No. 757,128. PATENTED APR. 12, 1904.

E. M. KELLOGG.

# HARVESTER AND BINDER.

APPLICATION FILED MAR. 8, 1901.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

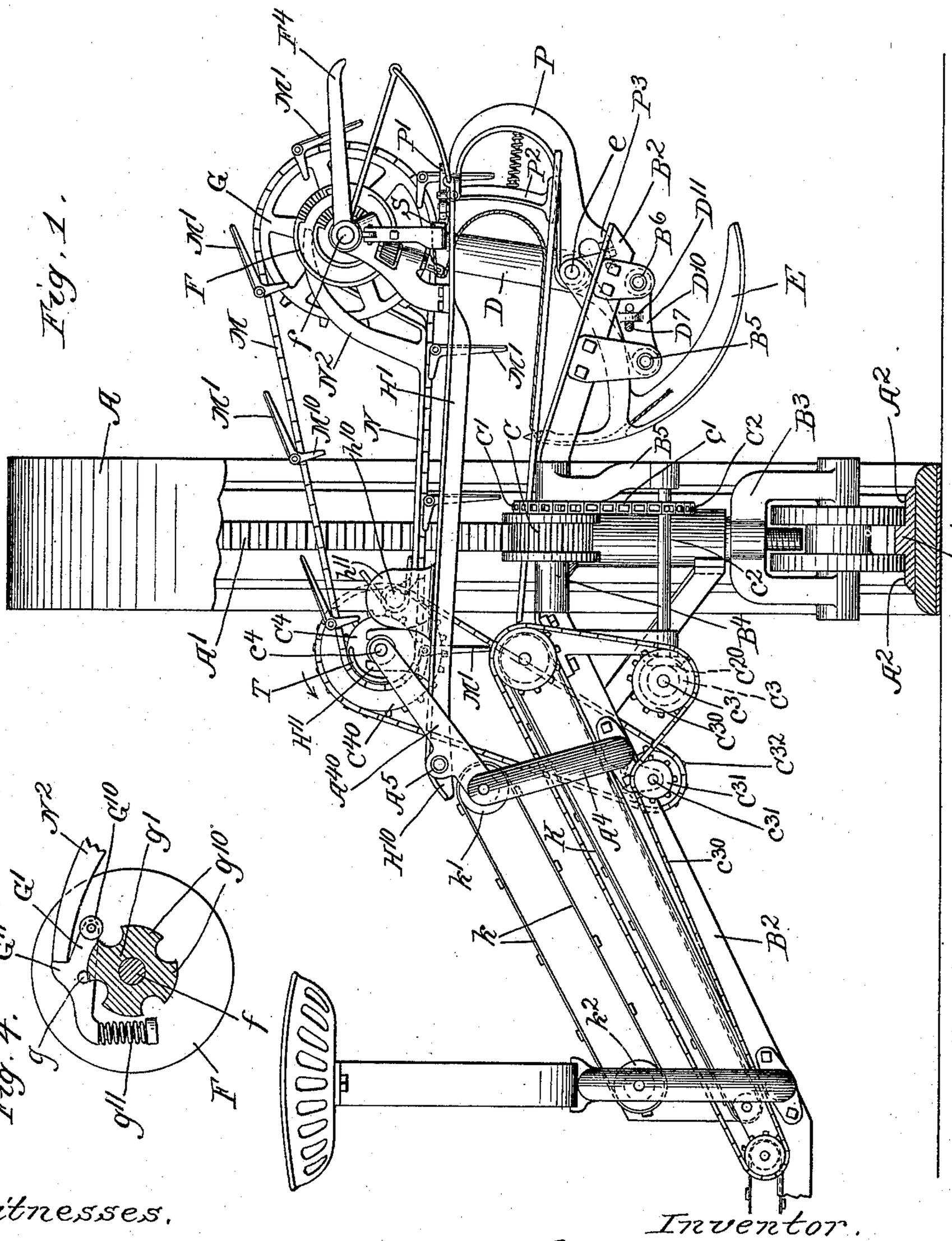


Fig. 4.




Witnesses.

Edward T. Wray

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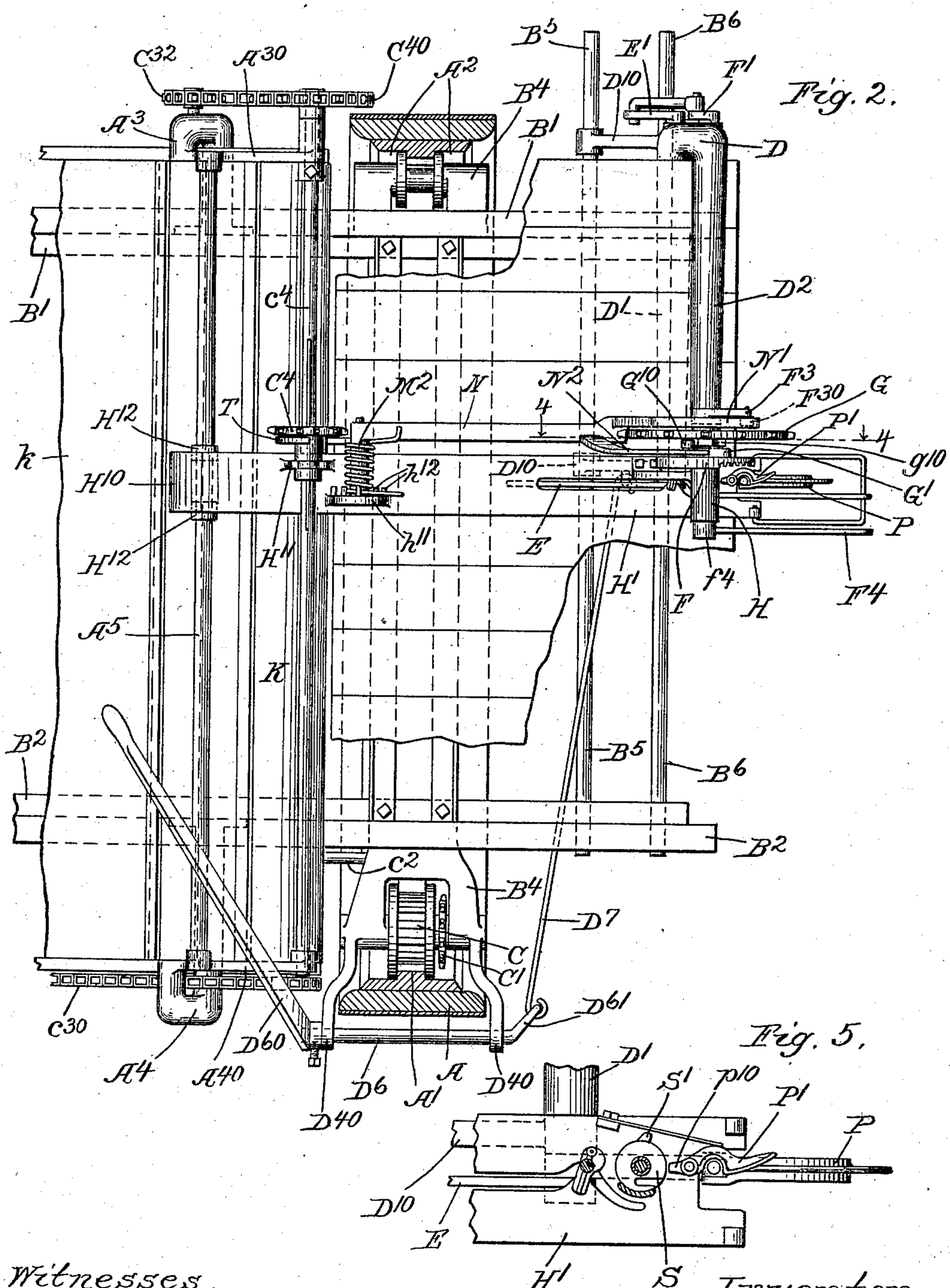
NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2.

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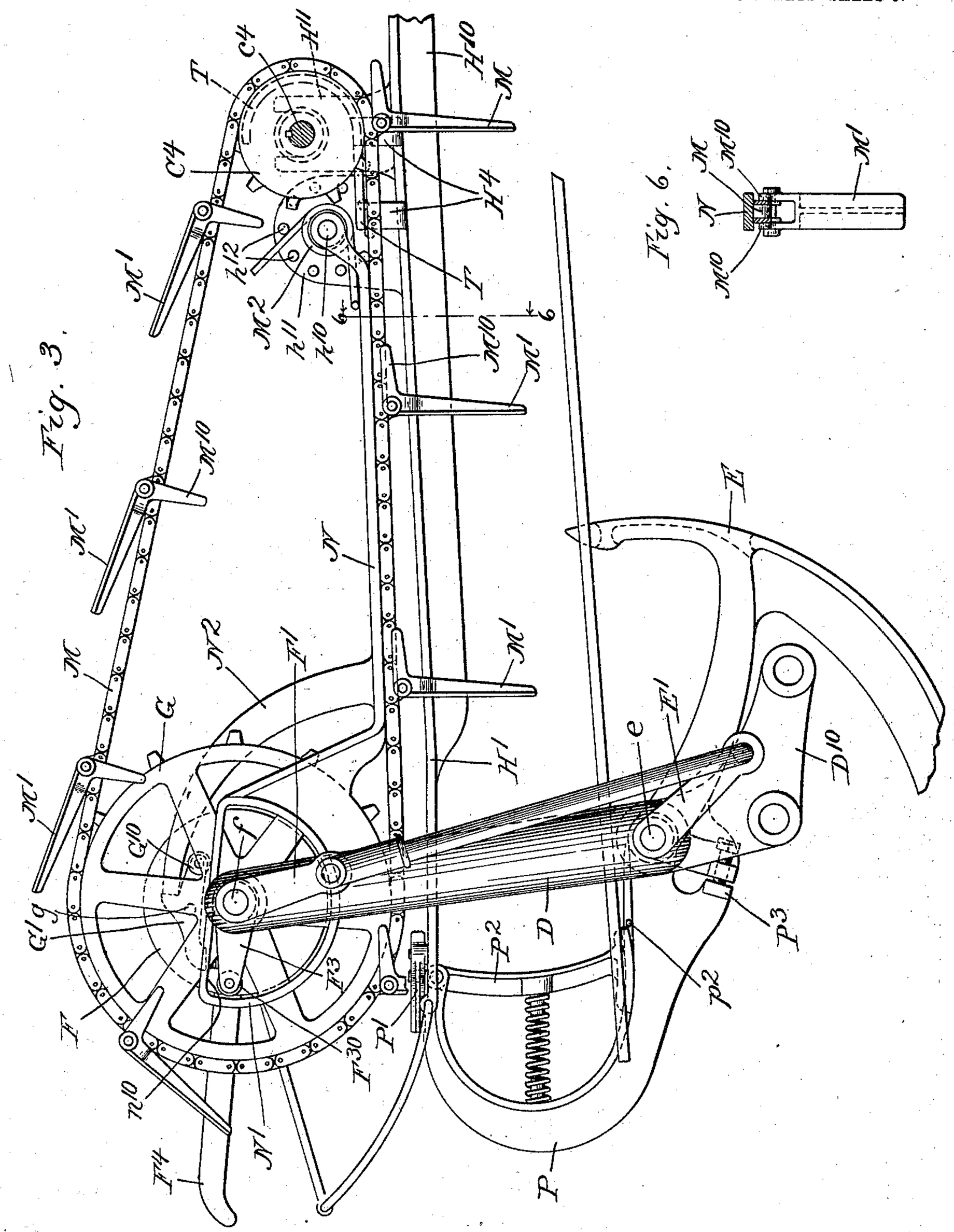
NO MODEL. 3 SHEETS—SHEET 3.

Fig. 3.




Witnesses.

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Edgar L. Grant.

Inventor

Edwin M. Kellogg

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No. 757,128. Patented April 12, 1904.

# UNITED STATES PATENT OFFICE.

EDWIN M. KELLOGG, OF ST. PAUL, MINNESOTA, ASSIGNOR OF ONE-HALF TO WILLIAM C. THOMPSON, OF CHICAGO, ILLINOIS.

## HARVESTER AND BINDER.

SPECIFICATION forming part of Letters Patent No. 757,128, dated April 12, 1904.

Application filed March 8, 1901. Serial No. 50,293. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN M. KELLOGG, a citizen of the United States, and a resident of St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Harvesters and Binders, of which the following is a full and complete specification, reference being had to the accompanying drawings, forming a part thereof.

The purposes of this invention are, first, to provide a binder in which the usual alternating, oscillating, and reciprocating packers are omitted and in lieu thereof continuously-driven devices are provided for accumulating and compacting the bundle; second, to provide new and simplified construction in which the resistance of the accumulated grain to the continuously-driven compacting devices operates to trip the binder into action; third, new and simplified construction by which starting of the binder's action renders the continuously-driven devices for accumulating the grain inoperative through the bundle-space, while remaining still operative to clear the grain from the delivery side of the devices which forward the grain to the binder; fourth, simplified construction of the binder-train by which the same derives driving power at the knotter end of the main binder-shaft and all mechanism at the opposite end is dispensed with except the crank and link for operating the needle rock-shaft; fifth, adapting a binder which derives its binding power at the knotter end of the main binder-shaft, as last above stated, to a harvester having an open-center traction-wheel and grain-forwarding means which deliver the grain through such wheel to the binder and specifically to provide a construction in which the binder shall be driven from a train at the grainward side of the traction-wheel by means of a chain extending through the wheel above the path of the grain; sixth, to provide a binder construction in which the gate at the discharge side is positively latched during the accumulation and banding of the bundle, but which, nevertheless, affords yielding resistance to the grain during such accumulation; seventh, to provide a construction in which the discharge-gate is unlatched by the knotter mechanism, and specifically by means of the cord-holder of said mechanism.

It consists, further, in features of construction relating to or growing out of the above features or their proper combination, which are set out in the claims.

Figure 1 is a rear elevation of a portion of my improved harvester and binder, the platform and reel and some other parts being omitted and the traction-wheel being broken away at the rear part to disclose the mechanism interior thereto. Fig. 2 is a top plan view of substantially the same parts, the elevator mechanism being broken away at the right and the traction-wheel being cut away above the horizontal plane of the axis of the main driving-pinion. Fig. 3 is a front elevation of the binder mechanism. Fig. 4 is a detail section at the line 4 4 on Fig. 2. Fig. 5 is a detail plan of devices for locking the end gate and unlocking the same by the action of the holder. Fig. 6 is a detail section at the line 6 6 on Fig. 3.

The harvester in connection with which my invention is shown comprises an open-center traction-wheel A, having an interior driving-gear rim A′, a rigid main frame, comprising front and rear sills B′ $B^2$, extending through the open center of the traction-wheel and supported and steadied on an interior tread-rim $A^2$ of the latter by means of suitably-located limbs $B^3$ $B^4$ $B^4$, the power being communicated to the train from the interior driving-gear rim A′ through the pinion C, suitably journaled on one of the limbs of the frame, the train extending from such pinion at the grainward side of the wheel to operate the usual cutting, reeling, and conveying devices, which are not attempted to be fully shown in the drawings, as the present invention does not concern their specific construction. The details of the structure generally so far as it involves the extension of the rigid main frame through the open-center traction-wheel and supporting and adjusting the frame within the wheel and transmitting power from the interior gear-rim thereof to shafts on the main frame are fully shown and described in my application, Serial

No. 707,753, filed March 4, 1899, and will not be herein described in detail, but only referred to as may be necessary for a clear understanding of the features of the present invention. It is necessary to point out, however, that from the pinion C power is communicated to the train by means of a sprocket-wheel C′, rigid with the pinion, around which a chain $c'$ passes to drive a sprocket-wheel $C^2$ on a shaft $c^2$, journaled in a bracket $B^5$ of the main frame within the traction-wheel, said shaft extending grainward out of the wheel and driving the remainder of the train by means of a beveled gear $c^{20}$, meshing with a beveled gear $C^3$ on a fore-and-aft shaft $c^3$, which at the forward end may have a crank to drive the sickle, while at the rear end it carries a sprocket-wheel $C^{30}$, from which, by means of a chain $c^{30}$, the lower elevator-apron K is driven. The bracket $A^3$ at the front and $A^4$ at the rear obtaining ultimate support from the front and rear sills, respectively, gives bearing for the discharge-side roller of the upper elevator-apron. A sprocket-wheel $C^{31}$ on the rear end of a fore-and-aft shaft $c^{31}$ deflects the chain $c^{30}$ and derives therefrom rotation in a reverse direction from the lower elevator-rollers, and said shaft $c^{31}$ being extended forward carries at the forward end a sprocket-wheel $C^{32}$, which by means of a chain drives the sprocket-wheel $C^{40}$ on the forward end of a shaft $c^4$, which is journaled in bracket-arms $A^{30}$ and $A^{40}$, projecting up forward from the brackets $A^3$ and $A^4$, respectively. The purpose of this shaft $c^4$, which extends fore and aft above the discharge side of the elevator, is to communicate power to the binder and to support and communicate movement to the means for carrying the grain thereto from the elevator, as hereinafter described. The upper element of the elevator consists of a short endless apron $k$, carried around suitable upper and lower rollers $k'$ $k^2$. This upper apron has its discharge-side roller located at a considerable distance back—that is to say, grainward—from the discharge-side roller of the lower apron K, so that the shaft $c^4$ and the mechanism thereon located above the discharge side of the lower apron operate at a position stubbleward from the discharge side of the upper apron, as particularly seen in Fig. 1.

D is the binder standard or frame. It is supported by the main frame-sills B′ and $B^2$, fore-and-aft tubular bars $B^5$ and $B^6$ being connected rigidly to the portion of said sills which extends stubbleward from the traction-wheel, and the lower arm D′ of the binder-standard having the lugs $D^{10}$ $D^{10}$, by which said standard is seated and adapted to slide fore and aft on said tubular bars in the adjustment necessary to accommodate the varying lengths of the grain. Any suitable means may be provided for sliding the binder at will, as the rock-shaft $D^6$, journaled in the bracket arms or lugs $D^{40}$ $D^{40}$, projecting rearward past the said rim of the traction-wheel, such rock-shaft having at the grainward end the lever-arm $D^{60}$ for operating it and at the stubbleward end a crank-arm $D^{61}$, connected by a link $D^7$ to the lug $D^{11}$ of the binder-frame standard. The lower fore-and-aft arm D′ of the binder-standard D constitutes a bearing for the needle rock-shaft $e$, on which E is the needle at the rear end of said bearing and E′ the crank at the forward end.

$D^2$ is the upper fore-and-aft arm of the binder-standard, constituting the bearing for the main binder-shaft $f$, which extends therethrough, having at the forward end the needle-operating crank F′ and at the rear end of the bearing, first, next to the end of the bearing, a crank $F^3$ for a purpose hereinafter explained; next, the loose sprocket-wheel G, whose hub $g'$ at the farther side from the bearing has the teeth $g^{10}$ for engaging the clutch-dog, (see Fig. 4;) next, the knotter-operating wheel F, on which at $g$, at the side toward the wheel G, is pivoted the clutch-dog G′, provided with a spring $g^{11}$, tending to throw its abutment $g^{10}$ into engagement with the loose wheel G, and, next, outside the knotter-operating wheel, the knotter frame or hanger H, beyond which at the end of the shaft is fast thereon the outside discharger $f^4$, whose hub $f^4$ constitutes a collar to retain the shaft.

H′ is the breastplate, extending rigidly from the lower end of said knotter-frame and having a further extension $H^{10}$, which reaches grainward through the open center of the traction-wheel and carries at $H^{11}$ a sprocket-wheel $C^4$, which is feathered and adapted to slide on and be continuously rotated by the shaft $c^4$, located, as above described, above the elevator at the grainward side of the traction-wheel. The grainward end of this breastplate extension $H^{10}$ is directly supported on the main frame of the harvester, a tubular fore-and-aft bar $A^5$ being provided, supported by the bracket-arms $A^{30}$ and $A^{40}$, and the grainward end of said breastplate extension having slide-bearings $H^{12}$ $H^{12}$ on said tubular bar.

M is a chain driven by the sprocket-wheel $C^4$ and driving the sprocket-wheel G, which is thereby continuously driven. The chain M has suitably pivoted to its links at convenient intervals teeth or fingers M′ M′, &c., which are designed to take the grain directly from the elevator and advance it stubbleward through the binder.

N is a lever pivoted at $h^{10}$ near the bearing of the wheel $C^4$ and extending thence stubbleward along the course of the chain M above the breastplate and having toward the stubbleward end an open cam N′, which encompasses the main binder-shaft $f$ immediately rearward of the end of the bearing, and thus encompassing a crank $F^3$, fast on the shaft $f$ adjacent to the rear end of the bearing, as

above described. Said crank has an abutment in the form of a stud and roll $F^{30}$, which as the shaft revolves acts upon the interior of the open cam N′ for the purpose of actuating the lever, as hereinafter described.

$N^2$ is an arm or branch of the lever N, offset therefrom so as to extend on the opposite side of the wheel G from the cam N′, said arm constituting a tripper for operating the clutch-dog G′, which is pivoted to the back of the knotter-operating wheel F and provided with a stud and roll abutment $G^{10}$, adapted to engage any one of the teeth $g^{10}$ of the hub of the wheel G, and thereby cause said wheel to be engaged with and rotate the shaft *f*. The nose $G^{11}$ of the clutch-dog when its abutment $G^{10}$ is thus engaged stands in position to encounter the end of the tripper $N^2$ when the latter is in normal position, as hereinafter explained, and the dog is thereby disengaged from the wheel G, bringing the binder to rest at the conclusion of its binding action. The teeth or fingers M′ of the chain M are provided with tails $M^{10}$ $M^{10}$, &c., which trail on the lever N, and said lever when in nominal position (at which the tripper is engaged with the clutch-dog and holds the same out of engagement with the wheel G) thus operates to hold the fingers protruded in position to engage and actuate the grain. A spring $M^2$, reacting between the lever N and the support to which it is pivoted, tends to hold it in this position. When thus held, the chain being continuously driven, engages the grain by means of the fingers M′, taking it from the delivery of the elevator and advancing it into the binder, compacting it against the discharge-gate, hereinafter described, until the resistance of the grain thus compacted operating against the fingers M′ forces them back, causing their tails $M^{10}$ to crowd against the lever N and swing it about its pivot until the tripper $N^2$ is disengaged from the clutch-dog G′, which thereupon becomes immediately engaged with the wheel G, causing the shaft *f* to be rotated. The first movement of the shaft causes the wrist of the crank $F^3$, operating against the straight face $n^{10}$ of the open cam N′, to force the lever back still farther than it has been forced by the mere pressure of the grain on the fingers, thus not only carrying the tripper quite out of the path of the clutch-dog, but also permitting the fingers to be folded back in inoperative position throughout the bundle-space, although they are held protruded in operative position at that portion of their path at which they pass around the wheel $C^4$ and take the grain delivered from the elevator, a shoe or track T for that purpose being secured to an arm $H^4$, which projects from the breastplate extension $H^{10}$. This track the tails $M^{15}$ encounter as the chain passes onto the wheel $C^4$, and said tails ride thereon until they pass onto the lever N near its pivot. The grain is thus continuously cleared away from the discharge of the elevator while the binder is operating and is accumulated back of the needle, while the latter is thrown up during the action of the binder.

It should be noticed that means for tripping the binder into action consists of the devices for advancing the grain into the binder, said devices being so constructed and operated that the resistance which the grain, advanced and compacted by said devices, offers to the compacting and advancing action causes delay of the advancing devices involving movement of said devices relatively to parts which are not delayed, such relative movement being taken advantage of to operate the tripping devices. This action originating with the resistance offered by the grain to the movement of parts tending to impel it should be distinguished from action which might be produced by pushing the grain against a yielding resistance, since in the latter case not the resistance of the grain, but its incapacity to further resist, and its consequent movement under pressure, would produce the tripping action, and this distinction is to be undertood as involved in the use of the term "resistance of the grain," as employed throughout this specification and my claims in this application.

When the binding operation is completed and the bundle is discharged and the needle recedes, the tripper is restored to position for disengaging the clutch-dog by the rotation of the crank $F^3$, which, having made a full half-revolution from the starting-point, begins to engage the cam N′ as it starts on the second half of its revolution and positively forces the lever N back to initial position, where the tripper encounters the tail of the clutch-dog and disengages it from the wheel G and positively stops the rotation of the knotter-operating wheel to which the dog is pivoted.

In order that the grain may be packed against a yielding resistance while the bundle is being accumulated, as is desirable for reasons well understood, and at the same time may be positively restrained in the bundle-space until the full quantity for a bundle is accumulated, I provide a deeply-recessed discharge-gate P, which is hinged to the frame at the needle rock-shaft side of the bundle-space and adapt it to swing in to the breastplate at the opposite side, where it is provided with a latch or automatic catch P′, with which it becomes engaged when it is thus closed. To this gate there is connected a yielding member $P^2$, hinged at the inner side of the gate—that is, toward the advancing grain extending across the deep recess of the gate and provided with a spring tending to hold it swung in toward the grain to a limit determined by a suitable stop $p^2$ on the gate. This member is thus adapted to yield stubbleward as the grain is packed against it during

the accumulation of the bundle. In order to unlatch the gate and allow it to be swung outward for the discharge of the bundle, I provide upon the cord-holder S of the knotter mechanism a projection S′ in such position as to encounter the tail $p^{10}$ of the latch P′ a little before the holder comes to rest at the proper time for the opening of the gate and the discharge of the bundle. The gate being under pressure of the grain at this stage will fly open the moment the catch is released, and the holder completing its movement runs off the tail of the catch, and it is by its spring restored to its position to again engage the gate when the latter is picked up by the tail of the needle encountering the back side of the gate at $P^3$ as the needle recedes to its position of rest.

The spring $M^2$ may be adjusted to vary its tension, and thus vary the limit of pressure necessary to trip the binder and regulate thereby the size of the bundle. Such adjustment is provided for by forming about the pivot $h^{10}$ of the lever N a flange $h^{11}$, having a plurality of pins $h^{12}$, against any one of which the end of the spring may be secured, thus coiling it more or less tightly.

I claim—

1. In a grain-binder, in combination with binding mechanism, a bundle accumulating and compacting device, consisting of an endless conveyer having grain-actuating arms or fingers adapted to yield to the resistance of the grain; a unitary device operating as integral, mounted on the frame and at one part of its extent constituting a tripper for tripping the binder into and out of action, and at another part of its extent constituting a support for holding the grain-actuating fingers of the bundle-accumulating device operatively protruded, said fingers having lever projections which ride on the support and force the same back and operate the tripper when the fingers yield to the resistance of the grain.

2. In a grain-binder, in combination with binding mechanism, a bundle-accumulating device, consisting of an endless conveyer having grain-actuating arms or fingers adapted to yield to the resistance of the grain, and means for driving it continuously through the binder in discharge direction; a unitary device operating as integral, mounted on the frame, and at one part of its extent constituting a tripper for tripping the binder into and out of action, and at another part constituting a support for holding the grain-actuating fingers of the bundle-accumulating device operatively protruded; said fingers having lever projections which ride on said supporting part and force back the same and thereby the tripping part when the fingers yield to the resistance of the grain.

3. In a grain-binder, in combination with a knotter-operating wheel, a continuously-driven wheel coaxial therewith and means for clutching said wheels together; a chain which is continuously driven through the binder in discharge direction; grain-actuating fingers on such chain, adapted to yield to the resistance of the grain; a support for holding such fingers operatively protruded; a tripper for operating said clutching means; connections from said support for operating said tripper; and means by which the fingers, yielding to the resistance of the grain, move the support and cause it to operate the clutching means to start the binder.

4. In a grain-binder, in combination with the knotter-operating wheel, a continuously-driven wheel and means for clutching it with the knotter-operating wheel; a chain which is continuously driven through the binder in discharge direction, and which drives said continuously-driven wheel; grain-actuating fingers on such chain, adapted to yield to the resistance of the grain, a support for the fingers yieldingly mounted on the frame and a tripper for operating the binder-clutch, said fingers having lever projections by which when the fingers yield to the resistance of the grain, the support is forced back and the tripper is caused to operate the clutch to start the binder.

5. In a grain-binder, a main binder-shaft; a continuously-driven wheel thereon and means for clutching it with the shaft; a bundle accumulating and compacting device, consisting of an endless conveyer having grain-actuating arms or fingers; a unitary device operating as integral, mounted on the frame and at one part of its extent constituting a tripper for operating the clutch, and at another part a support for holding the grain-actuating fingers of the bundle-accumulating device operatively protruded, the fingers having lever projections which ride on the supporting part and force back the same, and thereby operate the tripper when the fingers yield to the resistance of the grain.

6. In a grain-binder, in combination with the main binder-shaft, a continuously-driven wheel thereon, and means for clutching it with the shaft; a bundle accumulating and compacting device consisting of an endless conveyer having grain-actuating fingers adapted to yield to the resistance of the grain, and means for driving it continuously through the binder in discharge direction; a unitary device operating as integral, mounted on the frame and at one part constituting a tripper for operating the clutch, and at another part a support for holding the grain-actuating fingers of the bundle-accumulating device operatively protruded, the fingers having lever projections by which when said fingers yield, the support is forced back, and the tripper is caused to operate the clutch to start the binder.

7. In a grain-binder, in combination with the knotter-operating wheel, a continuously-

driven wheel coaxial therewith; means for clutching said wheels together; a chain which is continuously driven through the binder in discharge direction at the same side of the grain's path as said continuously-operating wheel, and which drives said wheel; grain-actuating fingers on such chain, adapted to yield to the resistance of the grain; a support for holding the fingers operatively protruded, and a tripper operatively connected with said support for operating said clutching means, the fingers being provided with means by which, when they yield to the resistance of the grain, they force back the support, causing it to operate the clutch to start the binder.

8. In a grain-binder, a continuously-driven conveyer-chain operating through the binder; a wheel on the main binder-shaft continuously driven by such chain; a clutch for connecting it operatively with the shaft; yielding devices on the chain by means of which it advances the grain to accumulate and make compact the bundles, a tripping device for operating the clutch, connections whereby said tripping device is operated by the yielding of the grain-advancing devices on the chain to the resistance of the grain.

9. In a grain-binder, in combination with the binder-shaft, the bearing in which it is journaled; the knotter-operating wheel fast on the shaft; a continuously-driven wheel at the same end of the bearing as the knotter-operating wheel; means for engaging the latter with said continuously-driven wheel; a conveyer operating through the binder, having yielding grain-advancing fingers, and connections by which the yielding of said fingers to the resistance of the grain operates said engaging means, causing the conveyer-operating wheel to rotate the shaft.

10. In a grain-binder, in combination with the main binder-shaft, the bearing in which it is journaled; the knotter-operating wheel fast on the shaft; a continuously-driven wheel loose on the same shaft at the same end of the bearing as the knotter-operating wheel; means for clutching the latter with such continuously-driven wheel; a conveyer operating through the binder, having yielding grain-advancing fingers; and connections by which the yielding of such fingers to the resistance of the grain operates said clutching means, causing the conveyer-operating wheel to rotate the shaft.

11. In a grain-binder, in combination with the main binder-shaft, the bearing in which it is journaled; the knotter-operating wheel fast on the shaft; a continuously-driven wheel at the same end of the bearing as the knotter-operating wheel; means for engaging the latter with such continuously-driven wheel; a continuously-driven conveyer operating through the binder, having yielding grain-advancing fingers; and connections by which the yielding of said fingers to the resistance of the grain operates such engaging means, causing the conveyer-operating wheel to rotate the shaft.

12. In a grain-binder, in combination with the main binder-shaft, the bearing in which it is journaled; the knotter-operating wheel fast on the shaft; a continuously-driven wheel loose on the same shaft at the same end of the bearing as the knotter-operating wheel; means for engaging the shaft with such continuously-driven wheel; a continuously-driven conveyer operating through the binder, having yielding grain-advancing fingers, and connections by which the yielding of said fingers to the resistance of the grain operates such clutching means, causing the continuously-driven wheel to rotate the shaft.

13. In a grain-binder, in combination with the main binder-shaft, the bearing in which it is journaled; the knotter-operating wheel fast on the shaft; a continuously-driven wheel at the same end of the bearing as the knotter-operating wheel; means for engaging the shaft with such continuously-driven wheel; a continuously-driven conveyer operating through the binder, having grain-advancing fingers adapted to yield to the resistance of the grain; and means by which the grain-advancing fingers, so yielding, operate the said engaging means to engage the continuously-driven wheel with the shaft.

14. In a grain-binder, in combination with the main binder-shaft, the bearing in which it is journaled; the knotter-operating wheel fast on the shaft; a continuously-driven wheel at the same end of the bearing as the knotter-operating wheel; means for engaging the shaft with such continuously-driven wheel; a conveyer operating through the binder, having yielding grain-advancing fingers; connections by which the yielding of such fingers to the resistance of the grain operates said engaging means, causing said continuously-driven wheel to rotate the shaft; and means by which the rotation of the shaft renders said fingers inoperative through the binder while the latter is operating.

15. In a grain-binder, in combination with the main binder-shaft, the bearing on which it is journaled; the knotter-operating wheel fast on the shaft; a continuously-driven wheel at the same end of the bearing as the knotter-operating wheel; means for engaging the shaft with such continuously-driven wheel; a continuously-driven conveyer operating through the binder, having grain-advancing fingers, adapted to yield to the resistance of the grain; a yielding support, for holding them operatively protruded; and connections by which the yielding of said fingers to the resistance of the grain operates said engaging means, causing the continuously-driven wheel to rotate the shaft; and means by which the rota-

tion of the shaft withdraws such support to make said fingers inoperative through the binder while the latter is operating.

16. In a grain-binder, in combination with the main binder-shaft, the bearing in which it is journaled; the knotter-operating wheel fast on the shaft; a continuously-driven wheel at the same end of the bearing as the knotter-operating wheel; means for engaging the shaft with such continuously-driven wheel; a continuously-driven conveyer operating through the binder, having grain-advancing fingers adapted to yield to the resistance of the grain; a spring-held support for such fingers; means operated by the yielding of such support, for operating said engaging means and causing the continuously-driven wheel to rotate the shaft; and means by which the rotation of the shaft withdraws such support to make said fingers inoperative through the binder while the latter is operating.

17. In a grain-binder, in combination with the main binder-shaft, the knotter-operating wheel fast on the shaft; a continuously-driven wheel loose on the same shaft; means for engaging the shaft with such continuously-driven wheel; a continuously-driven conveyer operating through the binder, having yielding grain-advancing fingers, and connections by which the yielding of the grain-advancing fingers to the resistance of the grain operates said engaging means, causing the continuously-driven wheel to rotate the shaft and knotter-operating wheel.

18. In a grain-binder, in combination with the main binder-shaft, the knotter-operating wheel fast on such shaft; a continuously-driven wheel loose on the same shaft; means for clutching the shaft with said continuously-driven wheel; a continuously-driven conveyer operating through the binder, having grain-advancing fingers adapted to yield to the resistance of the grain; a yielding support for holding such fingers operatively protruded into the grain's path; and means operated by the yielding of such support, for operating said clutching means and causing the continuously-driven wheel to rotate the shaft.

19. In a grain-binder, in combination with the main binder-shaft, the knotter-operating wheel fast on the shaft; a continuously-driven wheel located at the same side of the grain's path through the binder as said knotter-operating wheel; means for engaging the shaft with such continuously-driven wheel; a continuously-driven conveyer-chain actuating said continuously-driven wheel and operating through the binder at the same side of the grain's path as the knotter-operating wheel, and having grain-advancing fingers adapted to yield to the resistance of the grain; a yielding support for holding such fingers operatively protruded into the grain's path, and means operated by the yielding of such support for operating said engaging means and causing the continuously-driven wheel to rotate the shaft.

20. In a grain-binder, in combination with the main binder-shaft, a knotter-operating wheel fast on said shaft; a continuously-driven wheel loose on the same shaft; means for clutching the shaft with such continuously-driven wheel; a continuously-driven conveyer operating through the binder at the same side of the grain's path as said main binder-shaft, and having grain-advancing fingers adapted to yield to the resistance of the grain; a yielding support for holding such fingers operatively protruded into the grain's path, and means operated by the yielding of such support for operating such clutching means and causing the continuously-driven wheel to rotate the main binder-shaft.

21. In a grain-binder, in combination with the main binder-shaft, the knotter-operating wheel fast on said shaft; a continuously-driven wheel loose on the same shaft; means for clutching the shaft with the continuously-driven wheel; a continuously-driven conveyer operating through the binder, at the same side of the grain's path as the main binder-shaft, and having grain-advancing fingers adapted to yield to the resistance of the grain; a spring-held support for the fingers; means operated by such support for operating the clutching means and causing the continuously-driven wheel to rotate the main binder-shaft; and means by which the rotation of such shaft withdraws such support to make the fingers inoperative through the binder while the latter is operated.

22. In a grain-harvester, in combination with mechanism for forwarding the grain toward the binding devices, adapted to deliver the same at the limit of their own path of action, a continuously-driven conveyer independent of said forwarding means, operating from the delivery side of the latter through the binder, and having grain-advancing fingers adapted to yield to the resistance of the grain; a fixed support for holding the fingers operatively protruded at a portion of their path commencing at the delivery side of the forwarding devices thence a short distance toward the bundle-space; a yielding support for holding them so protruded through the bundle-space; binding mechanism, and means for tripping it into action, operatively connected with such yielding support.

23. In a grain-harvester, in combination with the binding mechanism, mechanism for forwarding the grain to the binder; a continuously-driven conveyer, operating from the delivery side of the forwarding devices through the binder at the same side of the grain's path as the band-securing mechanism, and having grain-actuating fingers adapted to yield to the resistance of the grain; a support for holding the fingers operatively protruded into the grain's path at the portion of said path commencing at the delivery side of the forward-

ing devices and extending thence a short distance toward the bundle-space; a support for holding such fingers operatively protruded through the bundle-space, yielding in a direction to permit such fingers to be withdrawn from operative position; means for tripping the binding mechanism into action operatively connected with the yielding support; and means operated by the initial action of the binder for withdrawing the yielding support positively in the same direction in which it yields, to allow the fingers to become inoperative throughout the bundle-space during the binding action.

24. In a grain-binder, in combination with a retaining-gate at the discharge side; means for latching it, and means operated by the cord-holder for unlatching it to permit the discharge of the bundle.

25. In a grain-binder, in combination with a retaining-gate at the discharge side, hinged at the needle rock-shaft side, a latch for securing it and means operated by the cord-holder for unlatching it to permit the discharge of the bundle.

26. In a grain-binder, in combination with a retaining-gate at the discharge side, hinged at the needle rock-shaft side of the bundle-path; means for latching it on the opposite side of said path, and the cord-holder of the knotting mechanism having a projection which unlatches the gate to permit the discharge of the bundle.

27. In a grain-binder, in combination with the main binder-shaft, the bearing in which it is journaled; the knotter-operating wheel fast on the shaft; a continuously-driven wheel at the same end of the bearing as the knotter-operating wheel; means for engaging the shaft with such continuously-driven wheel; means for advancing the grain comprising a chain which drives said wheel operating through the binder and having grain-engaging fingers, an element in said grain-advancing means being adapted to yield to the resistance of the grain to the fingers; and means by which such yielding operates such engaging means, causing the continuously-driven wheel to rotate the shaft.

28. In a grain-harvester, in combination with an open-center traction-wheel, grain-forwarding mechanism, arranged to deliver the grain sideward toward the opening of such wheel; a continuously-driven conveyer overhanging the path of the grain through the binder, extending into the opening of the wheel and operating to engage the grain at the delivery thereof from said forwarding devices within the wheel.

29. In a grain-harvester, in combination with an open-center traction-wheel having an interior driving-gear rim, a train on the grainward side of the wheel, driven by said interior gear-rim; the binder at the stubbleward side of the wheel comprising the main binder-shaft, the bearing in which it is journaled, the knotter-operating wheel fast on the shaft, a continuously-driven wheel at the same end of the bearing as the knotter-operating wheel, means for engaging the shaft with such continuously-driven wheel, a chain which drives said wheel, operating through the binder and having grain-advancing fingers; and means by which the resistance of the grain to such advancing-fingers operates said engaging means, causing the continuously-driven wheel to actuate the shaft.

30. In a grain-harvester, in combination with an open-center traction-wheel having an interior driving gear-rim, a train at the grainward side of said wheel driven by said interior gear-rim; a binder at the stubbleward side of the traction-wheel; two sprocket-wheels above the path of the grain, one in a train at the grainward side of the wheel, and the other in the binder-train at the stubbleward side of the wheel, and conveying mechanism comprising a chain connecting said sprocket-wheels, extending through the open center of the traction-wheel, overhanging the path of the grain.

31. In a grain-harvester, in combination with an open-center traction-wheel having an interior driving gear-rim, a train at the grainward side of the traction-wheel driven by said interior gear-rim; a binder at the stubbleward side of the traction-wheel; two sprocket-wheels, one in the train at the grainward side of the wheels, and the other in the binder-train, both above the path of the grain; an endless conveyer, comprising a chain passing about said sprocket-wheels through the open center of the traction-wheel above the path of the grain; means for clutching the sprocket-wheel in the binder-train with the main binder-shaft; a tripper for operating said clutching means; yielding grain-advancing fingers on said chain; and connections by which the yielding of the fingers to the resistance of the grain operates the tripper, whereby the binder mechanism is driven by the conveyer-chain and tripped into action by the resistance of the grain to the grain-advancing action of the latter.

32. In a grain-harvester, in combination with an open-center traction-wheel having an interior driving gear-rim, a train deriving power from such gear-rim and having its shaft and wheels at the grainward side of the traction-wheel; forwarding mechanism driven by said train, arranged to move the grain sidewise stubbleward toward the open center of the wheel; said train having a shaft extending fore and aft above the path of the grain at the grainward side of the wheel; the main frame having sills extending through the open center of the wheel, and binder-frame, mounted on said sills at the stubbleward side of the wheel, said binder-frame having an arm projecting grainward through the traction-wheel above the path of the

grain; and a wheel journaled in said arm and feathered on said fore-and-aft shaft at the grainward side of the traction-wheel; and a drive-chain passing about said feathered wheel and extending stubbleward through the center of the traction-wheel above the path of the grain, and the binder-train having its prime wheel driven by said chain.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Stillwater, Minnesota, this 5th day of March, A. D. 1901.

EDWIN M. KELLOGG.

In presence of—
WILLIAM A. HOSBY,
FRED W. GAIL.