(No Model.) 5 Sheets—Sheet 1.

M. A. KELLER.

SELF BINDING HARVESTER.

No. 542,737. Patented July 16, 1895.

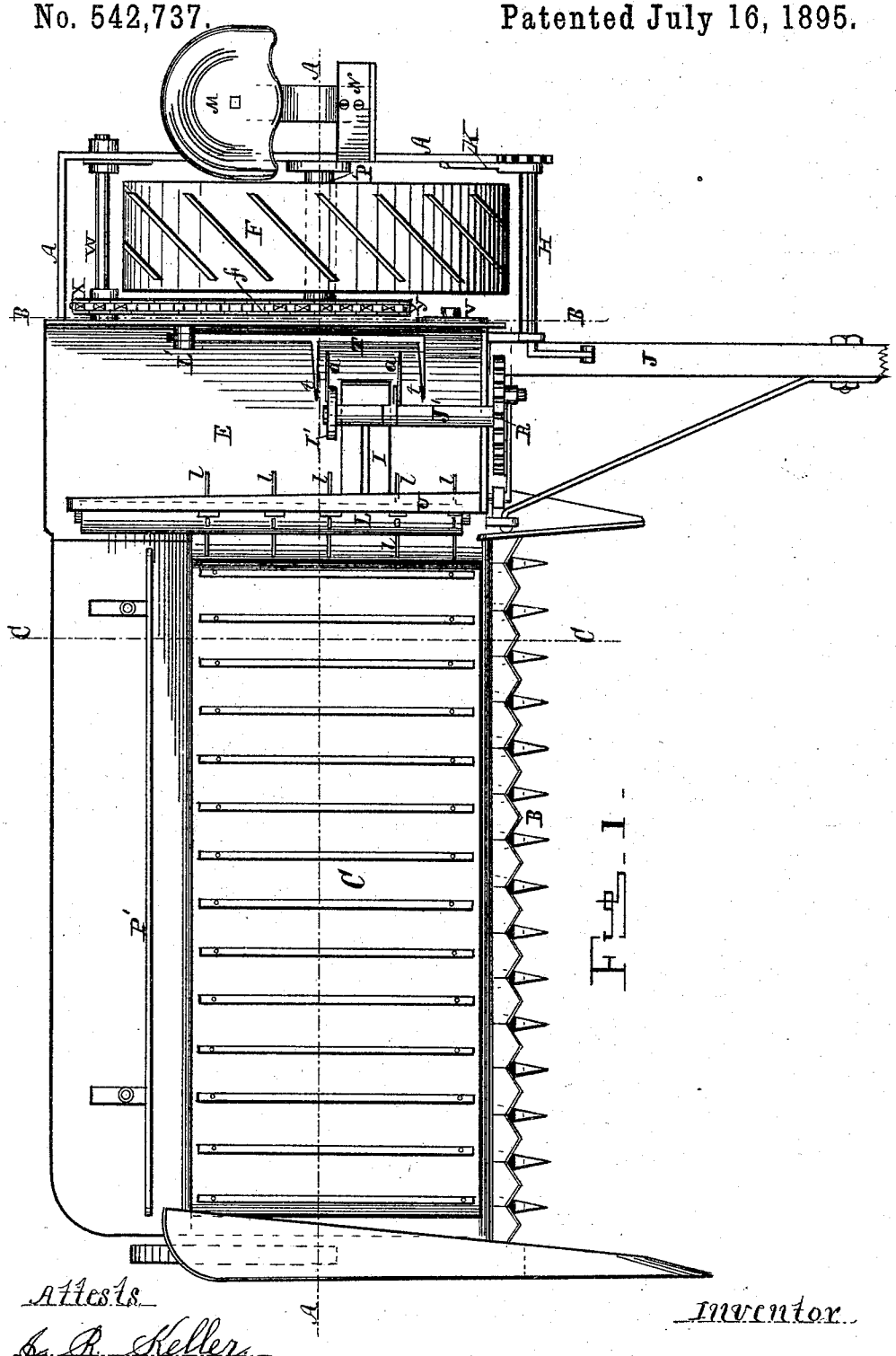

Fig. 1.

Attest:
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Inventor.
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(No Model.) 5 Sheets—Sheet 2.

M. A. KELLER.

SELF BINDING HARVESTER.

No. 542,737. Patented July 16, 1895.

FIG. 2.

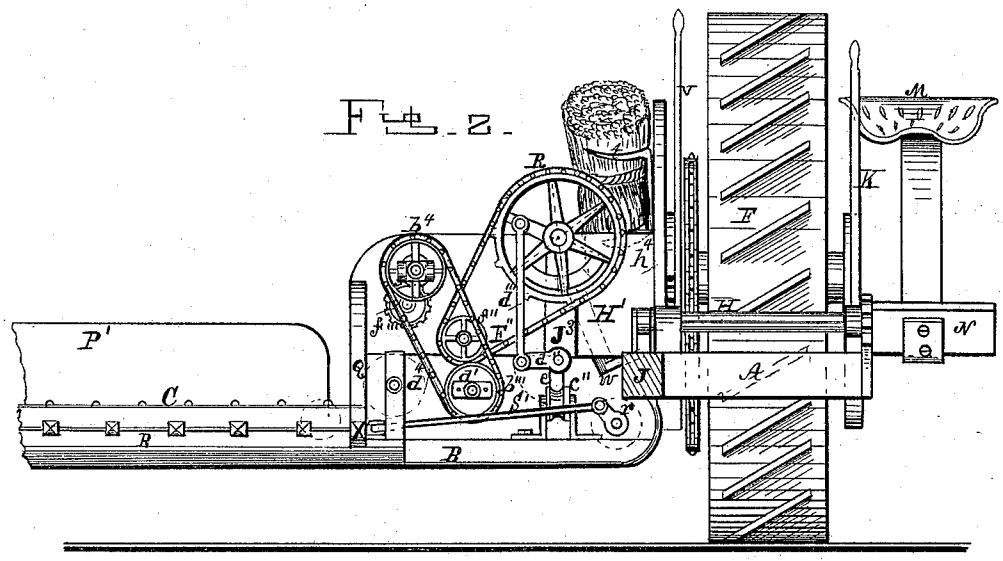
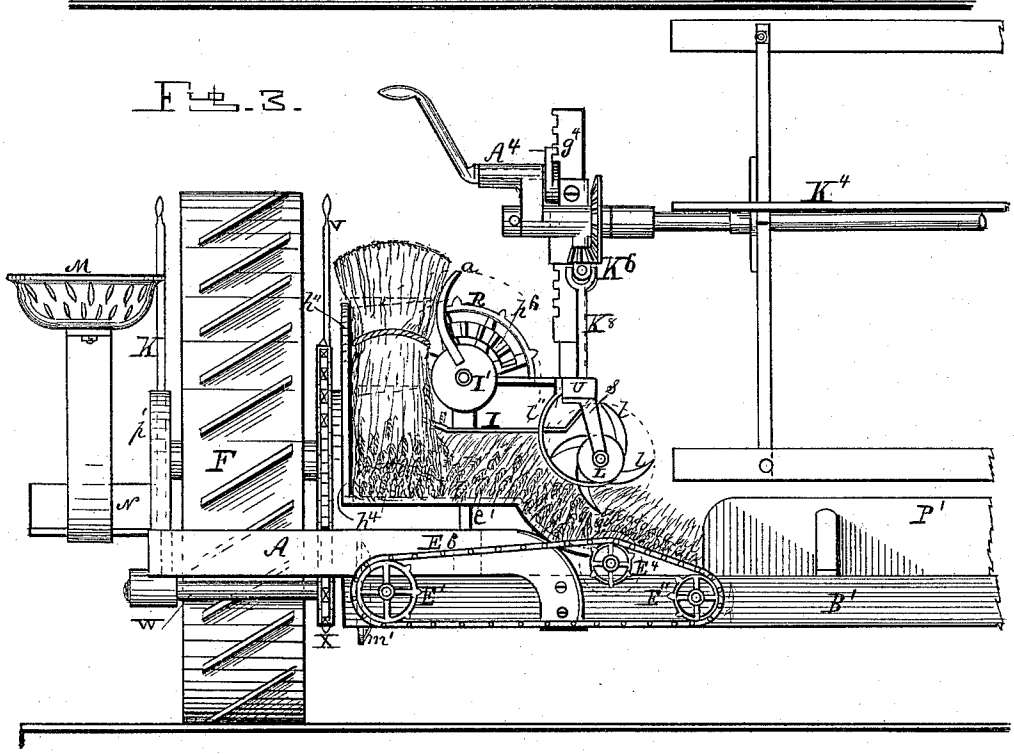


FIG. 3.



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Wm. C. Keller.

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M. A. Keller.

(No Model.) 5 Sheets—Sheet 3.

M. A. KELLER.

SELF BINDING HARVESTER.

No. 542,737. Patented July 16, 1895.

Fig. 4.

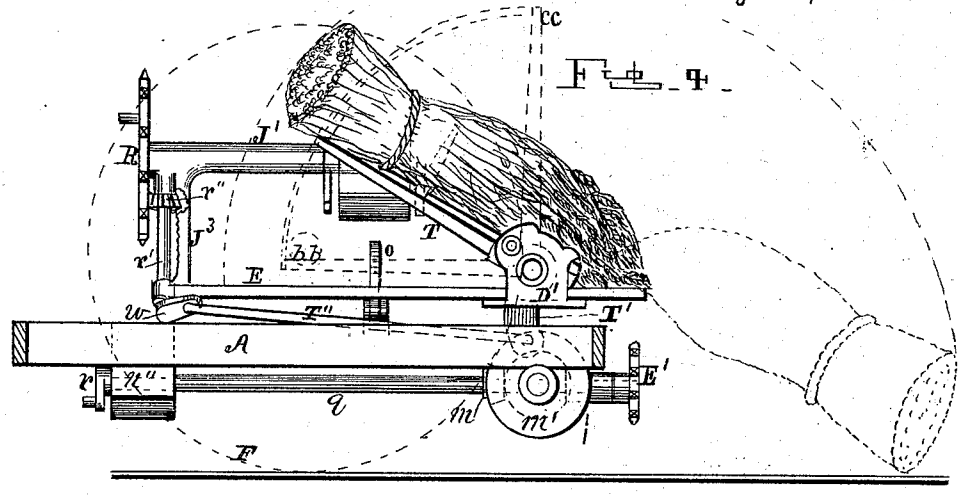


Fig. 5.

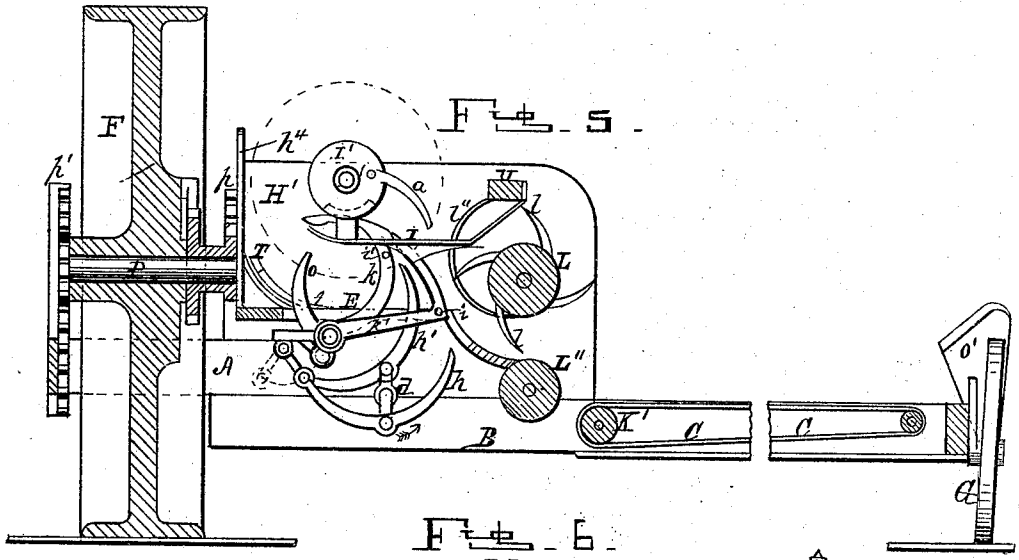
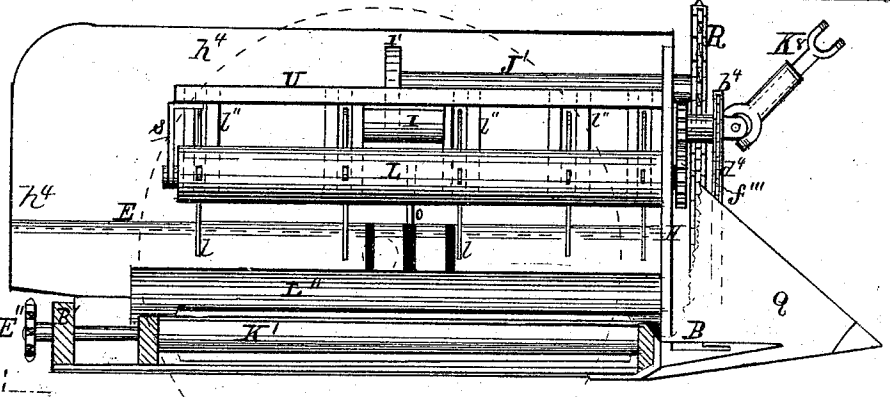


Fig. 6.



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SELF BINDING HARVESTER.

No. 542,737. Patented July 16, 1895.

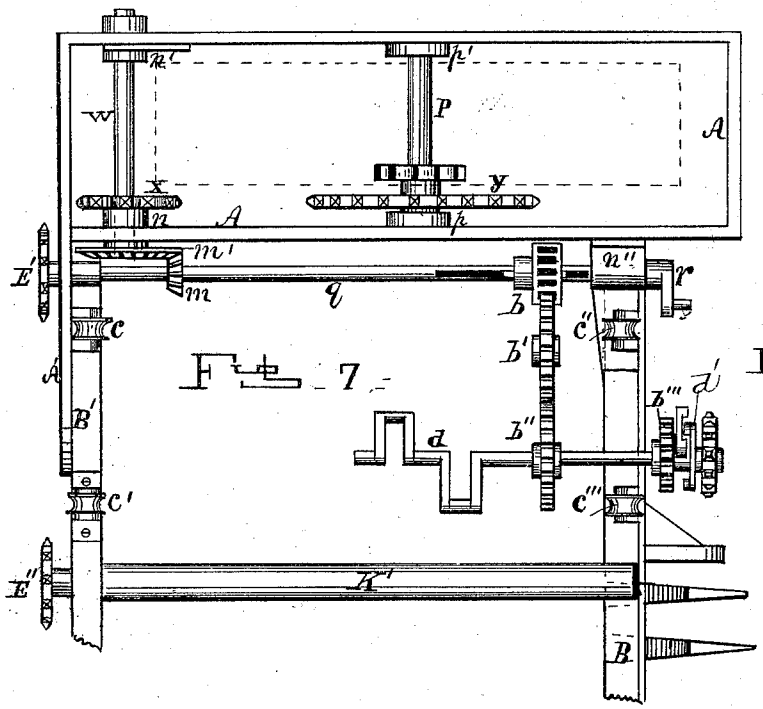

Fig. 7.

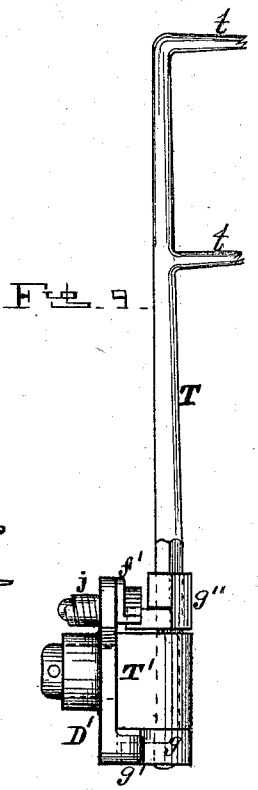

Fig. 9.

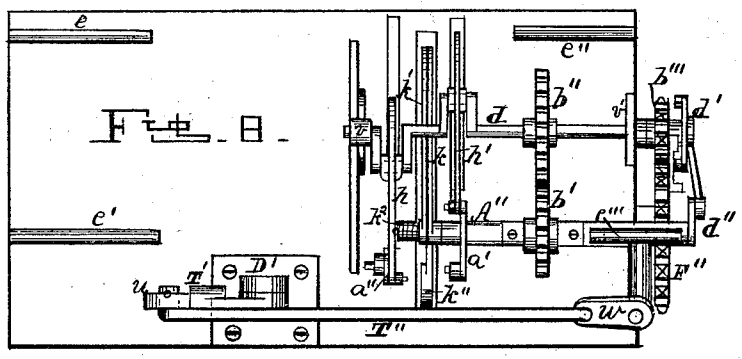

Fig. 8.

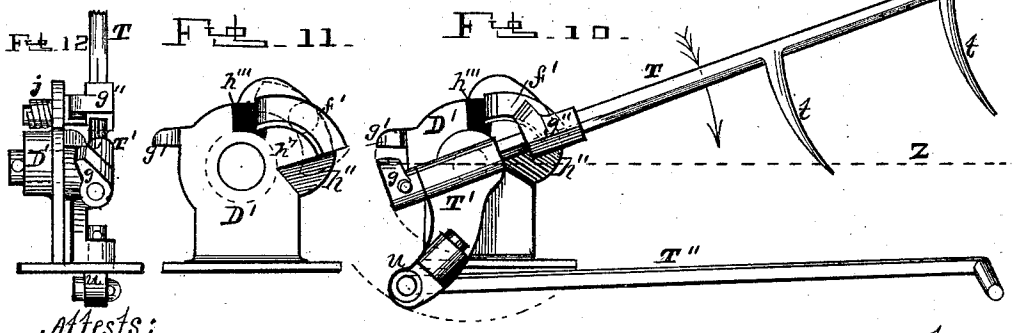

Fig. 12. Fig. 11. Fig. 10.

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(No Model.) 5 Sheets—Sheet 5.

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SELF BINDING HARVESTER.

No. 542,737. Patented July 16, 1895.

Fig. 14.

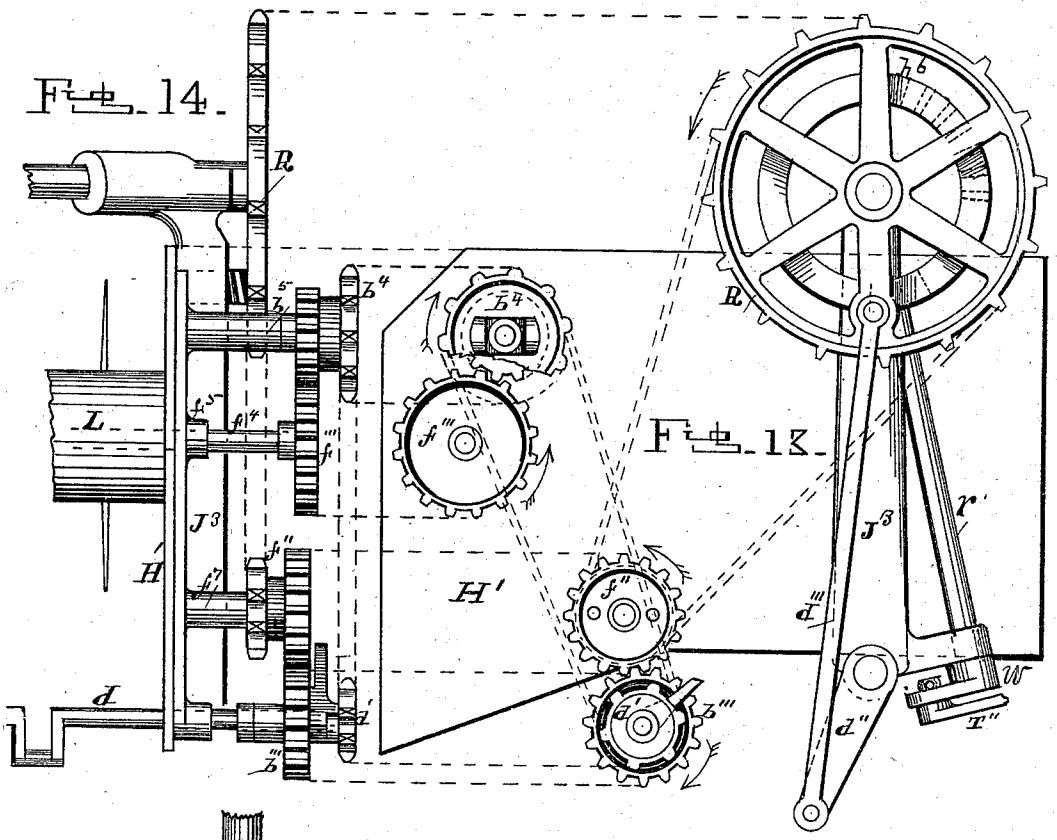


Fig. 13.

Fig. 15.

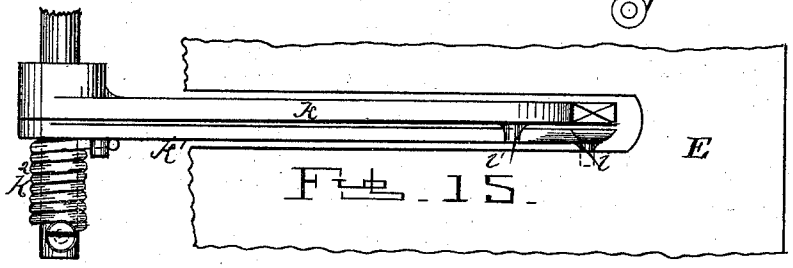
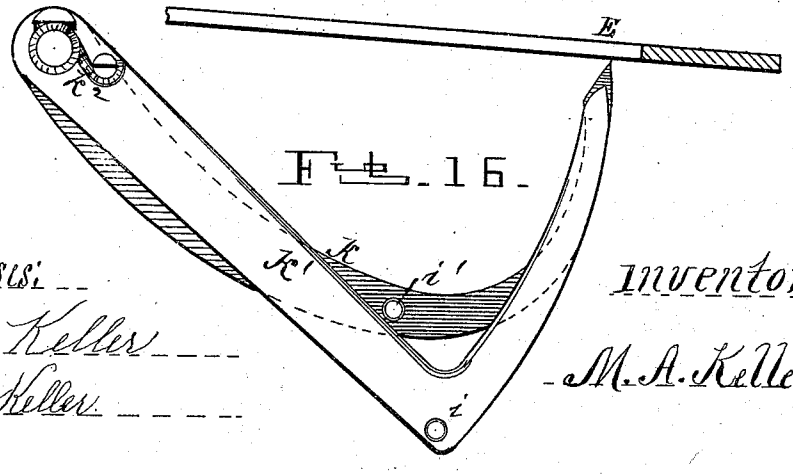


Fig. 16.



Witnesses:
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A. P. Keller

Inventor.
M. A. Keller.

UNITED STATES PATENT OFFICE.

MOSES A. KELLER, OF BATAVIA, NEW YORK, ASSIGNOR TO THE McCORMICK HARVESTING MACHINE COMPANY, OF CHICAGO, ILLINOIS.

SELF-BINDING HARVESTER.

SPECIFICATION forming part of Letters Patent No. 542,737, dated July 16, 1895.

Application filed September 24, 1887. Serial No. 250,617. (No model.)

To all whom it may concern:

Be it known that I, MOSES A. KELLER, a citizen of the United States, residing at Batavia, in the county of Genesee and State of New York, have invented a new and useful Improvement in Self-Binding Harvesters, of which the following is a specification.

The invention has reference to self-binding harvesters, and relates more especially to that class of machines generally known as low-down binders.

The object of the present invention is to improve these machines in respect of the manner of discharging the bundles after they are bound and in the mechanism for effecting such discharge.

Referring to the accompanying drawings, forming part of this specification, Figure 1 is a top plan view of a machine embodying my improvement. Fig. 2 is a front elevation, and Fig. 3 a rear elevation of the same. Fig. 4 is a sectional elevation taken through the line B B of Fig. 1, showing the bundle-ejecting mechanism in the operation of removing a bundle from the binding-table. Fig. 5 is a longitudinal section taken through the line A A of Fig. 1. Fig. 6 is a transverse section taken on the line C C of Fig. 1. Fig. 7 is a top plan of the main wheel and gear-frame and the gearing. Fig. 8 is a bottom plan of the binding-table and binding mechanism. Fig. 9 is a top plan of the bundle-ejecting fork. Fig. 10 is a side view of the same as it appears on its return movement. Figs. 11 and 12 are detail views of the mechanism for turning the fork. Fig. 13 is an elevation of the binder-operating mechanism. Fig. 14 is a side view of the same. Fig. 15 is a plan view showing the binder-arm and cut-off, and Fig. 16 is a side view of the same in its normal position.

Similar letters of reference denote corresponding parts in the several views.

Referring to Fig. 7, A indicates the metallic frame in which the main wheel F and the counter-shaft W are mounted and to which the inner ends of the platform-sills are secured. This frame is preferably formed of a single piece bent into the form of a rectangle and having a lateral extension A′ at its rear end, to which the rear sill B′ of the platform is rigidly secured. Upon either side of this frame arc-shaped gear-racks *p p′* are fastened, these racks being for the purpose of raising and lowering the main wheel, the axle P of which is provided with pinions engaging the racks, all as now well understood.

The front sill of the platform is denoted by B. Its inner end is secured to and supported by the frame A on a level with the rear sill B′ by means of a bracket *n″*, depending from a point near the front inner corner of the frame. The two platform-sills B B′ carry the cutting apparatus and the rollers K K′ and belts C for receiving and delivering the grain to the binder in the usual manner.

Power to drive the different mechanisms of the machine is taken from the main wheel F by means of an endless chain or belt *f*, thrown over a sprocket-wheel Y on the axle of the main wheel and transmitted to the sprocket-wheel X on the counter-shaft W, whence it is distributed to the various parts by means of a line-shaft *q*, journaled in bearings in the front and rear sills and which is driven from the counter-shaft by miter-gearing *m m′*.

Referring to Figs. 1, 4, and 5, E denotes a rectangular table constituting the binder receptacle or deck. This table is mounted on the platform-sills and is arranged in the direction of the length of the grain coming from the platform and is located between the inner end of the platform and cutting apparatus and the main wheel, its outer edge lying close to the inner side of the wheel-frame. As indicated in Figs. 3 and 5, this table is slightly elevated above the level of the platform; but even in extreme adjustments of the frame it is much below the top of the main wheel. The entire mechanism for feeding, packing, separating, compressing, binding, and ejecting the bundles is carried by or has a fixed relation to this table.

In order to insure the placing of the band centrally around the bundle regardless of the length of the grain, I make the table adjustable in the direction of the grain's length by mounting the same on rollers *c c′ c″ c‴*, journaled in brackets upon the sills B B′, which rollers engage with ledges or tracks *e e′ e″ e‴* on the under side of the table and thus permit the position of the table with relation to the incoming grain to be varied at will.

At the inner end of the grain-platform and in proximity to the edge of the canvas is ar-

ranged a transferring-roller L″, the position of the roller being a little above that of the platform-canvas, but not so high as the binder deck or table. The inner side of the deck E is inclined or concaved, as shown in Fig. 5, and its edge is arranged close to the periphery of the roller L″, the object of this arrangement being to permit the roller as it receives the grain from the platform-canvas to elevate and transfer it to the concaved or inclined portion of the deck, whence it is taken by a feeding device and carried upward and forward onto the main body of the deck within reach of the packers of the binder.

As before stated, the feeding, packing, separating, binding, and ejecting devices are all carried by or with the movable binder-table E. The binder-frame proper consists of the usual standard J^3, having a tubular arm J′, overhanging the deck and carrying the usual or any preferred knotting devices, the breast-plate, and the combined separator and ejector. This frame occupies a position about centrally of the width of the table and is secured to the latter so as to be movable therewith. Secured to the standard J^3 and projecting on either side of the same so as to extend clear across the width of the binding-table, and preferably spanning the entire space between the inner end of the platform-canvas and the main wheel-frame, is an end-board H′, which board closes the front end of the binding-receptacle and the grain-passage leading thereto and also furnishes a support for part of the gearing which drives the reel, the feeding device, and the binder. Located at the outer edge of the binder-deck is a vertical guard or side board h^4, which board may be connected with the deck and the end board H′ and movable therewith, or may be secured to the wheel-frame in fixed position. The board closes the outer side of the binding-receptacle next to the main wheel, and prevents the bundles from being thrown against the wheel or entangled with any part of the gearing.

The mechanism for feeding the grain up the inclined part of the table E onto the deck proper consists of a roller L, journaled at its front end in the end board H′ and at its rear end in a bracket S, depending from the overhead bar U, which in turn is secured at its front end to the board H′ and has a supplemental support at or about the middle from the usual knotter breast-plate I, as clearly shown in Figs. 3 and 5. This breast-plate, it will be understood is secured to and supported in the usual manner by the overhanging arm J′ of the binder-frame. The feed-roller is armed with teeth *l*, arranged in rows longitudinally of the same, said teeth being curved or inclined in the reverse direction to the rotation of the roller, so as to clear themselves from the grain. As a further preventive of entanglement of the grain with the roller I provide a number of guards or strippers *l*″, these guards being made of spring metal and secured at their upper ends to the overhead bar U and extending down on the inner side of the roller and having their free ends lying close to or bearing against the periphery of the plain portion of the roller. It is preferable to arrange these guards in pairs, one for each set of teeth, as shown in Fig. 6, though this is by no means essential. By supporting the roller in the manner above described, the rear end of the grain-passage leading from the platform-canvas to the binder-deck is left open at the rear, the object being to permit the passage of grain of unusual length and to allow the adjustment of the roller with the binder-table.

The mechanism for packing, compressing, separating, and binding the grain into bundles, herein illustrated, is of a type now well known in the art and no particular novelty is claimed therein, excepting in so far as the binder-arm guard is concerned.

Referring more especially to Fig. 5, K denotes the needle or binder arm, O the tripping compressor, and *h h′* the vibrating packers, the latter being connected at their heel ends to a stationary support by means of links *a′ a″* and driven by cranks on the shaft *d*. In low-down binders the usual rigid guard extending from the back of the needle for the purpose of preventing the packers acting on the grain while the needle is encircling the bundle is impracticable, owing to the low position of the binding-table. I therefore dispense with this integral projection and provide a separate guard-arm preferably mounted on the same shaft as the needle and arranged to operate in conjunction therewith, so that as the needle rises the guard will also rise and hold back the grain and as the needle falls the guard will be depressed below the surface of the deck, as indicated in Fig. 16.

Referring to Figs. 15 and 16, K′ indicates the guard. It approximates closely the shape of the needle itself and is loosely pivoted on the needle-shaft, so as to lie close alongside of the body of the needle. The connection between the arm and the shaft is made by means of a spring K^2, one end of which is secured to the shaft, and the other end, after taking several turns around the shaft, engages with a pin on the arm, so as to tend constantly to raise and hold the arm in elevated position with its guard above the table, a lug *i* being provided on one side of the arm to contact with the under side of the table to limit this movement. In order to depress the arm and hold its guard part down below the table when the needle is down, the latter is provided with a lug *i′*, projecting from the side next to the arm, which lug strikes the top part of the arm as the needle recedes and forces it down and holds it below the table. The point of the guard is coincident with the point of the needle, the object being that, as the needle is positively raised, the guard may follow in the rift in the grain caused by the entrance of the needle.

I will now describe the mechanism for dis-

charging the bound bundles from the machine.

The letters *a a* denote the usual revolving binder-ejectors, these ejectors being rigid on the knotter-driving shaft and operating, so far as the action of the binder itself is concerned, in substantially the same manner as in well-known machines of the present day.

T indicates a vertically-swinging bundle-discharge fork or throw-off arm, the object of which is to take the bundles from the binder, or, more properly speaking, from the ejectors, and throw them over toward the rear of the machine in the manner hereinbefore referred to. This fork is mounted upon a bracket D′, secured to the binder-table at its outer edge on the wheel side of the receptacle and near the rear corner of the binder. Being mounted upon or secured to the binder-table E, the fork is adjustable fore and aft with the binder, and always preserves a constant relation to the binding mechanism and to the ejectors *a*. Projecting from the side of the fork next to the binding-receptacle are tines *t*, there being preferably two of these tines, one located at the extreme end of the fork in front of the binder-ejectors and the other in the rear of the ejectors at a point farther along its length. These tines stand in toward the binder-receptacle and are preferably curved, as indicated in Figs. 5 and 10, so as to form a sort of cradle-like receptacle for the bundles, the end tine passing under and supporting the butt of the bundle and the other tine supporting the bundle about midway of its length and preferably piercing it on the opposite side of the band, so as to prevent the bundle from sliding down the fork when the latter rises. The axis upon which the fork swings is substantially horizontal and transverse to the binder-receptacle and is located preferably somewhat above the level of the table. The particular manner of mounting and operating the fork and the timing of the same with relation to the binder-ejectors is an important feature of the invention and will now be described.

The binder-ejectors *a*, although operating in substantially the same manner as heretofore with relation to the binding devices, are preferably curved in the direction of their rotation, as represented in Figs. 3 and 5, or in an opposite direction to the curvature of the fork-tines, and the fork is operated from the shaft carrying the ejectors, so as to start just as the ejectors in coming around to push the bundle out of the binder meet the tines *t*, so that the bundle is lifted bodily out of the binder by the conjoint action of the two devices, the binder-ejectors effecting a clean separation of the outgoing bundle from the gavel which follows it into the binder. This concurrent movement of the two devices continues until the usual pause in the movement of the binder-ejectors, when, the bundle having been completely separated from the gavel and lifted bodily from the place of binding by the co-operation of the ejectors and the fork, the further discharge is effected by the action of the throw-off fork alone. This conjoint action of these two devices is of the utmost importance. Indeed, it practically solves the difficulty heretofore attending the use of this type of discharge-fork, for, in addition to the assistance which the ejectors render in separating and disentangling the bundle from the gavel, they relieve the fork of the strain of starting the bundle and help it when assistance is most needed.

As before explained, the tines lie in substantially a horizontal direction when the fork is in receiving position and they retain this relative position until the bundle has been discharged. It will be obvious, however, that it would not be possible to return the fork to proper receiving position with the tines in this position. I therefore provide for turning the fork on its longitudinal axis as it starts to return to place, so that the tines go down end foremost until they reach the place of binding, when the fork is rocked, so as to bring them in proper horizontal position. This is effected by the following mechanism:

Referring to Figs. 9 to 12, D′ denotes the bracket hereinbefore referred to and T′ an arm projecting from a short shaft journaled horizontally in the same. The arm T′ carries a sleeve arranged transversely of its axis, and in this sleeve is journaled the butt end of the fork T. *g* indicates a dog projecting radially from the end of the fork on one side of the sleeve, and *g″* a similar dog projecting from the fork at an angle of about ninety degrees from the dog *g* on the opposite side of the sleeve. These two dogs, co-operating with cams and recesses on the face of the bracket D′, presently to be described, serve to rock the fork on its longitudinal axis, as above described. *h″* indicates a recess in the face of the bracket D′, into which the end of the dog *g″* extends when the fork is down in receiving position, so that the side face of the dog is in position to engage the plain surface h^7 of the bracket in the rising movement of the fork, which engagement prevents the rocking of the fork. At the opposite end of the plain surface h^7 from the recess *h″* is another recess *h‴*. The dog *g″* projects from the opposite side of the fork from the tines *t*, and the weight of the bundle on the tines would rock the shaft except for the plain surface h^7 acting on the dog *g″*. When, however, the fork has risen into position where the bundle leaves it, the dog *g″* comes opposite the recess *h‴*, when the resistance of the bundles turns the fork and the dog enters the recess and the tines point downward. *f′* is a spring-actuated switch-cam, onto which the opposite face of the dog runs as the fork recedes, and which holds the same with its tines pointing downward until the dog runs off the cam and enters again the recess *h″*. The spring *j* holds the switch-cam normally in the position shown in full lines in Fig. 11, in which posi-

tion it stands opposite the recess h''', ready to receive the dog g'' as it emerges from the recess on the return of the fork. The dog g'' is sleeved upon the square shank of the fork so as to slide but not to turn thereon. The cam f' has a projecting flange f''', the object of which is to insure the passage of the dog g'' onto the cam in the return movement of the fork and to prevent the dog from engaging the cam as the fork rises and cause it to engage the plain surface h^7. In order to rock the fork positively so as to present the tines in proper horizontal position when the fork is down, a lug or shoulder g' is arranged on the bracket D′ diametrically opposite the recess h'', which shoulder is engaged by the end dog g, causing the fork to rock, so that the dog g'' enters the recess h'' and the tines to lie flat, as in Fig. 5.

The gearing for operating the several mechanisms hereinbefore described is as follows: Referring to Fig. 7, q denotes the line-shaft above described. This shaft drives the cutter-bar by means of the crank r on its front end and the pitman s, and the platform-canvas by means of the sprocket-wheel E′ on its rear end, over which is thrown the chain-belt E^6, which passes around the sprocket-wheel E″ on the inner roller K′, and over the similar wheel E^4 on the rear end of the transfer-wheel L″, which it also drives.

All the other parts of the machine are driven from the packer-shaft d, mounted in bearings on the under side of the binder-table, which packer-shaft is, however, also operated from the line-shaft. The packer-shaft takes its rotation from the line-shaft by means of the gear-train b, b', and b'', the wheel b' being an idler journaled in a bracket on the under side of the binder-table and serving to transmit motion from the pinion b on the line-shaft to the gear b'' on the packer-shaft. As the packer-shaft is adjustable with the binder-table, the prime-pinion b is splined upon the line-shaft in a manner well understood, so as to preserve the relation of the gears in the various adjustments. On its front end the packer-shaft carries a fixed sprocket-wheel d' and a loose pinion b''', there being a clutch-connection between the two wheels so that the latter is driven intermittently by the former which has a continuous rotation with the packer-shaft. The sprocket-wheel d' drives a pinion b^4, mounted on a stud-shaft on the upper part of the end board H′, from which wheel b^4 the feeding-roller L is constantly driven by means of intermediate gearing b^5 and f''''. The reel K^4 is also driven from the wheel b^4 by means of a tumbling-shaft connection K^8. The loose pinion b''' on the packer-shaft gears with a pinion f'', mounted on a stud-shaft on the end-board H′, which pinion is integral with a sprocket-wheel f^7, which drives the binder-operating shaft R′ by means of a chain-belt thrown around said wheel f^7 and the wheel R on the front end of the shaft just outside of the frame-standard J^3. The needle-shaft J^2 is driven from the binder-shaft in the usual manner by means of a pitman d''', connecting the wheel R with a crank d'' on the shaft J^2.

As before stated, the discharge-fork is operated in unison with and in a certain relation to the ejectors which are mounted on the binder-shaft R′. To effect this operation the wheel R is provided with a rim r'', having a gear-segment b^6 thereon. This gear-segment and rim control the operation of the discharge-fork through the instrumentality of a shaft r', mounted in bearings on the standard J^3, and having a gear-pinion f^5 at its outer end co-operating with the rim and segment, and a crank W at its lower end connecting by means of a pitman T″ with the end of the fork-carrying arm D′ by means of a swivel-connection u. The pinion f^5 will preferably have a suitable delay-shoe acting on the rim r'' to hold the shaft r' stationary, except at the proper time, and the gear-segment is arranged at such point with relation to the position of the ejector-arms as to cause the rotation of the shaft r' and the operation of the discharge-fork at the time and for the purpose hereinbefore fully explained.

Having thus described the invention, what I claim, and desire to secure, is—

1. In a bundle discharging mechanism for binders, the combination, substantially as hereinbefore described, of the binder ejector, a supplemental discharger working in a plane at an angle to that of the binder ejector, and mechanism for operating the discharger relative to the ejector so that the bundle will be removed from the binder by the simultaneous action of the two devices and discharged from the machine in a direction at an angle to the line of movement of the binder ejector.

2. In a bundle discharging mechanism for binders, the combination, substantially as hereinbefore described, of the binder ejector, a pivoted oscillating supplemental discharger working in a plane at an angle to that of the binder ejector, and mechanism for operating the discharger relative to the ejector so that the bundle will be removed from the binder by the simultaneous action of the two devices and discharged from the machine in a direction at an angle to the line of movement of the binder ejector.

3. In a bundle discharging mechanism for binders, the combination substantially as hereinbefore described, of the binder ejector, a pivoted oscillating bundle discharger working in a plane transverse to that of the ejector, and mechanism for operating the discharger relative to the ejector so that the bundle will be lifted by the combined action of the two devices.

4. In a bundle discharging mechanism for binders, the combination substantially as hereinbefore described, of the binder ejector, a pivoted oscillating bundle discharger working in a plane transverse to that of the ejector, and operating mechanism for the dis-

charger connected to and driven by the shaft of the ejector, the operation being timed so that the bundle is discharged from the binder by the simultaneous action of the two devices.

5. In a bundle discharging mechanism for binders, the combination substantially as hereinbefore described, of a pivoted discharger oscillating in a plane lengthwise of the bundle and adapted to rock on its longitudinal axis, tines projecting radially from said discharger, dogs projecting radially from the shank of the discharger, and a bracket having cams and recesses co operating with said dog to rock the discharger on said longitudinal axis positively in opposite directions.

6. In a bundle discharging mechanism for binders, the combination substantially as hereinbefore described, of a pivoted discharger oscillating in a plane lengthwise of the bundle, and adapted to rock in a plane transverse thereto, tines projecting radially from said discharger, a fixed dog projecting radially from the shank of the discharger on one side of its pivot, a radial sliding dog projecting from the shank on the opposite side of its pivot, a bracket having a fixed cam face and a switch cam on one side of the pivot for co-operating with the sliding dog, and a stop or shoulder on the opposite side of the pivot for co-operating with the fixed dog, whereby the discharger is held against rocking during its discharge movement and rocked on its longitudinal axis on the return movement so as to properly present the tines to the bundle.

7. In a bundle discharging mechanism for binders, the combination substantially as hereinbefore described of the rotary binder ejector carried by the main binder shaft, a pivoted oscillating throw-off arm working in a plane transverse to that of the rotary ejector, and mechanism for operating the throw-off arm relatively to the rotary ejector so that the initial movement of discharging the bundle will be effected by the conjoint action of the two devices, the discharge being completed by the throw off arm.

8. In a bundle discharging mechanism for binders, the combination, substantially as hereinbefore described, of the binder ejector, a supplemental discharger, and mechanism for operating the discharger relative to the ejector so that the bundle will be first removed from the binder by the combined action of the two devices and afterward discharged from the machine in a direction at an angle to the line of movement of the binder ejector.

9. In a bundle discharging mechanism for binders, the combination substantially as hereinbefore described, of the binder ejector, a supplemental discharger, and mechanism for operating the discharger relative to the ejector so that it will first assist the ejector in removing the bundle from the binder, and afterward change the direction of movement of the outgoing bundle and complete its discharge from the machine.

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