(No Model.) 6 Sheets—Sheet 1.

E. M. KELLOGG.

GRAIN BINDER.

No. 422,947. Patented Mar. 11, 1890.

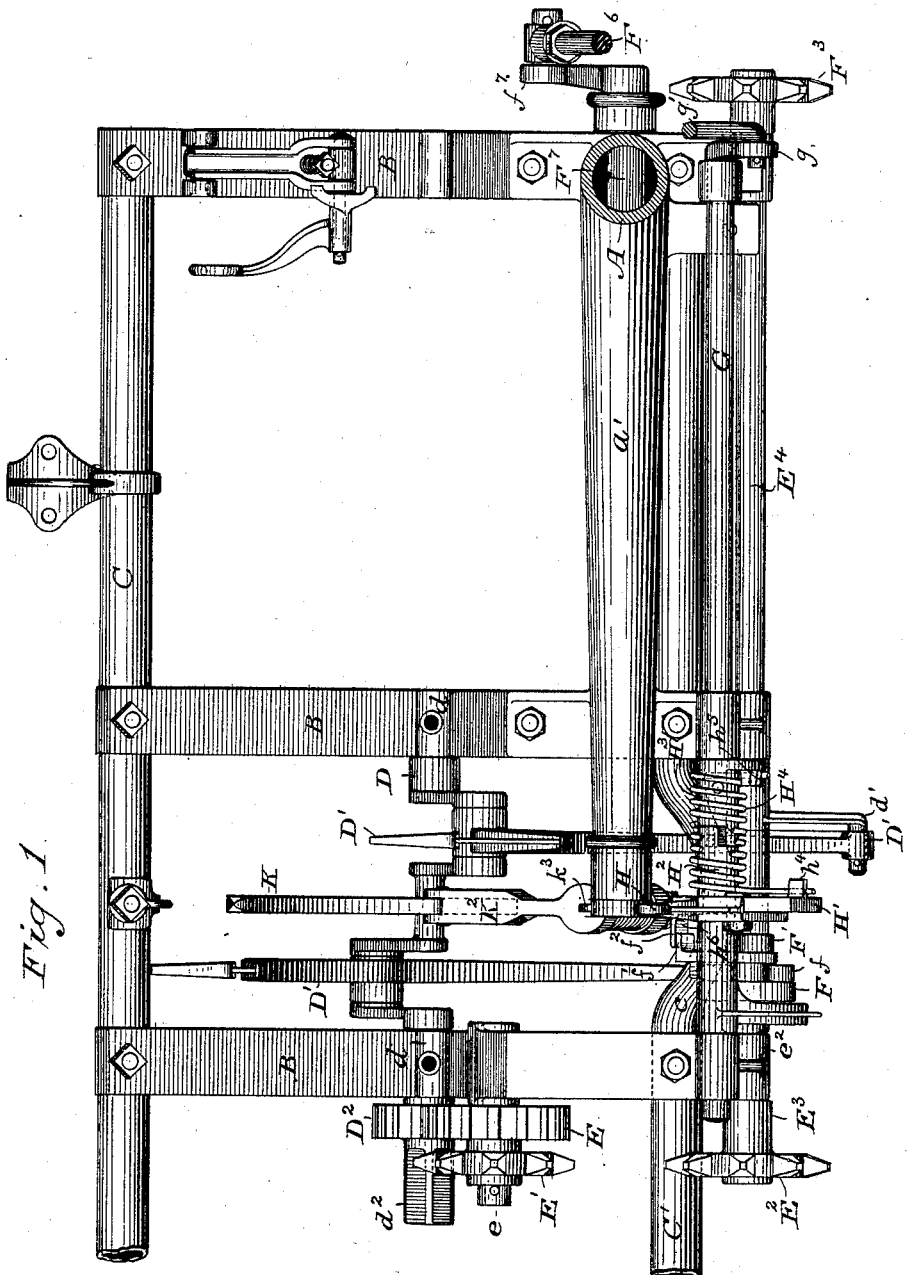

Fig. 1.

Witnesses

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Parkinson & Parkinson

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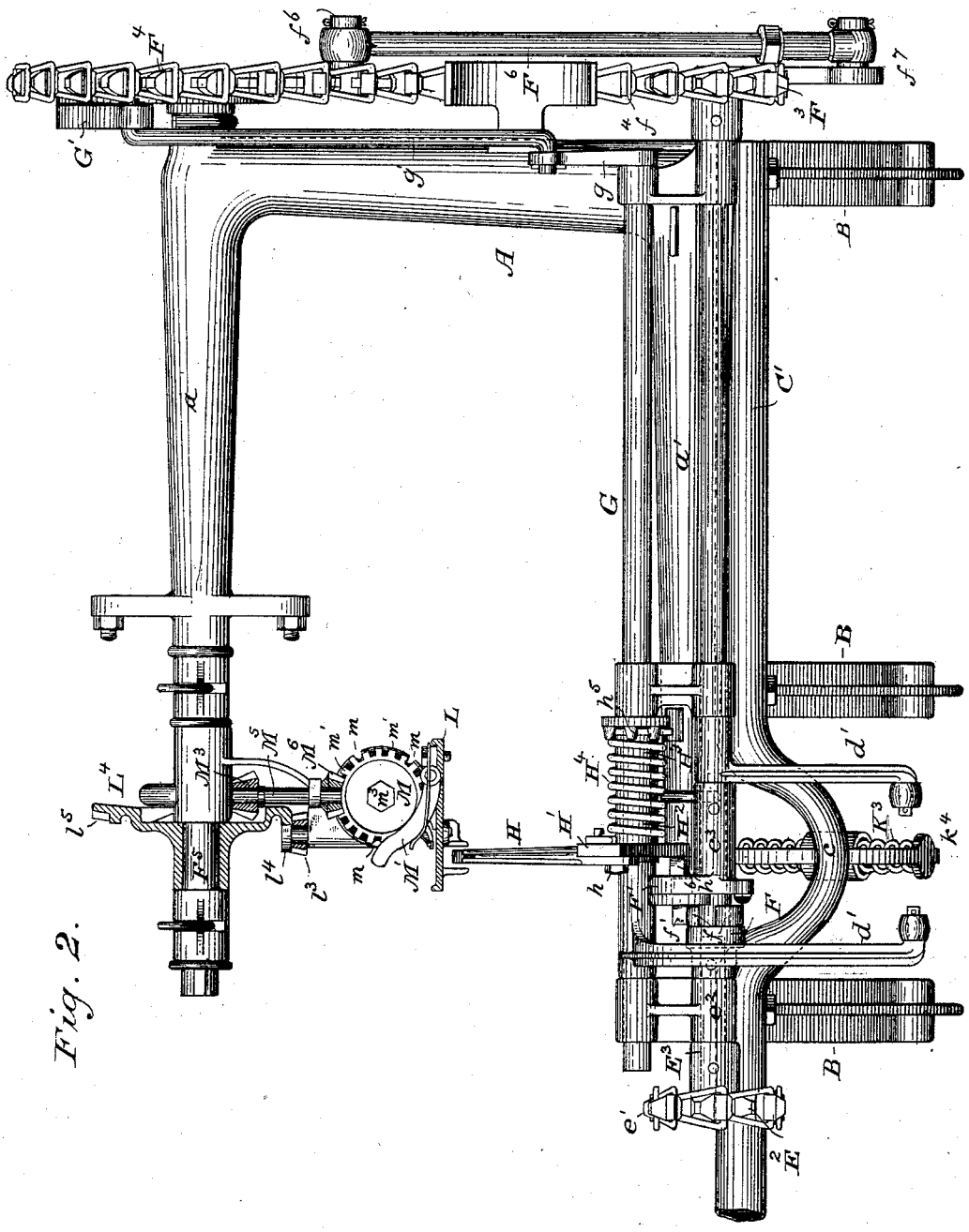

Fig. 2.

Witnesses

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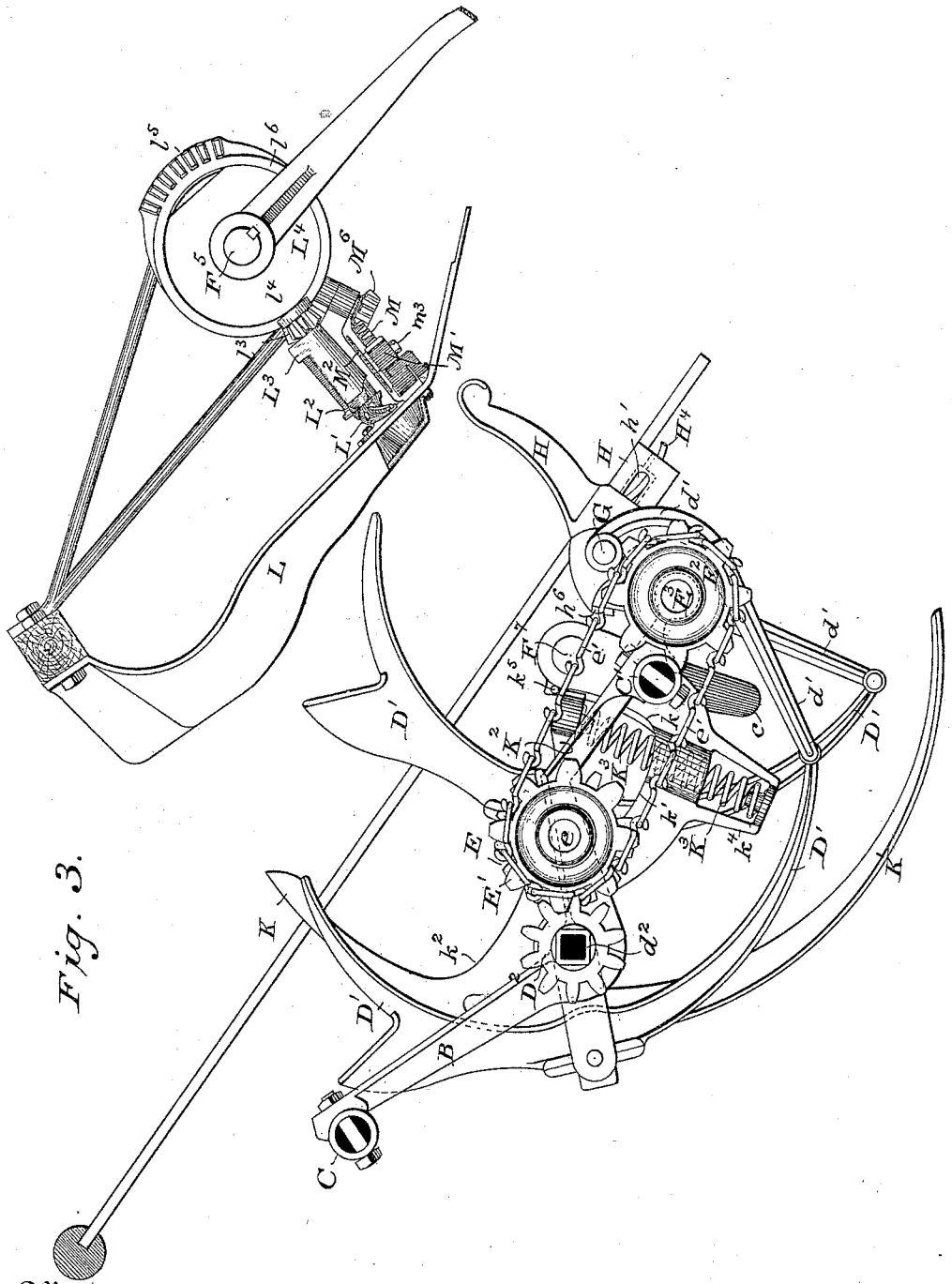

Fig. 3.

Witnesses

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(No Model.)

6 Sheets—Sheet 4.

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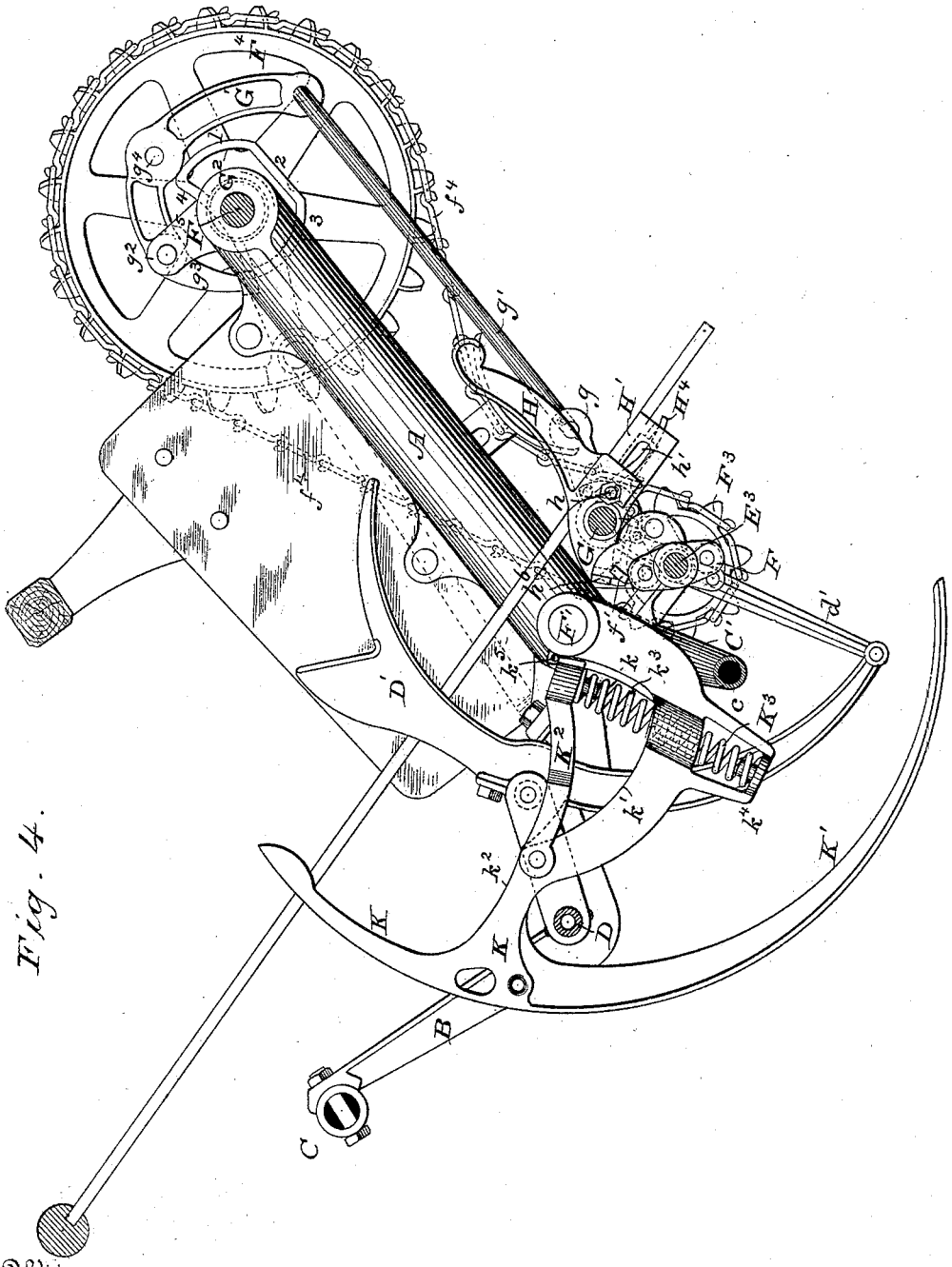

Fig. 4.

Witnesses

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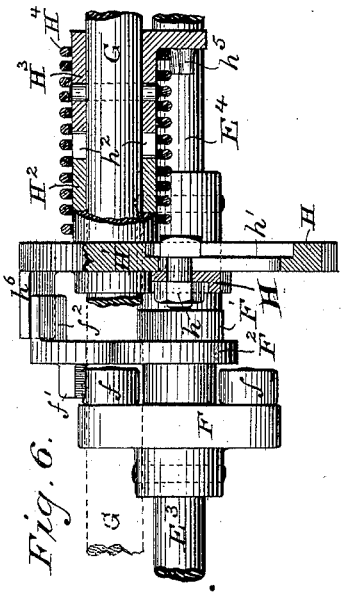

Fig. 6.

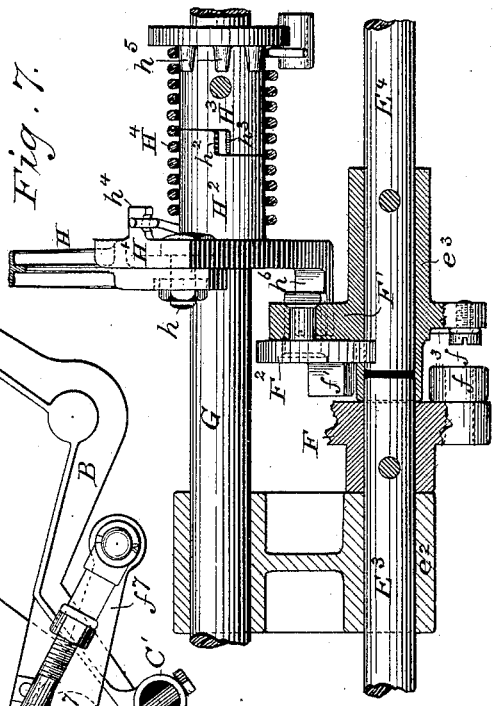

Fig. 7.

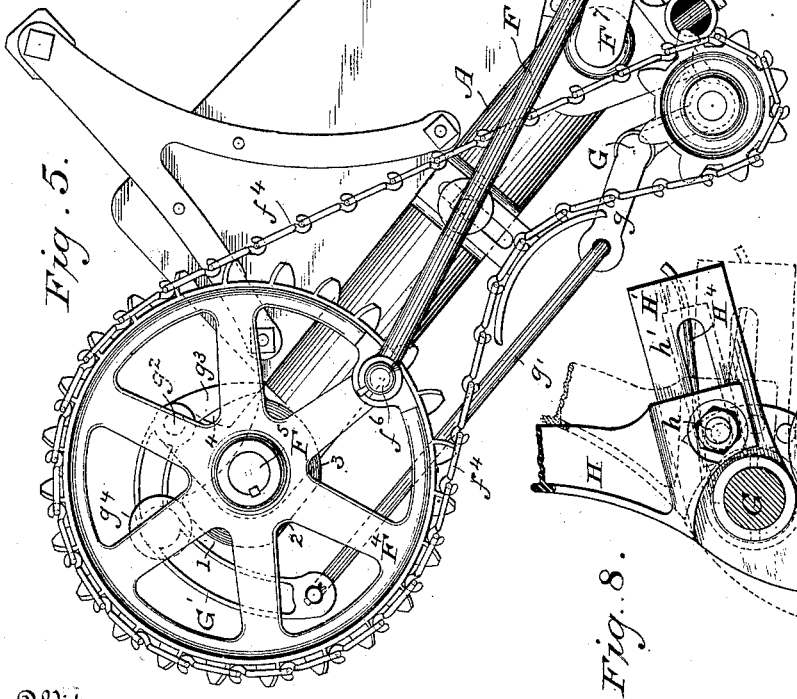

Fig. 5.

Fig. 8.

Witnesses

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(No Model.) 6 Sheets—Sheet 6.

E. M. KELLOGG.

GRAIN BINDER.

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Fig. 10.

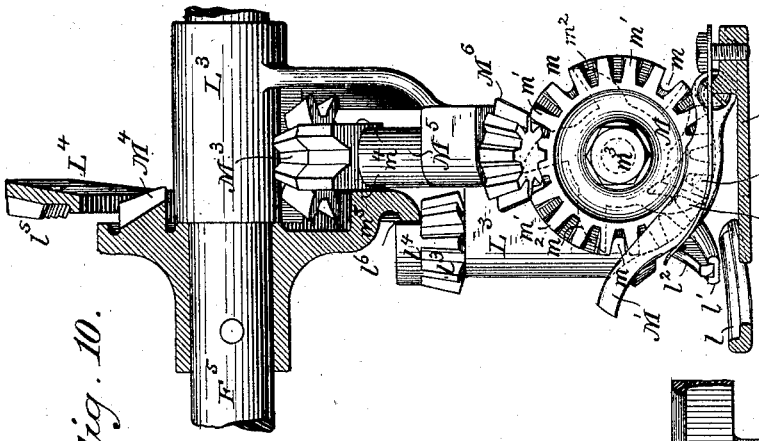


Fig. 11.

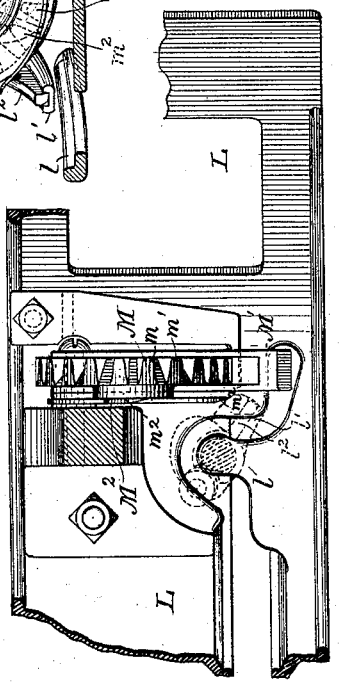
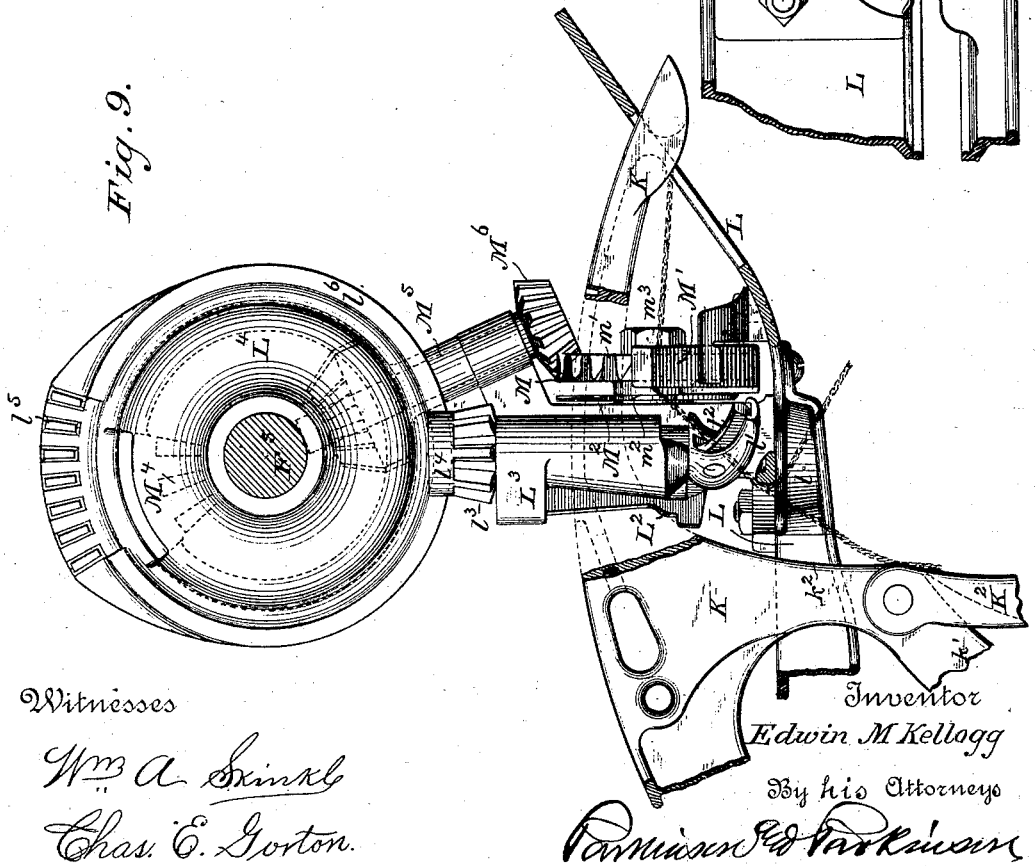


Fig. 9.



Witnesses

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UNITED STATES PATENT OFFICE.

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GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 422,947, dated March 11, 1890.

Application filed March 30, 1889. Serial No. 305,478. (No model.)

To all whom it may concern:

Be it known that I, EDWIN M. KELLOGG, a citizen of the United States, residing at Delavan, in the county of Walworth, State of Wisconsin, have invented certain new and useful Improvements in Grain-Binders, of which the following is a specification.

In that type of grain-binders generally known as the "Appleby," and most frequently used nowadays, the tripping-clutch has been, as a rule, located upon the end of the cranked packer-shaft and acted upon by a more or less complicated train of communicating parts from the compressor finger or fingers, the packer-shaft itself, by which may also be understood the trip-clutch shaft, extending from front to rear of the machine inside of the subtending arm of the post-frame.

In the present invention a short packer-shaft is employed of just sufficient length to drive the packers, while the clutch-shaft is located outside of in close proximity to and parallel with the subtending arm of the post-frame or with the outer tubular bar of the binder-frame, and the trip-clutch is immediately beneath the compressing-finger and acted upon directly by a latch which forms a rigid heel-extension of that finger. The main binder-gear is driven by a chain from a sprocket at one end of this clutch-shaft, and the compressing and tripping finger is mounted upon a rock-shaft in such manner that it can yield a short distance without disturbing the shaft, and is thrown open at the proper moment and reset by a link connected at its lower end with a crank upon the shaft and at its upper end with a lever acted upon by a cam on said main gear. The binder-arm is formed with an elastically-yielding section in its shank opposite to the compressing and tripping finger, and certain improvements are introduced into the knotting, cutting, and holding head, all as will presently appear.

In the drawings, Figure 1 is a top plan view of so much of an automatic grain-binder embodying my invention as is necessary to an understanding thereof, the overhanging arm of the post-frame and the grain-deck being removed. Fig. 2 is an elevation from the stubble side of the machine, the grain-deck being omitted. Fig. 3 is a rear elevation with the front part of the grain-deck shown. Fig. 4 is a vertical section on a line parallel with but slightly in rear of the plane in which the binder-arm plays, except as to the knotting-head, which is omitted. Fig. 5 is a front elevation with the grain-deck omitted. Figs. 6 and 7 are enlarged details of the tripping device, the first seen from the top and the second from the stubble side of the machine, and suitably broken away to more clearly expose the construction of the parts. Fig. 8 is also an enlarged detail of the tripping device seen from the rear. Fig. 9 is a rear elevation of the knotting-head with the tyer-cam and a portion of the binder-arm shown to explain the mode of presenting the cord. Fig. 10 is an elevation, partly in section from the stubble side, of said knotting, cutting, and holding head; and Fig. 11 is an enlarged detail of a portion of the breast-plate with the holder in its proper relative position thereto seen from the top.

A represents the post-frame of the binder, having an upper overhanging tubular arm *a*, which supports the tyer-shaft, and a lower subtending arm *a'*, upon which is mounted the binder-arm shaft. The subtending arm is bolted to transverse bars or brackets B, in which are formed bearings for the longitudinal shafts of the machine, with the exception of the two just named, and these brackets are united at their inner ends by a longitudinal tubular frame-bar C, and near the outer ends, beneath the post-frame and slightly outside of its subtending arm, by a second longitudinal frame-bar C', which, however, is herein shown as having a downward bend or curve *c* immediately beneath the compressing-finger to make room for certain of the tripping agencies, but would not necessarily have this curve if somewhat differently located.

In bearings *d* in the two rear transverse frame-bars, or those between which the binder-arm plays, is mounted a short cranked packer-shaft D, bearing brackets D', the heel ends of which are supported by links *d'*, of which the front link is, for convenience, sleeved upon the shaft which carries the tripping-clutch, and which will hereinafter be termed the "driving-shaft" or "clutch-shaft," while the rear link is sleeved upon a section

of the rock-shaft which carries the compressing finger or fingers and which lies somewhat above the driving-shaft, as will be presently explained.

The packer-shaft is to receive motion from the harvester, and for that purpose is provided, when the binder is adjustable back and forth, with a telescoping section d^2, and will in turn communicate motion, by means of a pinion D^2, to a gear E, mounted upon a short stub-axle e, secured to the rear transverse frame-bar, and alongside this gear and rigid therewith, so as to turn with it when it is driven, is a sprocket-wheel E′, communicating by a chain e' with an opposing sprocket-wheel E^2, keyed to the rear end of a short shaft-section E^3, mounted in a bearing e^2 outside of the subtending arm from the post-frame parallel therewith, and below the support for the compressing-finger. This shaft-section abuts against a second shaft-section E^4, and has its end, for steadiness, embraced by a sleeve e^3, pinned to said forward section. The rear section has also pinned to it just at the end of this sleeve a cross-head F, carrying lugs or rollers f, such as usual in the tripping-clutch of the Appleby binder, and the front section likewise carries most conveniently as a part of the sleeve a second cross-head F′, one arm of which bears a pivoted dog F^2, having flanges or lugs f' and f^2 on opposite sides of its nose and out of line with each other, intended to be caught alternately, the first by the driving-lugs on the opposite section of the clutch and the second by the trip-latch, and the other arm bears a spring f^3, by which the dog is urged normally into the path of the driving-lugs and carried therein whenever released by the trip-latch. The details of this clutch may of course be somewhat varied, but the form just described is the one that at present seems most advisable.

Whenever the driving-dog is engaged with one or the other of the driving-lugs, it is evident that the front section of this driving-shaft will revolve as if one with the rear section, and by means of a sprocket-wheel F^3 at its forward end, by a chain f^4, and sprocket-teeth formed on the periphery of the main gear and cam wheel F^4, will drive the latter, and with it the tyer-shaft F^5, and by means of the pitman-connection F^6 between a wrist-pin f^6 on said gear and cam wheel and a crank f^7 on the end of the binder-arm shaft F^7 will drive the latter, and with it the binder-arm.

G is a rock-shaft mounted in bearings outside of the post-frame and above the trip-shaft, and extending rearwardly to or past the trip-clutch. At its front end, beneath the gear and cam wheel, this rock-shaft has a crank g, connected by a link g' with a lever G′, pivoted to a lug g^2 from the post-frame to the rear of the gear and cam wheel and inside of said wheel. This lever has a tang or heel extension g^3, which strikes against the post-frame and prevents it from being raised too high, and between its pivot and the point where the link is attached it carries a roller g^4, which travels upon a cam G^2, formed upon the main gear and cam wheel, which for this reason has been termed the "gear and cam wheel." While the roller is traveling on the concentric reach 1 of this cam the link is raised to its full height, thus holding the finger mounted on the rock-shaft inward against the accumulating gavel or against the action of the binder-arm. When it reaches the straight reach 2 of the cam, the compressing-finger is permitted to yield a little away from the binder-arm, that the trip-latch may escape the driving-dog as it comes round on its second revolution, as will directly be explained. When it gains the third reach 3, the compressing-finger is again carried inward to its full extent, except as allowed to elastically yield, and is retained in such position until the knot is tied, when, finally, the last reach 4, which is cut away on an inward curve, allows the lever to drop, rocking the compressor-shaft outwardly and carrying the compressing-finger down below the decking, that the bound sheaf may be disengaged by the ejector-arms, which at that moment come around. Then, regaining the fourth reach, the compressing-finger is reset, and at that moment the trip-clutch is thrown out of action, and the parts, with the exception of the packers, come to rest in the position shown in Fig. 4 in the drawings.

H is the compressor-finger, rigidly but adjustably secured to a block H′ by means of a bolt h and a slot h', or in other suitable manner. This block in turn is mounted upon the compressor-shaft, but instead of being pinned thereto it has a sleeve-bearing H^2 thereon. Such sleeve is cut away for a little over half its periphery to form shoulders h^2, and meets a second sleeve H^3, similarly cut away to form shoulders h^3, thus leaving a space between the lapping shoulders of the two sleeves, so that the finger may have some play on the shaft, but will be stopped at each extreme of movement, this second sleeve being pinned to the shaft. Around the two sleeves is coiled a spring H^4, one end of which presses against a lug h^4 on the block to carry the compressing-finger inwardly against the stop in that direction, and the other is capable of being sprung into engagement with any one of a series of teeth h^5, projecting from a flange on the forward sleeve, or that one which is pinned to the shaft, so that the resistance met by the trip-finger in rocking outwardly toward the outside stop may be adjustably determined. The inner end of the block is prolonged downwardly to form a trip-latch, and at its point has a lug or flange h^6, which, whenever the trip-finger is in the position represented in Fig. 4, comes into the path of the second lug on the driving-dog, or the one opposed to that which engages the driving-lug, and, stopping the dog, causes it to swing on

its pivot, thereby disengaging it from the driving-lug and unclutching the binding mechanism. Whenever, however, grain has been packed sufficiently against the compressing-finger to rock it and the block which carries it upon the compressor-shaft to the limit or about the limit permitted by the shouldered sleeves, the block, or that part of it which forms the trip-latch, will be drawn out of engagement with the driving-dog, and the latter will at once be carried by its spring into the path of the driving-lug, and will be engaged by the first one that next comes round, thereby starting the binding mechanism.

The compressing-finger must be held up against the gavel while the latter is being bound; but should it retain the position shown in Fig. 4 when the driving-dog comes round at the completion of its first revolution the latter would be disengaged and the binder stopped before the band had been tied. Therefore the cam which controls the compressor-shaft is provided with the straight reach or cut-away part already mentioned, which at just this moment allows a slight outward movement of the compressing-finger sufficient to carry the latch out of the path of the dog, and then the succeeding concentric reach immediately resets the finger and holds it in position until the binding is completed.

K is the binder-arm or needle keyed to the binder-arm shaft and having the usual guard-finger K′; but its shank, instead of reaching almost directly from the shaft to the base of said finger in a curve, is formed with three curves k k' k^2, the first of which is described upon an arc substantially concentric with the point of the juncture of the other two, and has a guide-rib k^3 embraced by flanges upon the free end of a presser-arm K^2, pivoted at said point of juncture. A coiled spring K^3 is seated in a socket k^4, formed at the point where the first and second curves meet, and this spring holds up the presser-arm toward a stop k^5 on its guide-rib, so that it normally occupies about the position of the shank in the binder-arm commonly used in the field, and so, also, that when the binder-arm rises this presser-arm will be opposite to the compressor-finger and will yield somewhat to the gavel, should it be of such size as to otherwise endanger breakage of the machine, thereby obviating the necessity of having a spring-link to hold the compressor-finger to its work after the tripping action takes place.

The breast-plate L is of an ordinary form, having a stop-finger l in the cord-slot to temporarily intercept the strands of cord and prevent their slipping past the tying-bill L′, which latter is formed, as usual, with the rigid jaw l' and the pivoted jaw l^2, closed at a certain point in its revolution by a spring-cam L^2, attached to the stock L^3, in which the spindle of the knotter is mounted. A bevel-pinion l^3 and delay-shoe l^4, coacting with a gear-segment l^5 and delay surface or rim l^6 on the tyer-cam L^4, serve to give this knotter a single complete revolution and stop it, with its jaws trending outward in the direction of the extended cord-slot, as indicated in Fig. 11, from which position it starts again in the next tying operation, sweeping the cord round over the end of the stop-finger in the cord-slot and carrying it into the extended outer portion thereof. As it is not practically feasible to tie the knot in this single complete revolution, starting from the point indicated and ending at the same point, unless the ends of the cord are partly carried around to meet the tying-jaws toward the close of their revolution, a holder-disk M is arranged in conjunction with a spring-pressed shoe M′, which acts against its lower edge, so as to stand about perpendicular to the breast-plate and at substantially right angles to the general trend of the cord-slot and on that side thereof on which the tyer-bill is located, and is driven in such direction as to carry the cord-strands down along the shoe from its free end toward its pivoted end. This holder-disk, for the purpose of the present description, is provided with five notches m, and on its outer face is formed with bevel-teeth m', with certain of the interdental spaces of which these notches correspond. On the inner face and set out somewhat therefrom it carries a disk M^2, having five radiating knife-blades m^2, one of which comes slightly behind each of the notches, so that when the cord has been bent to a certain angle round the tyer-spindle by the revolution of the holder-disk the blade behind the notch in which the strands are held will be brought against them and sever them between the knotter and holder.

The pivot m^3 of the holder-disk and of its accompanying knife is located in a plane farther removed from the cord-slot than is the tyer-spindle, in order to get the full effect of carrying the cord around and practically on the further side of the tyer-cam, and it is therefore driven from the farther side of the tyer-cam, or the side reverse to that which drives the knotter. This is done by means of a bevel-pinion M^3 and two delay-shoes m^4, coacting with a short segment M^4, herein shown, with but three teeth and a delay-rim m^5. The segment gives the pinion one-half of a revolution for each engagement, and thereby revolves a short inclined spindle M^5, having at its lower end a bevel-pinion M^6, meshing with the teeth of the holder-disk. This bevel-pinion, for the purpose of the present description, has eight teeth, and from one of the notches in the disk to the next four teeth are to be engaged before the half-revolution of the spindle will move the holder-disk the space of one notch, carrying the cord round from the position shown by the strand-notch in full lines in Fig. 11, just entering the holder-shoe, to the position shown by the next notch in dotted lines near the lower point of said shoe.

I do not intend to confine myself to the specific construction and arrangement of the

tripping instrumentalities herein described, nor to the employment of a sectional driving-shaft, nor yet to the specific organization of the binder-frame, nor to the precise location or distribution of the various other elements of the machine, except as may hereinafter be particularly defined; but

I claim—

1. The combination, substantially as hereinbefore set forth, of the packer-shaft, the pinion thereon, the gear-wheel and its sprocket, driven by said pinion, the sectional driving-shaft located on the outer side of the binder, and the sprocket thereon driven by a chain from the gear-sprocket, the trip-clutch located between the sections of said driving-shaft, the compressor-finger adjacent to the meeting-point of said sections, a trip-latch for disengaging said clutch actuated by said compressor-finger, the main binder-gear driven by the second section of said shaft, and the binder-arm and band-uniting devices driven by said gear.

2. The combination, substantially as hereinbefore set forth, of the compressor-shaft, the sectional driving-shaft located therebeneath and having a trip-clutch between its sections, the compressor-finger located above said clutch, and a trip-latch rigid with said finger for disengaging the clutch.

3. The combination, substantially as hereinbefore set forth, of the compressor-shaft, the compressor-finger having a sleeve-connection therewith, the spring coiled about said shaft and urging the compressing-finger inward, the trip-latch rigidly connected with said finger, and a trip-clutch located directly beneath said finger and operated by the latch.

4. The combination of the gear and cam wheel, the compressor-shaft, the lever operated by the cam on said wheel, the link connecting said lever with a crank on the compressor-shaft, the sectional driving-shaft beneath the compressor-shaft, the chain connecting the sprocket on one of the sections of the driving-shaft with the gear and cam wheel, the trip-clutch between the sections of said shaft, the yielding compressor-finger mounted upon said compressor-shaft, and the trip-latch projected downward from said compressor-finger to control the trip-clutch.

5. The combination, substantially as hereinbefore set forth, of the compressor-shaft, the sectional driving-shaft located therebeneath, the trip-clutch between the sections of said driving-shaft, the compressor-finger, and the base-block to which it is adjustably secured, sleeved upon the compressor-shaft above said clutch, a spring urging the compressor-finger inward, a stop to limit its inward movement, and the trip-latch projected inward from the base-block of said finger.

6. The combination, substantially as hereinbefore set forth, with the compressing and tripping finger, of the binder-arm having a guide-rib, as described, the presser-bar hinged in the shank of said binder-arm and embracing said rib at its free end, and the spring urging said presser-bar outward.

7. The combination, with the gear and cam wheel and the compressor-shaft, of the pivoted lever actuated by said gear and cam wheel and having a tang projecting downwardly from its pivot to serve as a stop for its upward movement, and a link connecting said lever with a crank upon the compressor-shaft.

8. The combination, substantially as hereinbefore set forth, with the trip-clutch, the compressing-finger, and the trip-latch rigidly secured to said finger, of the compressor-shaft, upon which said finger is sleeved, the pivoted lever by which said shaft is operated, and the cam acting upon said lever having a cut-away portion to allow a slight recession of the finger to take the latch out of the path of the tripping-dog as the latter completes its first revolution.

9. The holder-disk constructed as described—that is, with bevel-teeth on one face and with cord-notches corresponding with certain of the interdental spaces.

10. The combination, substantially as hereinbefore set forth, of the holder-disk having bevel-teeth on one face, and cord-notches corresponding with certain of the interdental spaces, the tyer-cam, and the spindle driven at one end by the tyer-cam, and at the other end having a bevel-pinion to drive the holder-disk.

11. The combination, with the tying-bill and the tyer-cam having a segment and delay-flange on one side for driving said tying-bill and giving it a single complete revolution and stopping it with its jaws trending outwardly, of the notched holder-disk having beveled teeth on its outer side and mounted virtually on a pivot on the farther side of the tyer-cam from the cord-slot, a short inclined spindle having a bevel-pinion at its foot meshing with the teeth on said disk, and a bevel-pinion and delay-shoes at its head, and the segment and delay-flange on the farther side of the tyer-cam for driving said spindle and the disk.

12. The combination, substantially as hereinbefore set forth, with the tying-bill, its spindle, and its segment and delay-flange by which it is controlled, of the bevel-toothed holder-disk arranged vertically, the shoe beneath said disk, the cord-cutter disk on the inner side of said holder-disk and set out therefrom, and having knife-blades behind each of the notches in the disk, the spindle by which said disk is driven, and the segment and delay-flange for driving said spindle.

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