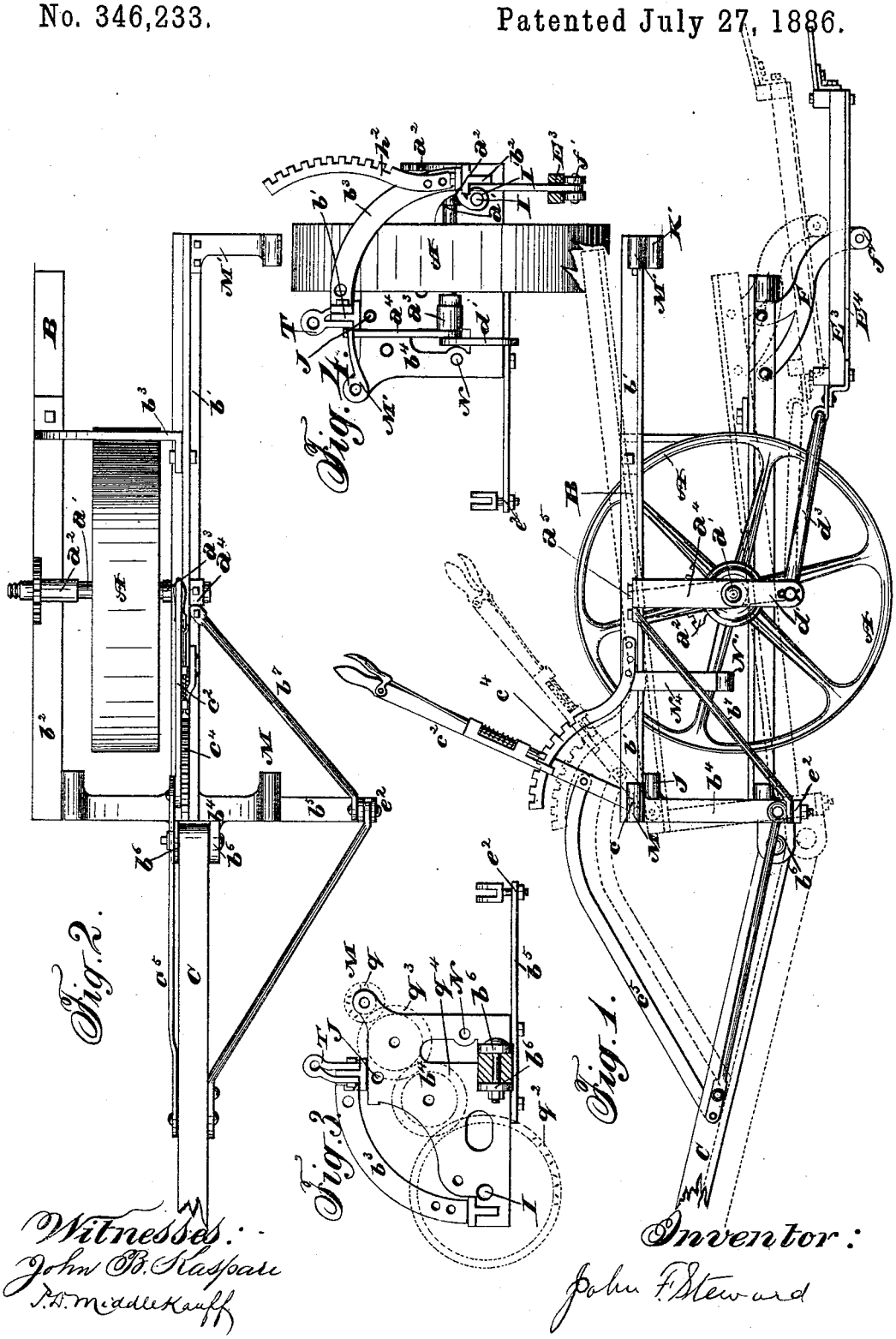
(Model.)

4 Sheets—Sheet 1.

J. F. STEWARD.

SELF BINDING HARVESTER.

No. 346,233. Patented July 27, 1886.



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(Model.) 4 Sheets—Sheet 2.

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SELF BINDING HARVESTER.

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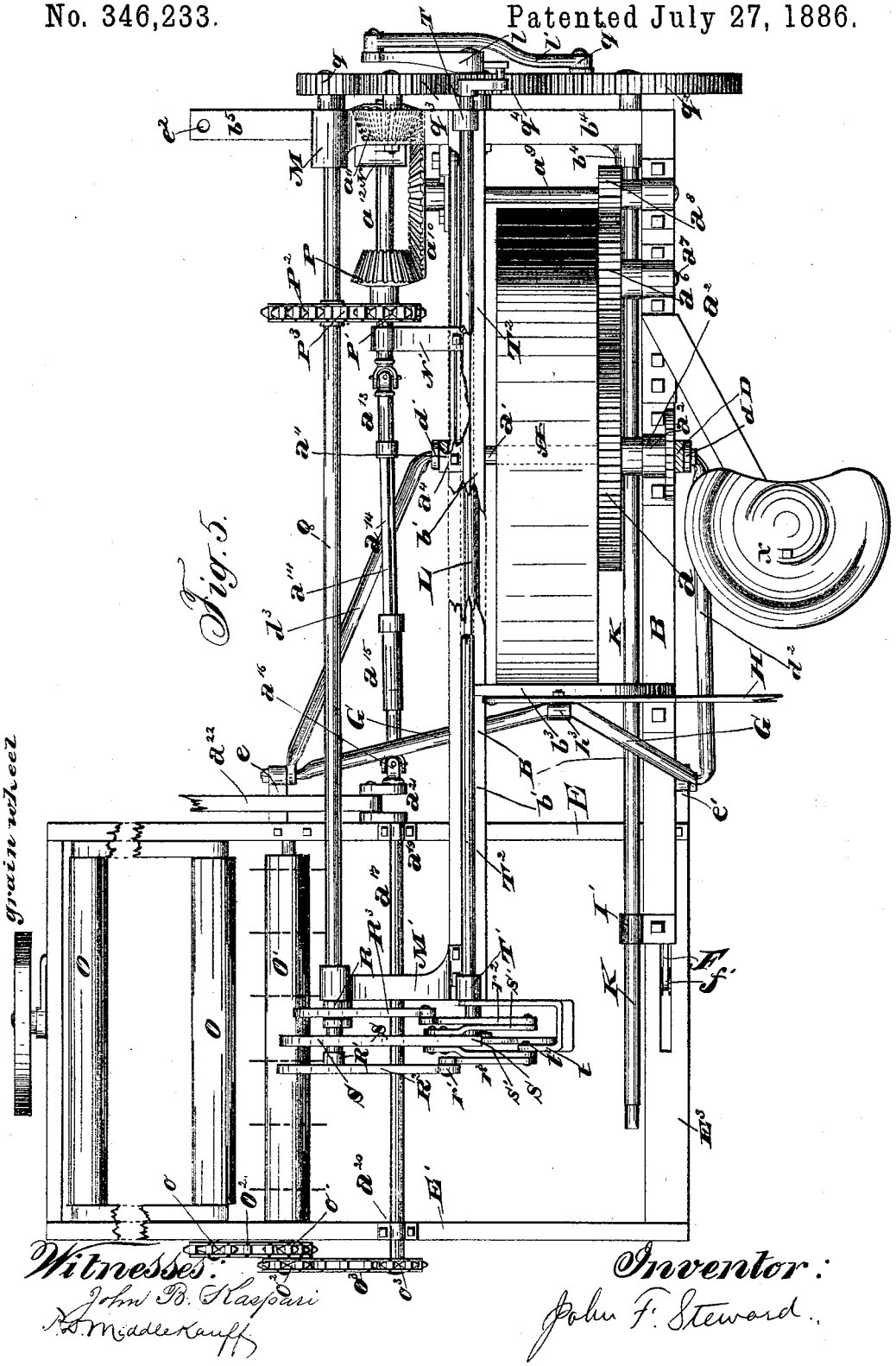

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(Model.)

4 Sheets—Sheet 3.

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SELF BINDING HARVESTER.

No. 346,233. Patented July 27, 1886.

Fig. 6.

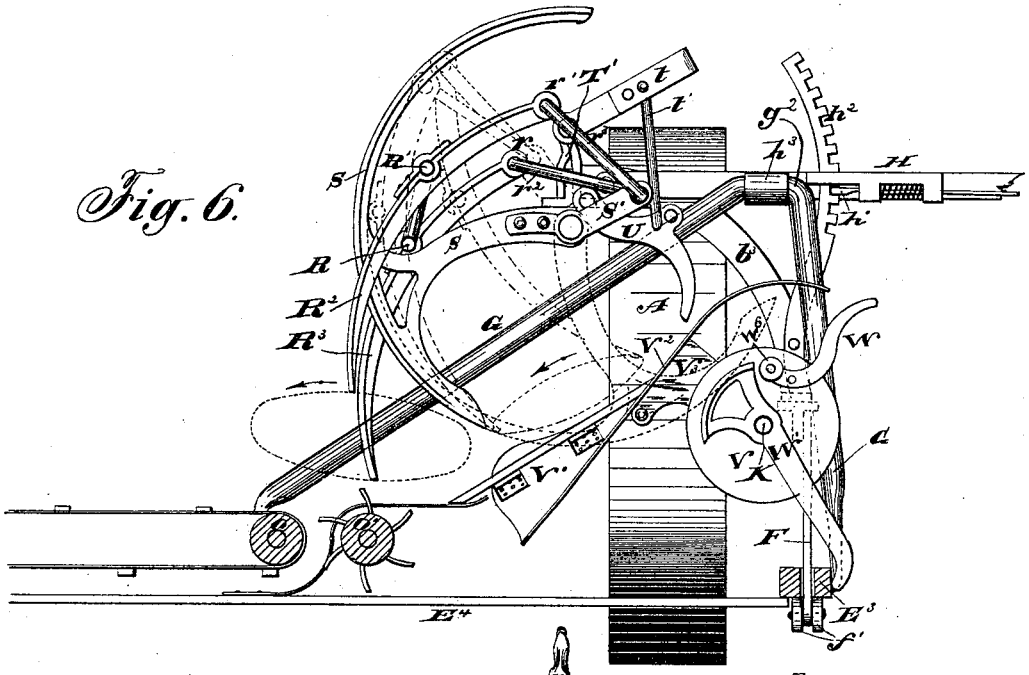
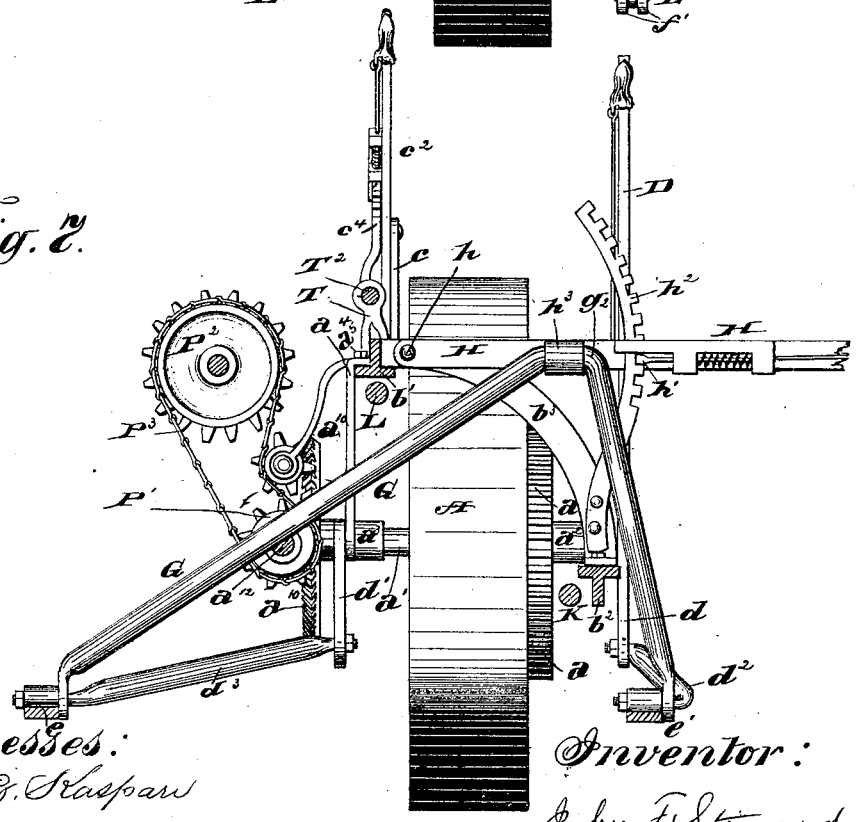


Fig. 7.



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(Model.) 4 Sheets—Sheet 4.

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SELF BINDING HARVESTER.

No. 346,233. Patented July 27, 1886.

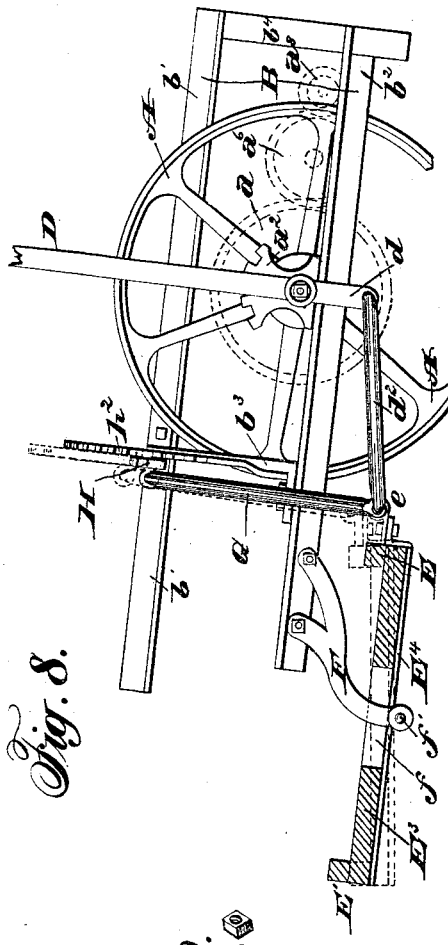

Fig. 8.

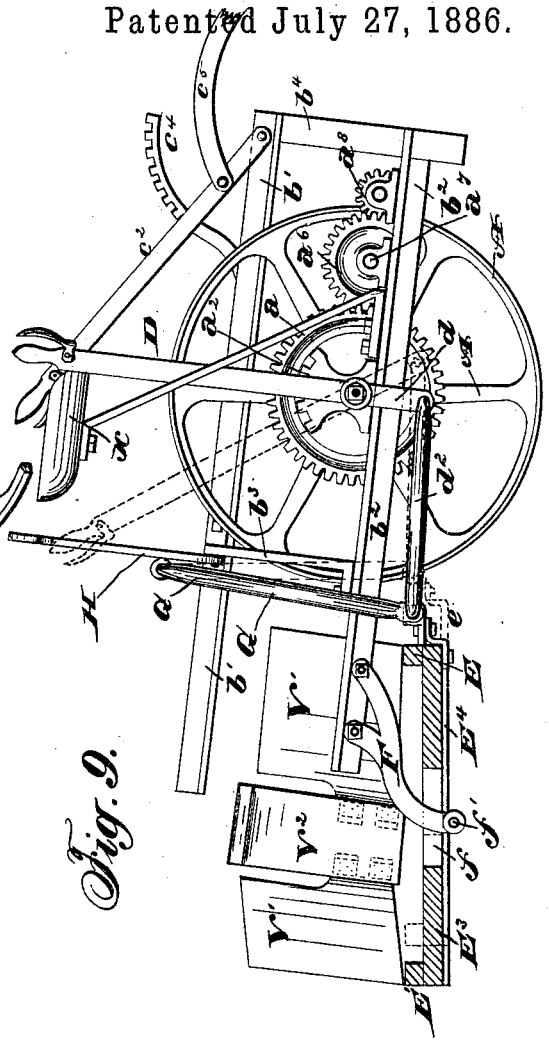

Fig. 9.

Fig. 10.

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UNITED STATES PATENT OFFICE.

JOHN F. STEWARD, OF CHICAGO, ILLINOIS.

SELF-BINDING HARVESTER.

SPECIFICATION forming part of Letters Patent No. 346,233, dated July 27, 1886.

Application filed July 12, 1883. Serial No. 100,712. (Model.)

To all whom it may concern:

Be it known that I, JOHN F. STEWARD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Low-Level Self-Binding Harvesters, of which the following is a specification.

The object of my invention is to produce a self-binding harvester that will have rear delivery and properly poise on two supporting-wheels; and its nature consists in mounting the master-wheel in a frame, which will also serve as a support for the binding mechanism and the grain-receiving platform, the said platform and binding mechanism being located upon one side of the master-wheel axle, and the binder-driving mechanism and the harvester gearing upon the other side of the axle in mounting the binding mechanism in a fixed position, and mounting the platform adjustably upon the said frame to deliver the grain centrally to the binding mechanism whatever its length, and in details of construction, which will be fully pointed out.

In the drawings, Figure 1 is a grain-side view of the frame-work. Fig. 2 is a plan view of the same. Fig. 3 is a front view of the same, and Fig. 4 a rear view of the same. Fig. 5 is a plan view of the shafts and gearing employed. Fig. 6 is a rear view showing the organization of parts for delivering, compacting, binding, and discharging the grain. Fig. 7 is a rear view of the frame and the tilting device. Figs. 8 and 9 show different positions of the platform in its relation to the binder-frame. Fig. 10 is a detail.

A is the master-wheel, having the gear *a* secured thereto, the said wheel and gear revolving loosely on an axle.

B is the main-wheel, and binder frame consisting of two parallel T-shaped iron side bars, b' and b^2, their length being greater than the diameter of the master-wheel by about one-half of the width of the delivery platform, said side bars being in different vertical planes. The side bars are connected by the transverse bar b^3 and the gear-plate b^4. The said parts b', b^2, b^3, and b^4 bolted together form a parallelogram of such internal length and width as to admit the master-wheel and have the rear ends of the two T-shaped iron bars project so far as to form supports for the grain-receiving platform and the binding mechanism. The connecting-bar b^3 extends from one of the parallel bars to the other, and is seated and bolted to each, and it is curved, as seen in Fig. 7, to avoid contact with the master-wheel, the purpose being, by so curving it, to place it so far forward that it shall not be in rear of the face of the wheel. The front connection, b^4, is a casting adapted to form bearings for the gearing-shafts and supports for the tongue. The axle a' rocks freely in bearings a^2 and a^3, the bearing a^3 being at the foot of the post a^4, which is bolted at a^5 to the bar b' immediately above the axle. Projecting from beneath the gear block or plate b^4, and secured thereunder, is the bar b^5, (see Fig. 3,) which is for providing an attachment for the tongue brace.

b^6 are lugs between which the butt of the tongue C is hinged. The tongue has a brace pivoted to the outwardly-projecting bar b^5 at c^2. This pivot and the tongue's pivot are near enough in line for all practical purposes, and on them the tongue and brace vibrate as the main-wheel and binder frame is rocked on the axle of the master-wheel.

c^2 is a lever pivoted at c to the bar b'.

c^4 is a curved or segmental rack.

c^5 is a rod pivoted to the tongue and lever c^2, as shown in Figs. 1 and 2. By moving the lever c^2, which is within reach of the attendant, the main-wheel and binder frame may be rocked on the axle of the master-wheel to place its rear end in a high or low position as may be required.

In Fig. 1 is shown, in dotted and full lines, the main-wheel and binder frame in two positions of adjustment. The lever c^2 is provided with a spring-latch, which serves to retain the parts where placed. b^7 is a brace extending from the outer end of the bar b^5 upwardly and rearwardly to the T-shaped bar b', for the purpose of throwing the stress of draft upon the main-wheel and binder frame. The rocking axle is provided with downwardly-projecting hangers or arms d and d'. E is the front sill of the grain-receiving platform, and E′ the rear platform-sill. E^3 is a stout plank connecting the platform-sills, and E^4 the grain-receiving platform-boards.

e e', Figs. 7, 8, and 9, are brackets firmly bolted to front sill, E. The bracket *e'* is attached at the stubble end of the grain-receiving platform, and *e* is located near the delivery end of the endless carriers on the grain-receiving platform. These brackets are each provided with an eye. d^2 and d^3 are drag-bars, made of gas-pipes (for lightness) having bent threaded ends. d^2 is hooked into the eye in the bracket *e'*, and connects the lever end of the hanger or arm *d* with the bracket *e'*, Fig. 7, on the platform-sill E, and d^3 connects the hanger or arm *d'* to the bracket *e* in a similar manner. The hangers or arms *d* and *d'* are rigidly secured to the axle, and vibrate when it is rocked. D is a lever, which is, in effect, an upward extension of the arm *d*. It is placed within easy reach of the attendant when in his seat *x*. The axle-bearing a^2 has a wide sector-shaped flange, (shown in Figs. 8 and 9,) and the lever D has a spring-latch for engagement with the teeth of the said sector-shaped flange. F, Figs. 8 and 9, is an arm riveted to the bar b^2, and which extends somewhat rearwardly and downwardly through the narrow slot *f* in the plank E^3, and has mounted upon its end beneath the plank the anti-friction rollers *f'*. The delivery end of the grain-receiving platform is thus supported by the main-wheel and binder frame, while the grain end of the said platform is supported in the usual manner by the grain-wheel. By the movement of the lever D the said platform is adjusted fore and aft, as required. In Fig. 9, in full and dotted lines, two positions of the grain-receiving platform are shown. The binding mechanism is mounted upon the main-wheel binder and gearing-frame, and is attached in a fixed position thereto; and it will be seen that if the grain-receiving platform has a fore-and-aft adjustment in relation to said frame the position of the grain presented to the binding mechanism may be varied, and by this means the machine is adapted to work in long or short grain. The grain-receiving platform is permitted to move freely fore and aft by the slot *f* in the plank E^3, the anti-friction roller *f'* and the grain-wheel rolling on the ground. The draft-bar d^3 is placed diagonally to give it a bracing effect.

For the purpose of tilting the grain-receiving platform and the cutter-bar, a hand-lever, H, is pivoted at *h* to the upper end of the curved end bar, b^3, near its junction with the T-shaped side bar, *b'*, of the main wheel and binder-frame. Swiveled to the lever H by means of a pivoted collar, h^3, is a yoke, G, preferably made of gas-pipe, as clearly shown in Fig. 7. The ends of the arms of the yoke G are jointed to the brackets *e* and *e'* on the front sill, E, of the grain-receiving platform. Bolted to the lower end of the end bar, b^3, near the T-shaped side bar, b^2, of the main wheel and binder-frame, is an upwardly-extending segmental rack-bar, h^2, and attached to the lever H is a spring-locking bolt, *h'*, which engages in the teeth of the segmental rack-bar. Upon raising and lowering the lever H the grain-receiving platform and cutter-bar, by means of the connecting-yoke G, is rocked or tilted upon the grain-wheel axle and the pivot formed by the roller *f*, the said pivot and axle forming bearings for said platform and cutter-bar, as before described. They can be locked in the desired positions by means of the segmental rack and spring-bolt. The arm F passes through the slot *f* in the plank E^3, and prevents lateral displacement of the grain-receiving platform when it is rocked or tilted. The sleeve h^3 turns slightly on its pivot to the right or left from the position shown in Figs. 6 and 7 as the lever H is raised or lowered, and the result is the grain-receiving platform is slightly rocked in its relation to the main-wheel and binder frame.

I find that in the practical machine, from which the drawings are taken, the change of position is so slight as to be unimportant.

Referring now to Fig. 3, I is the bearing for the knotter-driving shaft formed in the plate b^4, and I' a bearing secured to the rear end of the bar b^2. (See Fig. 4.) In these bearings the knotter-driving shaft K revolves, and projects from the bearings at each end, supporting in front of the bearing I the main binder-gear, and in the rear of the bearing I' the shaft projects so far as to form a support for the binder mechanism, its operating-gear, and the discharge-arms. J is a bearing in the plate b^4 for the front end of the needle-shaft L. K' is the bearing for the rear end of the needle-shaft, Fig. 1. In front the shaft projects from the bearing-plate b^4, so as to support the needle-shaft crank *l*, and it extends in rear of bar b^3 and supports the needle. M, Fig. 1, is the front bearing for the packer-shaft. M' is a bearing for the rear end of the packer-shaft, being an arm extending outwardly from the T-shaped bar *b'*. N is a bearing in the plate b^4 for the front end of the cutting and delivering apparatus driving-shaft. N' is also a bearing for the same shaft, and it projects downwardly from the bar *b'*, as shown in Figs. 1 and 5. The organization of parts for moving the cutting and delivery apparatus will next be considered. The gear *a* meshes into the idle gear a^6, which revolves on the stud a^7 secured to the frame, which gear in turn meshes into the pinion a^8, keyed to the shaft a^9, which carries the bevel-gear a^{10}, which meshes into the pinion a^{11}, keyed to the shaft a^{12}, revolving in the bearings N and N'. The shaft a^9 revolves in suitable bearings on the main-wheel and binder frame. These gears are all in front of the main supporting-wheel, as will be seen in Fig. 5. To the shaft a^{12} is connected by a universal joint, a^{13}, the square shaft a^{14}. a^{15} is a shaft socketed to fit the end of the square shaft a^{14}. By these two parts a slip-jointed shaft is produced. Connected by a universal coupling, a^{16}, to the slip-jointed shaft is the crank-shaft a^{17}, revolving in bearings a^{19} on the front sill, E, and a^{20} on the rear platform-sill, E'. a^{21}

is the crank, bent in the shaft, and a^{22} the pitman for driving the reciprocating cutting apparatus. The finger-bar and cutting apparatus are of common form and hence are neither shown nor described. The crank-shaft serves, however, to drive the grain-delivery mechanism. O is the platform-carrier driving-roller revolving in bearings on the platform-sills. O′ is a roller provided with picker-teeth for conveying the grain from the platform-carriers, and it also revolves in bearings on the platform sills. o is a sprocket-wheel upon the rear end of the roller O, and o' another on the end of the picker-shaft O′. Connecting these is the chain O^2. o^2 is a sprocket-wheel keyed to the picker-shaft beside o'. o^3 is a sprocket-wheel keyed to the rear end of the crank-shaft. The wheels o^2 and o^3 are connected by the chain O^3. It is clear that through the gears last mentioned and chains described, movements are given to the cutting and delivery apparatus mounted on the grain-receiving platform. The slip jointed shaft admits of the platform being moved fore and aft and the universal joints a^{13} and a^{16} permit of the tilting of the platform without interfering with the gearing.

Referring now to Figs. 5 and 7, a pinion, P, is mounted on the shaft a^{12}, and as one piece with it is the sprocket-wheel P′, these two wheels as one piece are loose on the shaft and revolve in a direction the reverse of the movement of that of the shaft. The shaft serves for an axis for these wheels. Upon the packer-shaft is mounted the sprocket-wheel P^2, and around the two sprocket-wheels is thrown the chain P^3. This chain is provided with the usual tightener. The packer-shaft Q is thus driven, and it serves as a source of power for operating the binding mechanism. q is a pinion clutched thereto, and q' a gear keyed to the knotter-driving-shaft, and q^3 and q^4 are gears revolving on studs on the plate b^4, which gears serve as means for transmitting the motion of the pinion q to the wheel q^2. The latter has the wrist q^5, and the needle-shaft has the arm l. Connecting the said arm to the wrist is the pitman l' By the rotation of the wheel q^2 the needle is oscillated at the same time that the knotter-shaft is rotated. The needle and knotting mechanism is of a common form, and each is timed in relation to the other in the usual manner. R and R′ are cranks on the packer-shaft, one upon each side of the needle S. These cranks carry the packers R^2 and R^3, having operating-points long enough to reach well downward from the said cranks so far as to operate properly on the swath of grain delivered to the binder, and they have extensions reaching in a reverse direction, which connect at r and r' to the links r^2 and r^3, which links are pivoted to an extension, S′, projecting from the hub of the needle, all of which are seen in Figs. 5 and 6. By this arrangement the packers are given a stepping motion, or, more properly, a feeding motion.

In Fig. 6 the needle is shown by dotted and full lines in two positions—that of rest while awaiting the compacting of the gavel in full lines, and that of lowest descent as in the act of binding in dotted lines. In the full-line position the packer-points reach well beyond the arc of the needle. Their path of movement when in operation is shown in dotted lines. When the needle is down, the extensions of the packers are thrown so far over that the packer-points travel wholly within the arc of the needle, as shown in broken lines in Fig. 6, and hence they cannot act upon the grain when its passage is obstructed by the needle. T is a bearing on the forward end of the T-shaped bar b', and T′ a bearing mounted on the rear end thereof. In these move the rock-shaft T^2, for vibrating the compresser U, on which is mounted the arm t, outreaching and curving around the packer-links, as shown in Fig. 5, and connected by the link t' to the compresser U, which is hinged to the butt of the needle. The compressor-operating mechanism, clutches, and other details form no part of this invention, and are omitted. V is the wheel for giving motion to the knotting and cord-holding mechanism. V′ is the grain-table, hinged to a support on the breast-plate V^2. V^3 is the knotter-frame, supported on the knotter-shaft. It is stationary and suitably braced to the frame-work, and does not rotate with the shaft supporting it. The breast-plate is secured to this, and it forms part of the grain-table. The parts V′ being pivotally connected to the breast-plate V^2, their free edges rest on the platform-sills, and thus always conform to them, as shown in Figs. 6 and 9, and I thus have a table that will be perfect, whatever the tilt. W is a discharge-arm pivoted on the wheel V, so as to fall and be permitted to revolve without coming in contact with other parts in its revolutions. W′ is a cam, loose on the knotter-shaft k, but provided with an arm that rests against the bar E^3, which prevents its turning. The discharge-arm is provided with an anti-friction roller, W^6, (shown in Fig. 6,) that engages the cam and travels on its concentric portion, and by it is erected at the proper time for performing its office as a bundle-discharger.

Many details of construction are omitted for clearness, but are shown in full in an application of G. H. and J. F. Steward, filed July 5, 1883, Serial No. 100,000.

What I claim is—

1. In a self-binding harvester, a main supporting-wheel and binder frame adapted to support the grain-platform, and the devices directly concerned in the operation of binding, located in rear of said supporting-wheel, and adapted to be moved by gearing in front of said master-wheel, the main binder-gear q^2 placed in front of said supporting-wheel, all arranged and combined substantially as described.

2. In a self-binding harvester, the main-wheel frame adapted to form supports for the

needle and knotter driving shafts, one upon either side of the supporting-wheel, and to have a bearing for each shaft in front and also in rear of the supporting-wheel, whereby the shaft on one side of the supporting-wheel is counterpoised by the shaft on the other side, and the shaft-bearings in front counterpoise those in rear of the said wheel, substantially as described.

3. In a self-binding harvester adapted to carry the grain-receiving platform and binding mechanism in rear of the master-wheel, a main frame supported on the main supporting-wheel, the band-carrying arm mounted on a shaft extending forward of and its driving-gearing in front of the said master-wheel, whereby the weight of the said driving-gearing is made to act as a counterpoise to the weight of the band-carrying arm and the grain-receiving platform, substantially as described.

4. In a self-binding harvester adapted to carry the grain-receiving platform in rear of the master-wheel, a main frame supported on the main supporting-wheel, the knotting mechanism mounted on a shaft extending forward of and its driving-gearing in front of the said master-wheel, whereby the weight of the said driving-gearing is made to act as a counterpoise to the weight of the said knotting mechanism and grain-receiving platform, all combined substantially as described.

5. In a self-binding harvester, the main-wheel and binder-mechanism supporting frame mounted directly upon the main wheel, and having the binder and harvester driving-gearing in front of the main wheel, in combination with the grain-receiving platform pivotally supported on said frame and on the grain-wheel, in rear of the main wheel, substantially as and for the purpose described.

6. In a self-binding harvester, a binder-mechanism-supporting frame, the band carrying and uniting mechanism thereon, the delivery end of the grain-receiving platform pivotally connected thereto, and adapted to tilt relative to said mechanism, the grain end pivotally supported on the grain-wheel, the said pivots substantially in line with the band carrying and uniting mechanism, all combined with means for tilting the platform on said pivots in relation to the said binder-frame, substantially as described.

7. In a self-binding harvester, a frame surrounding the master-wheel and supported on the wheel, rearwardly-projecting arms forming supports for the band placing and uniting mechanism, combined with cutting and delivery apparatus pivotally supported at the end of one of said arms, substantially as described.

8. In a self-binding harvester, the main-wheel and binder frame supported on the master-wheel, the binder mechanism located on said frame, the grain-receiving platform pivotally connected to a lever adapted to be locked to said frame, and the draft-bars pivoted to said platform and also connected to hangers or arms extending from the rock-shaft a', the said receiving-platform pivotally and fore and aft adjustably connected to the said frame, all combined substantially as described.

9. In a self-binding harvester, the main-wheel and binder supporting frame, the grain-platform pivotally supported thereon, the binder mechanism located on said frame and having the band placing and uniting mechanism located substantially in line with the axis of said pivot, whereby the tilting of the platform does not affect the relative positions of said mechanism and platform, all combined substantially as described.

10. In a self-binding harvester, the main-wheel frame having parallel side bars which form bearings and supports for the needle-shaft and knotter-driving shaft, said side bars lying in different horizontal planes and having one of the axle-bearings in one side bar and the other in a hanger from the other side bar, whereby one of the parallel side bars of the said frame is located so high that the swath of cut grain may be carried beneath it, in combination with delivery and discharging mechanism adapted to convey the grain beneath the elevated side of said frame, substantially as described.

11. In a self binding harvester, the main-wheel and binder frame having parallel side bars, one of which is adapted to overreach and the other to underreach the grain-passage way, and serve as supports for the band-carrying arm and knotting mechanism, respectively, and to receive the supporting-wheel between them, substantially as described.

12. In a self-binding harvester, the main frame supported on the master-wheel, the packer-shaft supported on the said frame, the packers and binding mechanism located in rear of the said master-wheel, and the packer-driving mechanism located in front of said wheel, all combined substantially as described.

13. The tilting grain-receiving platform and the yoke G, combined with the main-wheel frame, said yoke pivoted to a lever pivoted to the main frame, substantially as and for the purpose described.

14. The main-wheel and binder frame, the lever H, pivoted thereto, suitable lever-locking mechanism, and the yoke swiveled to the said lever and pivoted to the grain-receiving platform, the said platform pivotally supported on the main-wheel and binder frame, all combined substantially as described.

15. The main-wheel and binder frame, the rocking axle, the draft-bars d^2 and d^3, the tilting and fore and aft adjustable grain-receiving platform, the yoke, and lever H, all arranged and combined substantially as described.

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