(Model.) 7 Sheets—Sheet 1.

F. OGDEN & H. M. WEAVER.

Grain Binder.

No. 232,201. Patented Sept. 14, 1880.

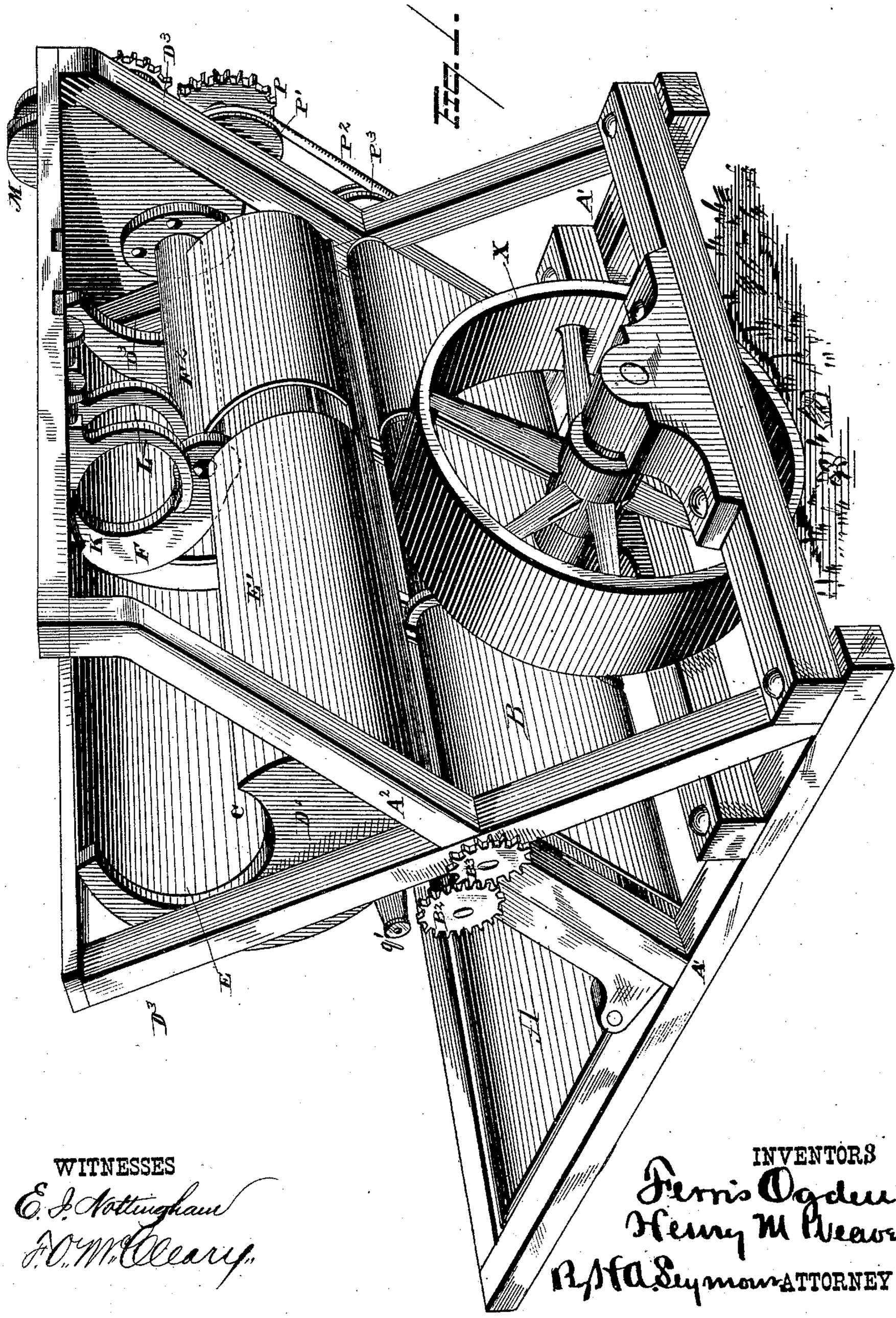

Fig. 1.

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(Model.) 7 Sheets—Sheet 2.

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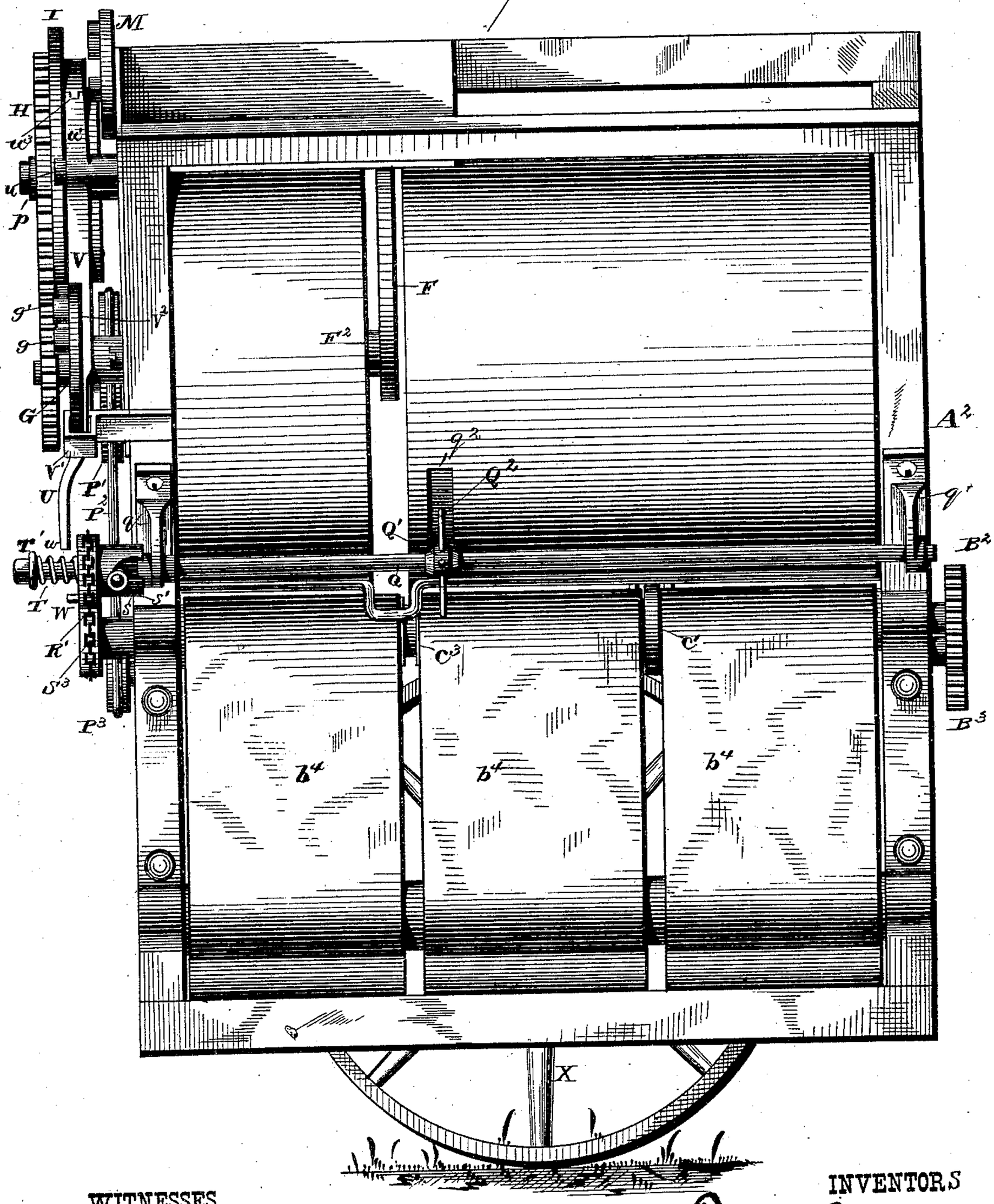
Grain Binder.

No. 232,201. Patented Sept. 14, 1880.

Fig. 2.



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(Model.) 7 Sheets--Sheet 3.

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Grain Binder.

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FIG. 3.

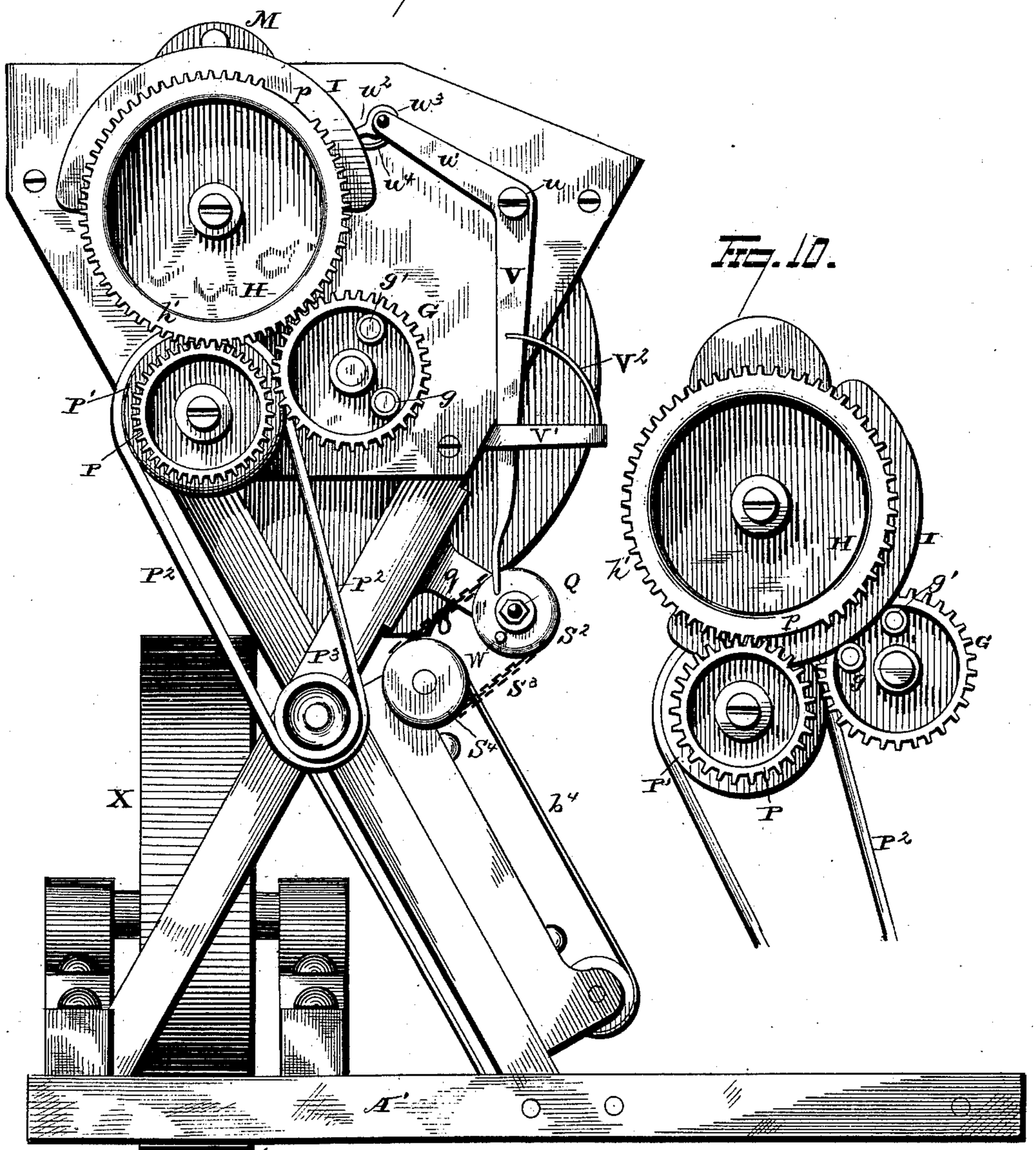

FIG. 10.

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Grain Binder.

No. 232,201. Patented Sept. 14, 1880.

Fig. 4.

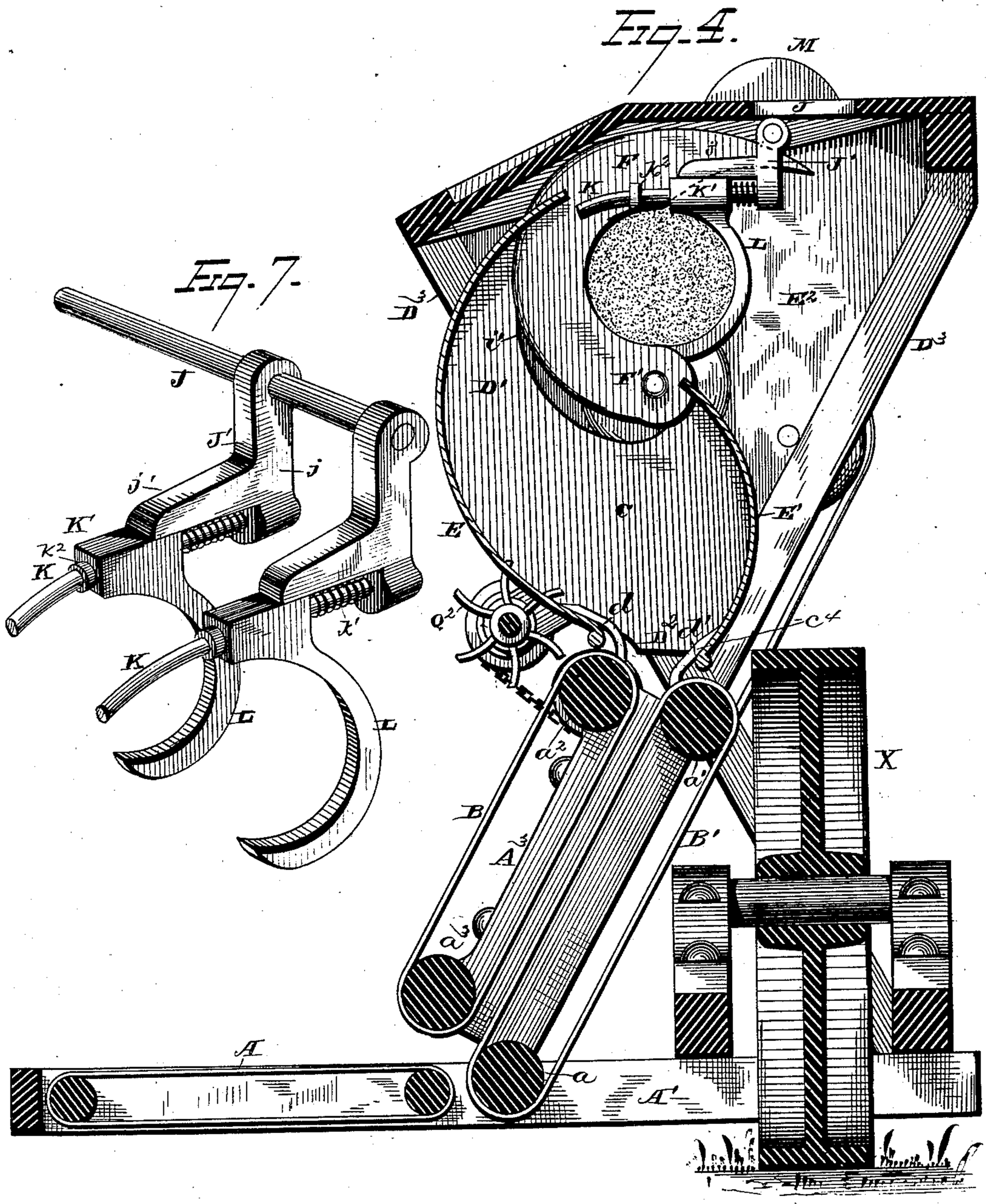

Fig. 7.

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Fig. 6.

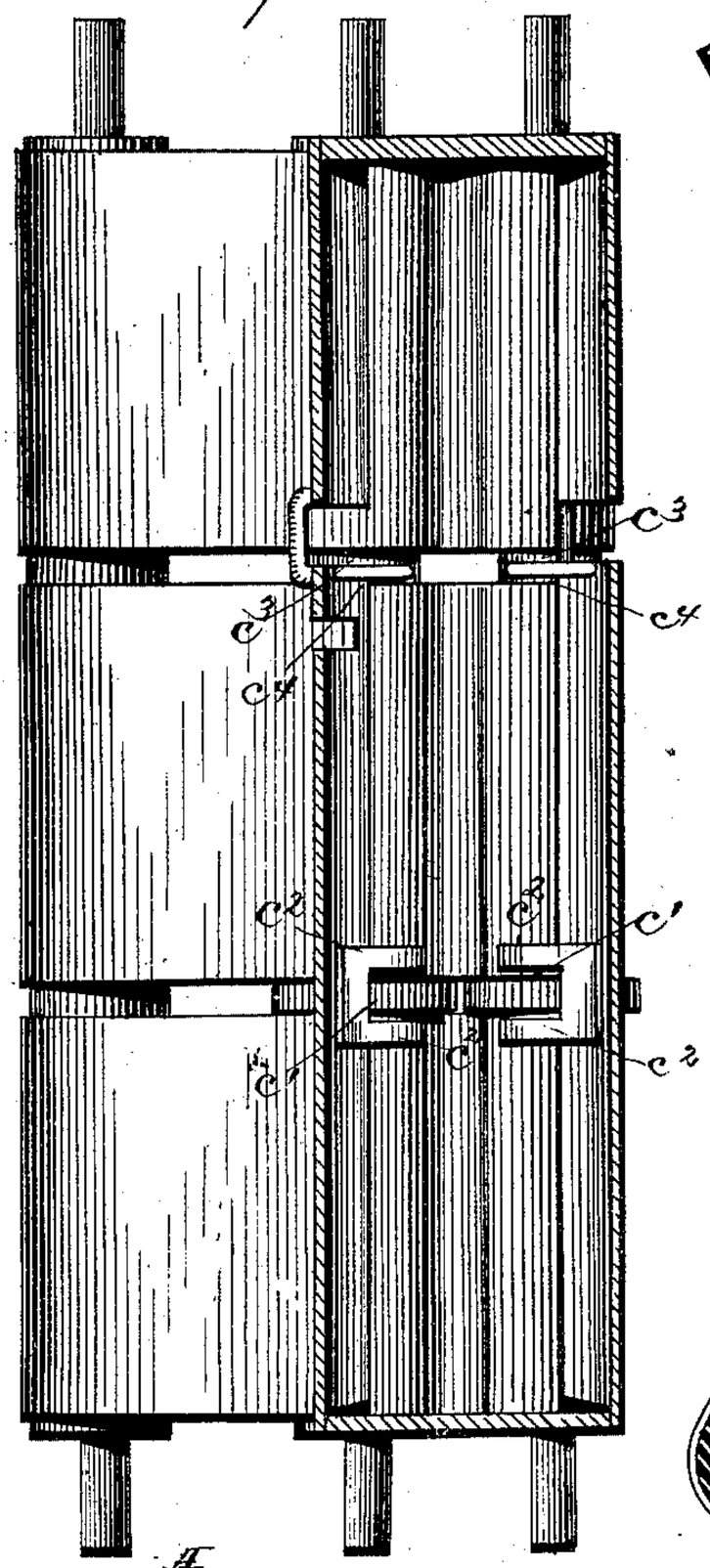
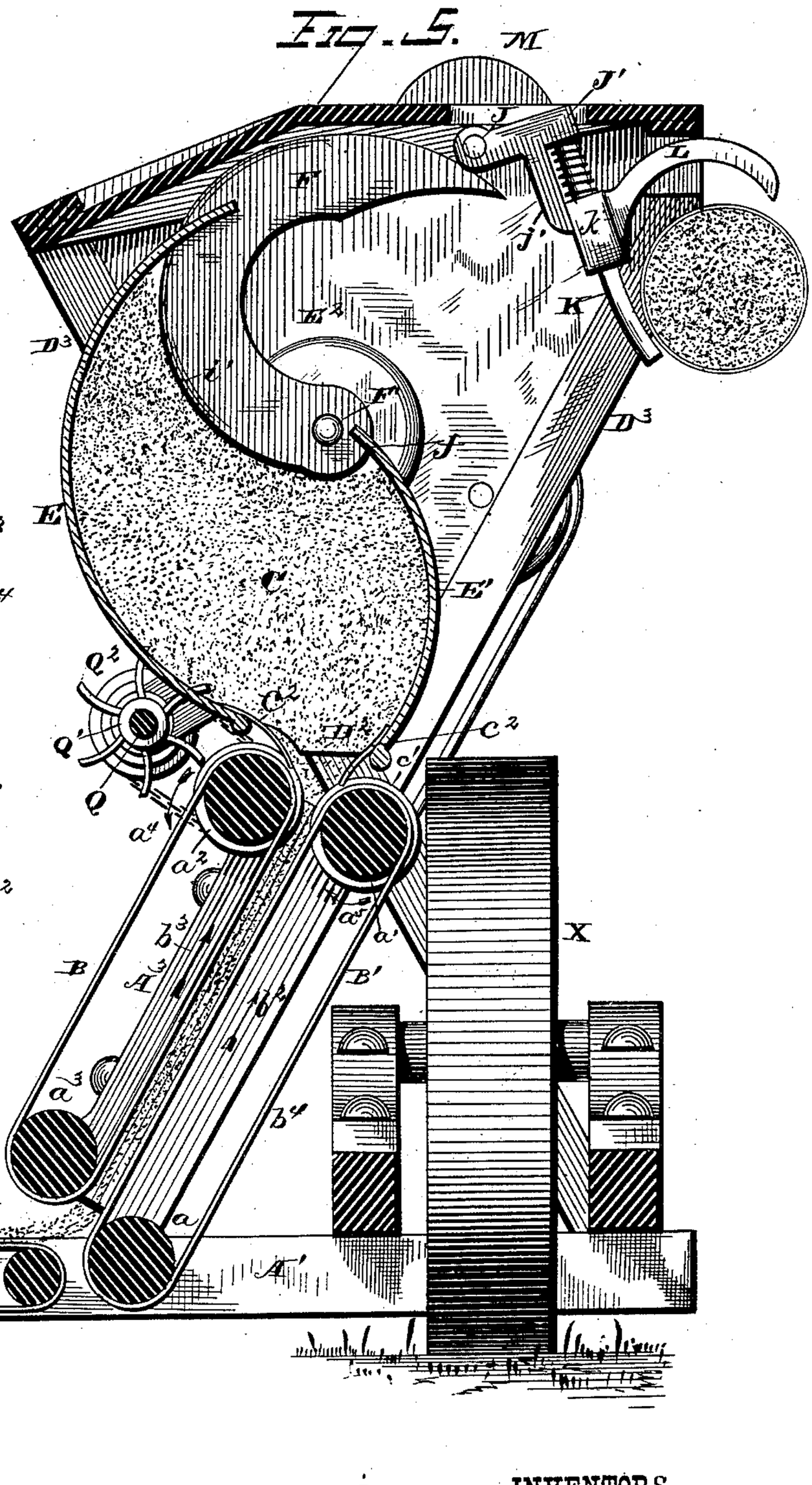


Fig. 5.



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Grain Binder.

No. 232,201. Patented Sept. 14, 1880.

Fig. 8.

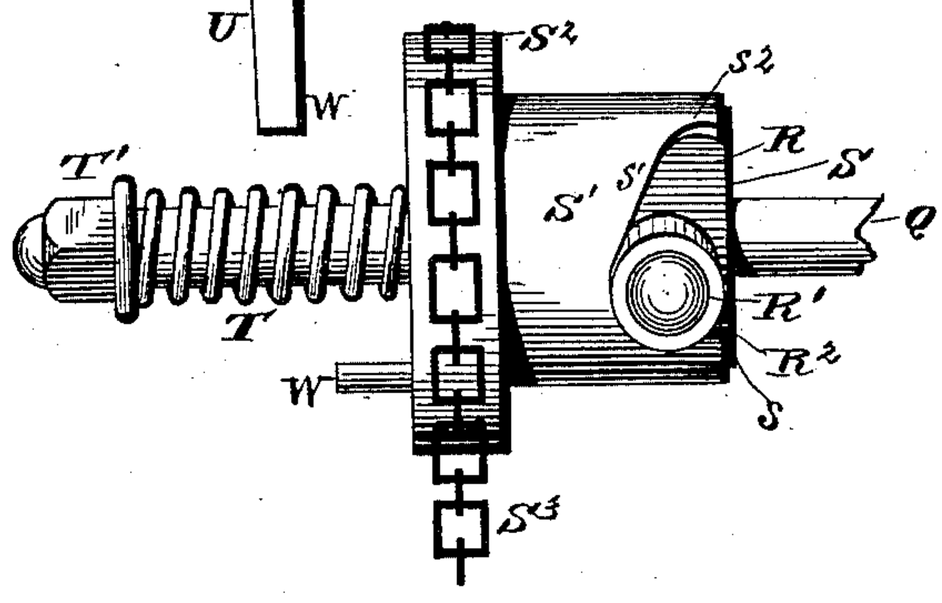
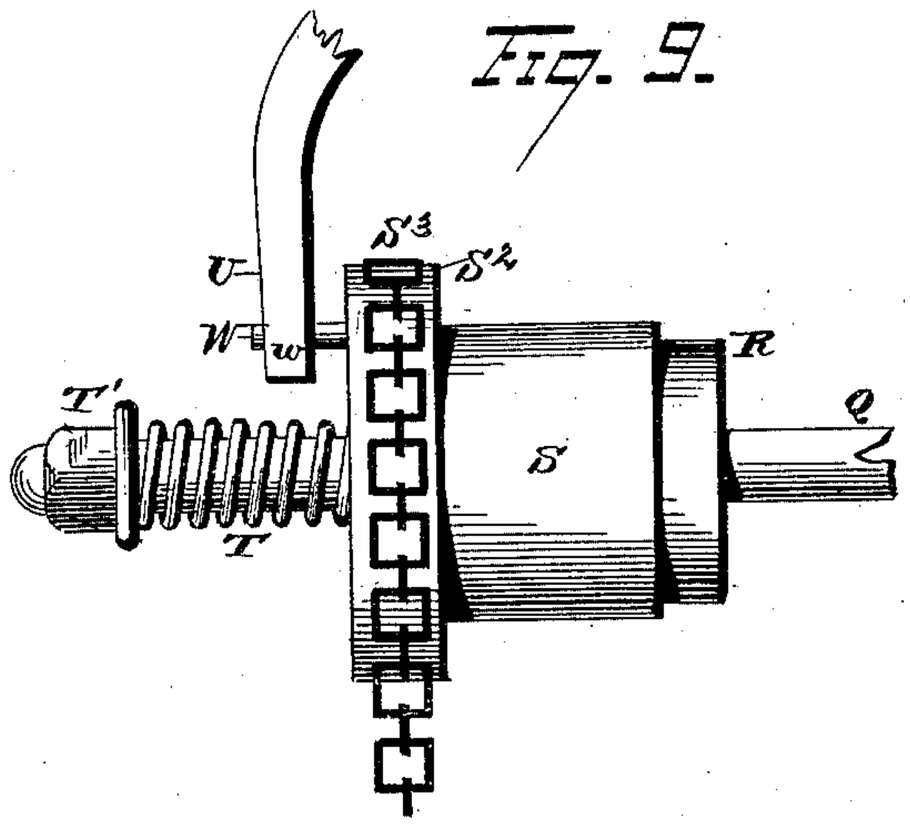


Fig. 9.



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(Model.) 7 Sheets—Sheet 7.

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Fig. 11.

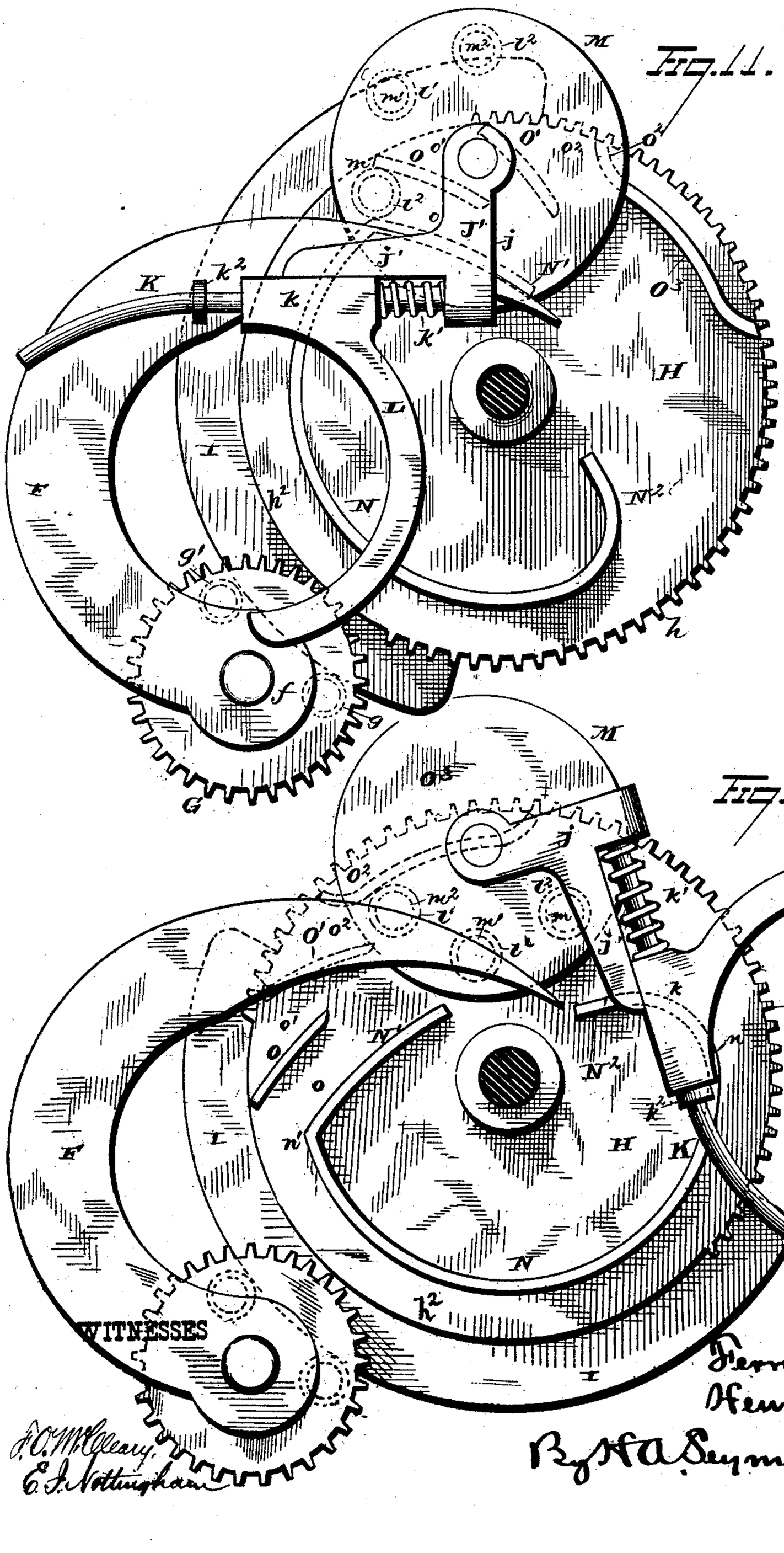

Fig. 13.

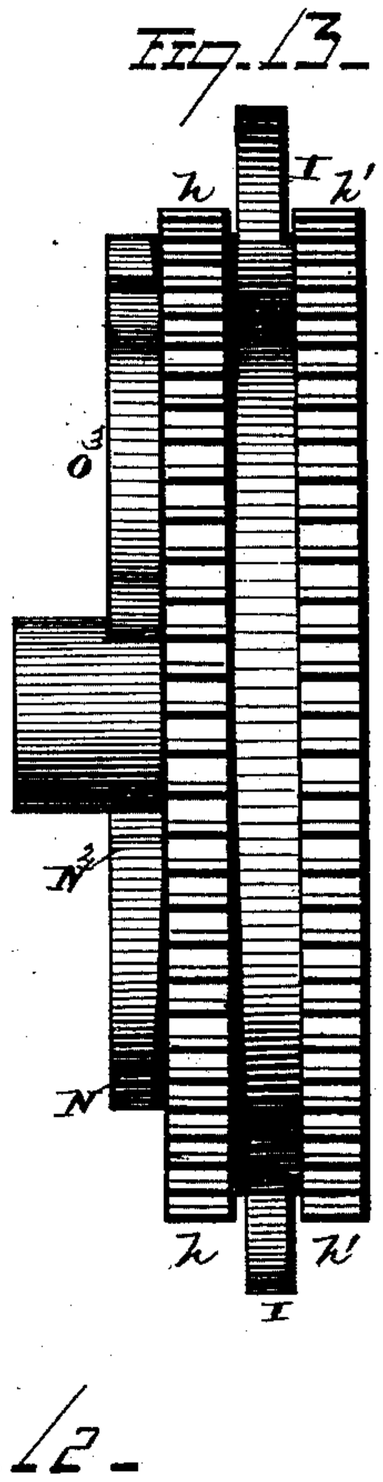

Fig. 12.

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UNITED STATES PATENT OFFICE.

FERRIS OGDEN AND HENRY M. WEAVER, OF MANSFIELD, OHIO.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 232,201, dated September 14, 1880.

Application filed April 6, 1880. (Model.)

To all whom it may concern:

Be it known that we, FERRIS OGDEN and HENRY M. WEAVER, of Mansfield, in the county of Richland and State of Ohio, have invented certain new and useful Improvements in Grain-Binders; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

Our invention relates to an improvement in grain-binders, the object being, first, to carry the cut grain from the platform of the harvester and force it into the grain-receiver to the required density to constitute bundles of any desired size, the operation to be effected without the employment of rakes, the grain-carrying apparatus being adapted to serve the double purpose of elevating the grain to the grain-receiver and forcing it into the same to form bundles of uniform size and density.

A further object of our invention is to arrange and adapt the cord or wire carrying arm to serve as a fixed or stationary abutment, against which the grain is packed in the grain-receiver, and thus obviate the employment of other devices, which will intercept the proper discharge of the bundles from the grain-receiver.

A further object of our invention is to provide a combined yielding compressor-arm and an ejector for receiving and imparting form to one side of the bundle and for discharging the bundle over the side of the main supporting-wheel of the harvester.

A further object of our invention is to automatically put the mechanism into gear for actuating the cord-carrying arm by the pressure of the grain in the grain-receiver exerted upon an arm attached to or connected with a continuously-revolving shaft, said arm (one or more) projecting into the grain-receiver.

A further object of our invention is to simplify and improve certain other features and parts of a grain-binder, as will hereinafter appear.

With these several ends in view our invention consists, first, in the combination, with endless carriers for elevating the grain, of a grain-receiver located above the upper ends of the endless carriers, the opening in the lower portion of the grain-receiver being in close proximity to the delivery end of the carriers, the parts being constructed and arranged substantially as hereinafter described, so that the endless carriers will serve to elevate the cut grain and also to force it upward directly into the grain-receiver to the required density for being formed into bundles of the desired size.

Our invention further consists in the combination, with the grain-receiver, of a cord-carrying arm and mechanism for retaining it locked in a fixed position at certain intervals of time to form an abutment or stop to retain the grain in the grain-receiver until the required quantity has been packed therein.

Our invention further consists in the combination, with the cord or wire carrying arm, of a combined yielding compressor-arm and ejector, which serves to receive and retain the bundle until bound or tied, and then to automatically discharge it over the side of the main wheel of the harvester.

Our invention further consists in the combination, with the grain-receiver and cord or wire carrying arm, of a revolving shaft having arms (one or more) connected therewith, said arms arranged to project into the grain-receiver, and connecting mechanism, whereby a predetermined pressure of the grain in the receiver exerted upon said arm or arms operates to automatically put in gear the mechanism to actuate the cord or wire carrying arm and form and bind the bundle.

Our invention further consists in certain features of construction and combinations of parts for automatically putting in operation the cord-carrying arm by the action of the tripping mechanism, as will hereinafter be described and claimed.

Our invention further consists in certain features of construction in the gearing employed for operating the cord-carrying arm, as will hereinafter be described and claimed.

Our invention further consists in a novel construction and arrangement of gearing for actuating the cord-carrying arm and combined compressor and ejector, as will hereinafter be described, and pointed out in the claims.

Our invention further consists in certain

other details in construction and combinations of parts, as will hereinafter be described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view, in perspective, of our improvement in grain-binders. Fig. 2 is a side elevation, illustrating the trip or starting mechanism. Fig. 3 is an end view of the machine, showing the gearing for operating the cord-carrying arm and compressor and ejector. Fig. 4 is a vertical section, illustrating the position of parts when the grain-receiver is being filled with grain while a bundle is being tied. Fig. 5 is a similar view, showing the relative position of parts when the bundle is being discharged over the harvester-wheel. Fig. 6 is a detached view, representing one of the endless carriers and that portion of the grain-receiver located adjacent thereto. Fig. 7 is an enlarged view of the combined compressor and ejector. Fig. 8 is a detached view of the trip or starting mechanism, showing the parts when not in operation to put in gear the mechanism which actuates the cord-carrying arm. Fig. 9 is a similar view, showing the position of parts when operated to impart movement to the mechanism operating the cord or wire carrying arm. Fig. 10 is a view of the gearing when the cord-carrying arm is retained in its locked position. Fig. 11 is an enlarged view, in side elevation, of the master-wheel and compressor-arm, the parts being in position to compress the bundle into the desired size and form. Fig. 12 is a similar view, showing the position of parts when the compressor-arm and ejector have been moved outwardly to discharge the bundle over the harvester-wheel. Fig. 13 is an edge view of the master-wheel.

A represents an endless apron or carrier upon which the cut grain is delivered from the rear end of the harvester-platform by the harvester-rakes.

B B′ are endless elevator carriers or aprons arranged to receive the grain from carrier A and carry it up and force it into the grain-receiver C. Carrier B′ passes over a lower roller, *a*, journaled in the frame A′, and an upper roller or shaft, *a′*, journaled at its ends in the upright frame A^2. The upper and lower rollers or shafts, a^2 a^3, for operating the carrier B are journaled in the supplemental frame-pieces A^3. The rollers or shafts *a′* a^2 are provided at one end with the cog-wheels B^2 B^3, which mesh with each other, motion being imparted to one of said cog-wheels by any suitable mechanism connected with the driving mechanism of the harvester, thereby causing the rollers *a′* a^2 to move in opposite directions, as indicated by the arrows a^4 a^5, and cause the carriers B B′ to travel in the opposite direction—that is, their inner and adjacent portion to travel upwardly—as indicated by the arrows b^2 b^3.

The carriers B B′ are each preferably formed of a series of endless aprons, b^4, formed of canvas or other material, and mounted independently of each other on their rollers. Each carrier may be provided with a series of cross-slats to insure a firmer hold upon the grain.

The space between the carriers B B′ may be regulated, as desired, by making the supplemental frame A^3 adjustable toward or from the frame A′.

Instead of applying the cog-wheels B^2 B^3 to the ends of the upper rollers or shafts, they may be attached to the lower rollers or shafts, and then the upper ends of the carriers provided with adjusting devices, so as to insure any desired pressure on the grain at the point of its delivery to the grain-receiver.

D′ are the ends of the grain-receiver C, and are suitably secured to the upright frames D^3, while E E′ are the sides of the grain-receiver. Between the lower edges *d d′* of the sides E E′ is formed the throat D^2, which is placed in close proximity to the upper ends of the carriers B B′, to allow the grain to enter the throat of the grain-receiver as it is delivered from the upper ends of the carriers.

Grain is stripped from the endless carriers B B′ or prevented from following the canvas or carriers by either of the following arrangements and constructions of devices: The upper rollers, *a′* a^2, are each furnished with collars *c′*, which serve as guides for the independent aprons or carriers. To the lower edges of the sides E E′ of the grain-receiver are secured the fingers or strippers c^2, one on each side of the collars *c′*, said fingers serving to deflect or strip the grain from the carriers and conduct it into the grain-receiver.

Instead of employing collars *c′* on the rollers or shafts *a′* a^2, the latter may be furnished with annular grooves c^3 and fingers c^4, attached to the lower edges of the sides of the grain-receiver, arranged to extend down into said grooves, and thus strip the grain from the carriers and conduct it within the grain-receiver.

The side E of the gavel-receptacle extends above the side E′, thereby forming a lateral discharge-opening, E^2, through which the grain is conveyed by the cord-carrying arm to the combined compressor-arm and ejector.

F is the cord-carrying arm, which is attached to the end of a shaft, F′, which latter is journaled in a sleeve-bearing, F^2, extending lengthwise of the grain-receiver any desired distance. The elongated bearing imparts a rigid and extended bearing to the actuating-shaft F′ of the cord-carrying arm, and also serves as a shield to the rotary shaft and prevents the grain from winding around the same.

The heel *f* of the cord-carrying arm is practically in the same horizontal plane as the upper edge of the side E′ of the grain-receiver.

To the outer end of the shaft F′ is secured a cog-wheel, G, the teeth of which mesh with the mutilated gear *h* on the master-wheel H, and for every revolution of the master-wheel H a complete revolution is imparted to the cord-carrying arm, causing the latter to lift the grain from the grain-receiver and carry it

against the compressor-arm. Upon the completion of the movement of the cord-carrying arm the segmental locking-plate I engages with the anti-friction rollers *g g'* on the cog-wheel G, thus locking the latter and the cord-carrying arm against either forward or backward movement. When the cord-carrying arm is in this position its rear edge, *i'*, serves as an abutment or stop, against which the grain is forced as it is fed into the grain-receiver.

J represents a shaft journaled in the upper portion of the binder-frame. To the inner end of this shaft is secured a bracket, J', consisting of the arm *j* and guide-finger *j'*.

A rod, K, is secured at one end to the lower end of arm *j*, the outer end of said rod being slightly curved, as shown in the drawings.

Upon the rod K is placed the compressor-arm L, which latter is provided with an elongated bearing, K', that it may be freely reciprocated on the rod.

Between the upper end of the compressor-arm L and the bracket-arm *j* a spiral spring, *k'*, is placed upon the rod K, while any suitable stop, k^2, secured to the rod K, limits the movement of the compressor-arm in the opposite direction.

We have described a single compressor and ejector arm constructed and arranged in accordance with our invention; but we prefer to employ two such compressor and ejector arms, as shown in Fig. 7, in order that the pressure in compressing and ejecting the sheaf shall be disposed on opposite sides of the binding-cord.

The cord-carrying arm having made a complete revolution, thereby encircling the bundle with the binding cord or wire, the bundle is lifted by the cord-carrying arm and carried against the compressor-arm L, which latter is of the proper length and curvature to correspond with the size and curvature of the cord-carrying arm, thereby causing the outer side of the bundle to be formed by the compression-arm and the inner side by the cord-carrying arm.

The density of the bundle is regulated by the tension of the spiral spring *k'*; and, if desired, devices may be employed for readily varying the tension of the spring.

The upper side of the bearing K' of the compressor-arm is made flat to allow the guide-finger *j'* to engage therewith and operate as a brace to prevent the rod K from springing or bending as it ejects the bundles, and also to prevent any swinging or lateral movement of the compressor-arm.

The desired movement is imparted to the combined compressor-arm and ejector by the following mechanism: To the outer end of the shaft J is secured a disk or wheel, M, having three studs or pins, *m m' m²*, projecting laterally from its outer face, upon which studs are journaled the anti-friction rollers *l l' l²*. Upon the inner side of the master-wheel H there is formed a locking-flange, N, which is formed concentric with the master-wheel, and extends from the point *n* to *n'*. To one end of the locking-flange is connected a cam-flange, N', which extends inwardly nearly to the axis of the master-wheel. A curved flange, N^2, is connected with the opposite end of the locking-flange N, and serves as an actuating-cam, as will be explained. O O' O^2 are short cams, their outer ends extending to the periphery of the master-wheel, said cams being located at a sufficient distance to form the track or guideways *o*, *o'*, and *o²*. The cam O^2 has a locking-flange, O^3, formed integral therewith.

The operation of these cams and locking-flanges is as follows: When the compressor-arm L is in position for receiving and imparting form to one side of the bundle, as illustrated in Fig. 11, the roller l^2 on the disk or wheel M travels upon the locking-flange N, the latter serving to retain the compressor-arm in place while the master-wheel is revolved and imparts a complete revolution to the cord-carrying arm, and also while the bundle is being subjected to the pressure exerted by the cord-carrying arm. As the master-wheel continues its revolution the outer end of the cam O engages with the roller l^2, thereby imparting a part rotation to the disk M. The next cam, O', engages with the next succeeding roller, *l'*, thus carrying the disk through another portion of its rotation, and, finally, the cam O^2 engages with the roller l^2 and moves the disk around until the roller l^2 has traveled beneath the locking-flange O^3. At this instant the master-wheel is stopped by mechanism hereinafter explained and the disk M is retained against movement in either direction. As the compressor-arm and ejector are connected with the shaft to which the disk M is attached, it follows that such parts will partake of the movement of the disk, thereby causing the ejector, which, in conjunction with the compressor-arm, partly embraces the bundle, to swing the bundle away from the grain-receiver and discharge it over the harvester-wheel, as illustrated in Fig. 12. This movement of the ejector is quick and positive by reason of the action of the cams referred to, so that no time is lost in discharging the bundle to one side of the harvester after it has been compressed and tied. When the bundle has been discharged the ejector and compressor-arm are locked against a return movement, and the cord-carrying arm is also locked against movement in either direction in the position shown in Fig. 12, when it serves as a stop or abutment against which the grain is continually being fed as it is packed into the grain-receiver.

The master-wheel is rotated by means of a cog-wheel, P, pulley P', belt or chain P^2, and pulley P^3, the latter being secured to the end of one of the rollers or shafts of the endless carriers or aprons. The teeth of cog-wheel P mesh with the series of teeth or cogs *h'* on the periphery of the master-wheel. The teeth or cogs *h'* are cut away at *p*, so that when the

master-wheel has been revolved so as to bring its cut-away portion *p* opposite the teeth of the cog-wheel P the master-wheel will be brought to a stand-still, while the cog-wheel will continue to revolve. When the master-wheel is stopped in the manner referred to the cord-carrying arm and the combined ejector and compressor-arm will be locked in the positions illustrated in Fig. 12. The endless aprons still continue their movement, and operate to pack the cut grain into the grain-receiver until the desired quantity for a bundle has been forced therein, when the compressor-arm and ejector and the cord-carrying arm are automatically started and put in operation by the mechanism now to be described.

Q is a shaft, having its opposite ends journaled in hangers *q q'* secured to the binder-frame. To shaft Q is secured a hub, Q', provided with curved arms Q^2, which project into the gavel-receptacle through the slot or opening q^2 formed in the side E. One end of shaft Q projects outside of the hanger *q*, and has secured thereto a collar, R, to which is attached a stud or pin, R', having an anti-friction roller, R^2, journaled thereon.

S is a sliding clutch which fits over the collar R. A slot, S', is formed in the inner edge of the clutch, said slot having a bearing-face, *s*, formed parallel with the axis of the clutch, and an inclined bearing-face, *s'*, which terminates in a curved edge, s^2. Upon the opposite end of the clutch is formed a sprocket-wheel, S^2, over which passes a chain, S^3, the latter also passing around a sprocket-wheel, S^4, attached to the end of one of the endless carrier-shafts. A spiral spring, T, encircles that portion of the shaft Q which extends outside of the sliding clutch, one end of said spring bearing upon the clutch and the other end upon an adjusting nut or cap, T', the latter being employed for regulating the tension of the spring, as desired.

U is a starting-lever of bell-crank form, and pivoted to the frame of the binder at *u*. The short arm *u'* of lever U has a pawl, u^2, pivoted thereto, the latter being provided with a shoulder, u^3, to limit its outward movement by the pressure exerted by the spring u^4. The long arm V of lever U works in a guide, V', and is retained out of operative position by means of the spring V^2.

To the outer face of the clutch S is secured a pin or lug, W, which engages with the lower end, *w*, of the long arm of the starting-lever when the clutch is moved endwise on its shaft, thereby causing the pawl to engage with and move the master-wheel.

A continuous rotary movement is imparted to the shaft Q through the medium of the roller of the endless carrier, the sprocket-wheel, the chain, and the sprocket-wheel on the clutch. When the grain shall have become packed to the desired density in the grain-receiver, so that the contents thereof shall form a bundle of the required size, the resistance offered to the rotation of the curved arms Q^2 within the gavel-receptacle and in contact with the compressed grain will overcome the resistance offered by the spiral spring T to the sliding movement of the clutch, thereby causing the driving-chain to turn the clutch ahead of the revolution of the shaft, which results in the endwise movement of the clutch upon the shaft caused by the inclined edge or face *s'* thereof bearing upon the roller R^2 and forcing the clutch outwardly upon its shaft until the lug or pin W strikes the lower end, *w*, of the starting-lever, thereby swinging the latter on its pivot and bringing the pawl in engagement with the cogs on the master-wheel and turning the latter a sufficient distance to cause the teeth of the constantly-rotating cog-wheel P to again mesh with the row of cogs *h* on the master-wheel and impart another revolution thereto.

Having described the construction and relative arrangement of the different parts of our improvement, we will now briefly describe its operation.

The cut grain is delivered upon the horizontally-moving carrier by the harvester-rakes, and is carried to the lower ends of the endless elevators and upwardly between the latter and forced into the grain-receiver.

It will be observed that rakes for forcing the grain into the grain-receiver to the required density are dispensed with, as the endless carriers which serve to elevate the grain also serve to force it into the grain-receiver until the required quantity has been packed therein.

While the grain is being forced into the grain-receiver the rear edge of the cord-carrying arm serves as an abutment or stop for the grain, the latter being packed against the rear edge of the cord-carrying arm. When a sufficient quantity of grain to form a bundle of the required size has been forced into the grain-receiver the resistance offered by the compressed grain to the rotation of the arms on the shaft Q is sufficient to retard the movement of the shaft, and thus allow the driving-chain to turn the sliding clutch on the clutch-collar and slide the clutch endwise, thereby operating the starting-lever, and through the latter starting the master-wheel, so that another complete revolution will be imparted thereto by the cog-wheel P. As the master-wheel revolves it operates to move the compressor-arm and cord-carrying arm in opposite directions. The cam mechanism which actuates the compressor-arm serves to move the latter backward until it is in proper position for receiving the bundle, as illustrated in Fig. 11, where the compressor-arm is securely locked against displacement, and thus held in proper position to receive the bundle. The cord-carrying arm continues to revolve, the point thereof entering the lower side of the grain-receiver and beneath the grain therein, then raising the grain and tightly compressing it between the compressor-arm and cord-carrying arm. The bundle is then tied by any suitable

knot-tying mechanism. The continued movement of the master-wheel then operates to lock the cord-carrying arm against movement in either direction, whereby it shall serve as a stop or abutment for the next succeeding supply of grain, which is continually being fed into the grain receiver, and at the same time the master-wheel quickly moves the compressor-arm and ejector outwardly or away from the grain-receiver, discharging the bundle over the harvester-wheel X.

The binding mechanism is located upon the inside of the harvester-wheel, thereby insuring a steadiness to the apparatus in various angles of inclination not attained when the heavy binding apparatus is located upon the outside of the main supporting-wheel of the harvester, as upon sharp inclines the weight of the binding mechanism will, in the latter arrangement, sometimes operate to overturn the machine.

While we have shown our preferred form of tripping or starting mechanism, we would have it understood that we do not restrict ourselves to the particular construction and arrangement of parts shown and described for accomplishing the result as explained. Instead of employing arms on the shaft of the tripping mechanism, a disk might be substituted therefor, or the disk might be located outside of the grain-receiver and acted upon by a brake-shoe attached to a hinged plate or section of the grain-receiver, the latter being outwardly moved by the increased pressure in the gavel-receptacle. Again, other combinations of parts may be employed for actuating the starting-lever than those shown and described.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a grain-binder, the combination, with endless carriers for elevating the cut grain, of a grain-receiver located above the upper ends of the endless carriers, said grain-receiver formed of two sides, with the throat thereof located in close proximity to the delivering ends of the carriers, and with a lateral discharge-opening at its upper portion, substantially as set forth.

2. In a grain-binder, the combination, with a grain-receiver, of a cord or wire carrying arm located and adapted to have its rear edge or face serve as a stop or abutment for retaining the grain in the receiver, and mechanism for automatically locking said cord or wire carrying arm against movement in either direction until the required quantity of grain has been forced into the receiver, substantially as set forth.

3. In a grain-binder, the combination of endless carriers, a grain-receiver located above the upper ends of said carriers, and a cord or wire carrying arm located and adapted to serve as a stop or abutment for retaining the grain in the grain-receiver until the desired quantity has been forced therein by the endless carriers, substantially as set forth.

4. In a grain-binder, the combination, with the cord or wire carrying arm, of an ejector arm or rod and a compressor-arm adapted to have a yielding movement on said rod or arm, substantially as set forth.

5. In a grain-binder, the combination, with the cord or wire carrying arm, of a yielding compressor-arm connected with an ejector-rod and attached to a rock-shaft, and mechanism for locking said shaft against rotary movement while the bundle is being compressed, and to automatically revolve the shaft and eject the bundle after being bound over the harvester-wheel, substantially as set forth.

6. In a grain-binder, the combination, with the cord or wire carrying arm and a combined compressor arm and ejector, of mechanism for simultaneously moving the cord-carrying arm and ejector in opposite directions and carrying the compressor-arm into position to receive the bundle before it has been gathered by the cord-carrying arm, substantially as set forth.

7. In a grain-binder, the combination, with a grain-receiver and a cord or wire carrying arm, of a revolving shaft and mechanism whereby a predetermined pressure of the grain in the grain-receiver will operate to retard the movement of said shaft and automatically throw the mechanism into gear for actuating the cord or wire carrying arm, substantially as set forth.

8. In a grain-binder, the combination, with a grain-receiver and a cord or wire carrying arm, of a revolving shaft having arms arranged to project into the grain-receiver, and mechanism whereby a predetermined pressure of the grain in the grain-receiver upon said arms, operating to retard the movement of said shaft, will automatically throw the mechanism into gear to actuate the cord or wire carrying arm, substantially as set forth.

9. In a grain-binder, the combination, with the grain-receiver and cord or wire carrying arm, of a revolving shaft provided with arms which project into the grain-receiver, a clutch adapted to be moved endwise on the shaft by pressure exerted upon said arms, and mechanism whereby the clutch automatically puts into gear the mechanism which operates the cord or wire carrying arm, substantially as set forth.

10. In a grain-binder, the combination, with a grain-receiver, the cord or wire carrying arm, and a master-wheel for rotating said cord or wire carrying arm, of a revolving shaft provided with arms which project into the grain-receiver, and mechanism whereby a predetermined pressure of the grain in the grain-receiver will operate to retard the movement of said shaft and to put in gear the mechanism which sets in motion said master-wheel and cord or wire carrying arm, substantially as described.

11. In a grain-binder, the combination, with the grain-receiver and cord-carrying arm, of a revolving shaft provided with arms which extend into the grain-receiver, and tripping mechanism connected with said shaft, and a spring adjusting device, whereby the desired quantity of grain to be forced into the grain-receiver to form a bundle may be regulated by adjusting the tension of a spring, substantially as set forth.

12. In a grain-binder, the combination, with the grain-receiver, cord-carrying arm, and master-wheel, of a revolving shaft provided with arms which extend into the grain-receiver, and with a collar having an anti-friction roller connected therewith, a shifting-clutch provided with a recess in one end for the reception of the anti-friction roller, a spring and adjusting device for regulating the pressure in said clutch, a sprocket-wheel and chain for imparting movement to the clutch and shaft, and a lever for starting the master-wheel through intermediate mechanism when the clutch is moved endwise on the shaft, substantially as set forth.

13. In a grain-binder, the combination, with a grain-receiver, a cord or wire carrying arm, and an independent compressor-arm, of tripping mechanism adapted to automatically throw into gear the mechanism for moving the cord or wire carrying arm and compressor-arm in opposite directions when a predetermined quantity of grain has been forced into the grain-receiver, substantially as set forth.

14. In a grain-binder, the combination, with a grain-receiver and a cord or wire carrying arm, of a yielding compressor-arm connected with an ejector rod or arm, and mechanism for locking the compressor and ejector arms against rotary movement in either direction while the bundle is being bound, and to automatically discharge the bundle over the harvester-wheel, substantially as set forth.

15. In a grain-binder, the combination, with the cord or wire carrying arm and a cog-wheel for revolving the same, of a master-wheel constructed to impart a complete revolution to said cord-carrying arm and to lock it against movement in either direction, substantially as set forth.

16. In a grain-binder, the combination, with the cord or wire carrying arm and a cog-wheel for revolving the same, said cog-wheel having two anti-friction rollers journaled upon one side thereof, of a master-wheel provided with a series of teeth or cogs for imparting a complete revolution to said cog-wheel, and also provided with a segmental locking plate or flange which engages with said anti-friction rollers and prevents the cog-wheel from turning in either direction during a portion of the revolution of the master-wheel, substantially as set forth.

17. In a grain-binder, the combination, with a combined compressor and ejector, of cam mechanism for moving said devices toward or from the grain-receiver and mechanism for automatically locking the ejector and compressor at either extremity of their movement, substantially as set forth.

18. In a grain-binder, the combination, with a disk or wheel attached to the shaft of a combined compressor and ejector, said disk having anti-friction rollers journaled to one side thereof, of a master-wheel provided with arms for oscillating said disk in opposite directions and with locking-flanges for locking the disk against movement in either direction, substantially as set forth.

19. In a grain-binder, the combination, with a continuously-revolving cog-wheel, of a master-wheel furnished with a row of cogs or teeth around its periphery with an interrupted space, whereby the master-wheel will be stopped at every revolution, and tripping mechanism adapted to be actuated by the pressure of grain in the grain-receiver to move the master-wheel a sufficient distance to be again engaged and revolved by said cog-wheel, substantially as set forth.

20. In a grain-binder, the combination, with the cord or wire carrying arm and cog-wheel for actuating the same, and a combined compressor and ejector, of a master-wheel and devices adapted to lock the cord-carrying arm against movement in either direction while the grain-receiver is being filled, and to move the cord-carrying arm and compressor-arm into position for forming the bundle and locking said parts in position until the bundle is formed, and then to move the ejector outward to discharge the bundle, substantially as set forth.

21. In a grain-binder, the combination, with the elevator-carriers B B′, of the grain-receiver having its throat D^2 located above and in close proximity to the upper ends of carriers B B′, and the side E of the grain-receiver extended above the side E′ thereof to form the lateral discharge-opening E^2, substantially as set forth.

22. In a grain-binder, the combination, with the grain-receiver, of a cord or wire carrying arm, F, having its axis located practically in the same horizontal plane as the upper edge of the shorter side E′ of the grain-receiver, substantially as set forth.

23. In a grain-binder, the combination, with the cog-wheel G, having the anti-friction rollers *g g′* journaled thereto, of the master-wheel provided with the row of cogs or teeth *h*, the plain portion h^2, and the segmental locking-plate I, substantially as set forth.

24. In a grain-binder, the combination, with the shaft J, of the arm *j*, guide arm or fingers *j′*, ejector-rod K, compressor-arm L, and spiral spring *k′*, substantially as set forth.

25. In a grain-binder, the combination, with the disk or wheel M, having anti-friction rollers *l l′* l^2 journaled thereto, of the master-wheel H, provided with locking-flanges N O^3, and

cams N N^2 O O′ O^2, substantially as set forth.

26. In a grain-binder, the combination, with the grain-receiver, of the shaft Q, curved arms Q^2, anti-friction rollers R^2, sliding clutch S′, sprocket-wheel S^2, chain S^3, spiral spring T, and adjusting-nut T′, substantially as set forth.

27. In a grain-binder, the combination, with the sliding clutch S′, spiral spring T, adjusting-nut T′, and lug or pin *w*, of the master-wheel H, starting-lever U, and pawl u^2, substantially as set forth.

In testimony that we claim the foregoing we have hereunto set our hands.

FERRIS OGDEN.
HENRY M. WEAVER.

Witnesses:
A. J. ENDLY,
GEO. MOORHOUSE.