(No Model.) 4 Sheets—Sheet 1.

J. F. APPLEBY.

GRAIN BINDER.

No. 502,267. Patented Aug. 1, 1893.

Fig. 1.

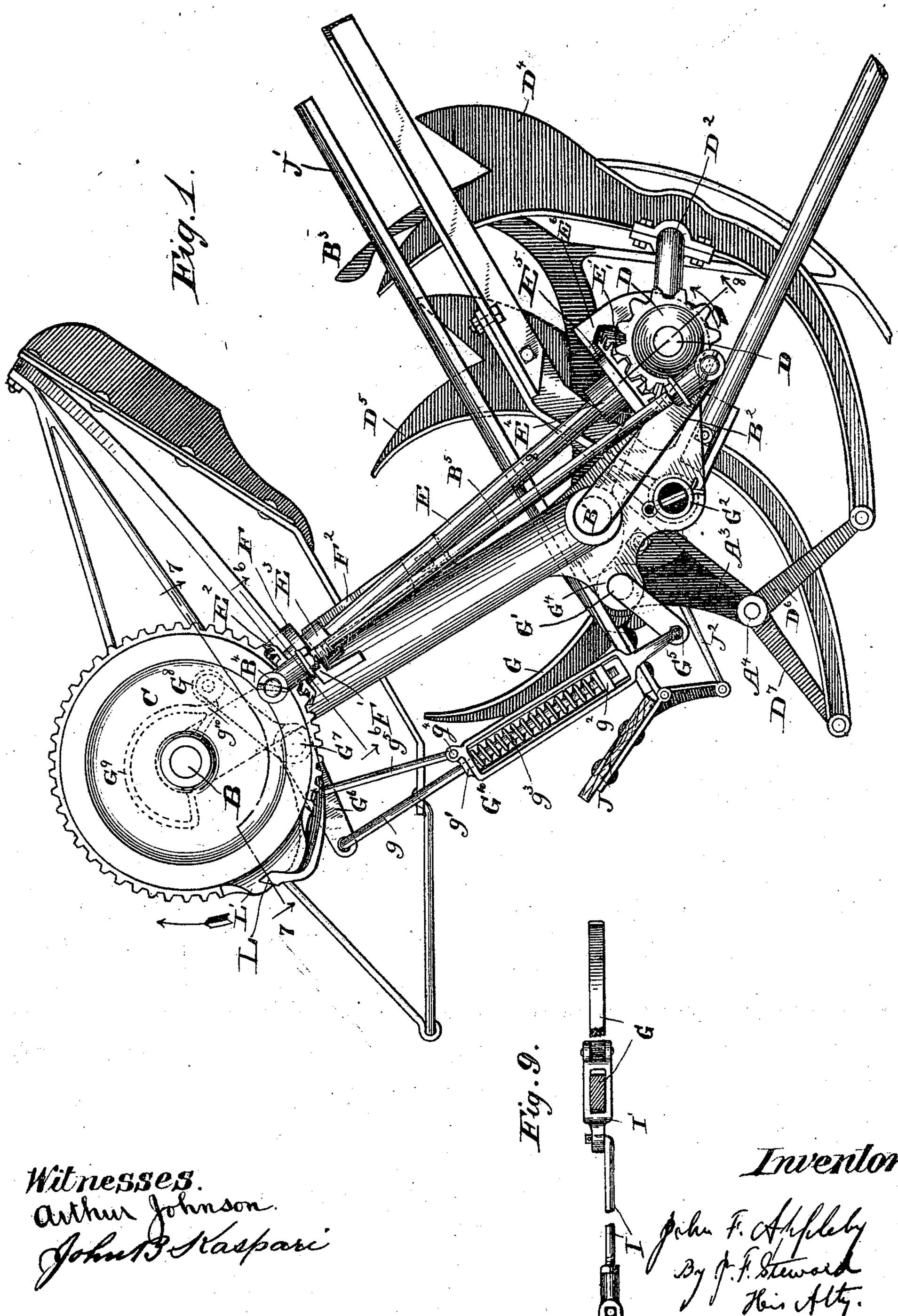

Fig. 9.

Witnesses.
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John B. Kaspari

Inventor:
John F. Appleby
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His Atty.

(No Model.)

4 Sheets—Sheet 2.

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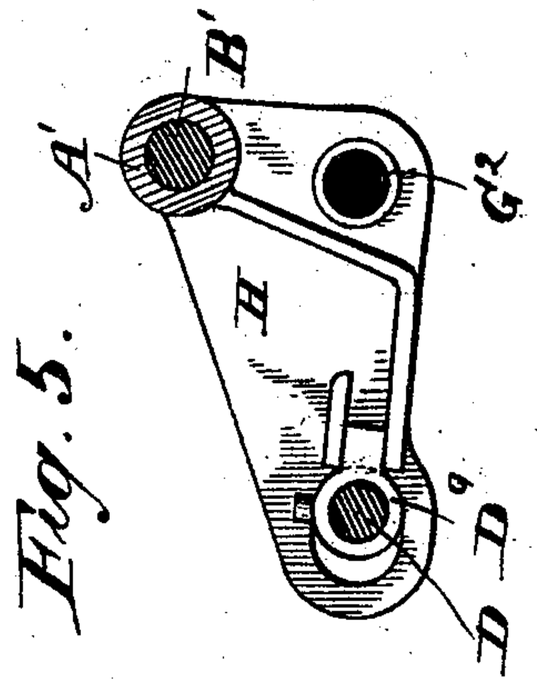

Fig. 5.

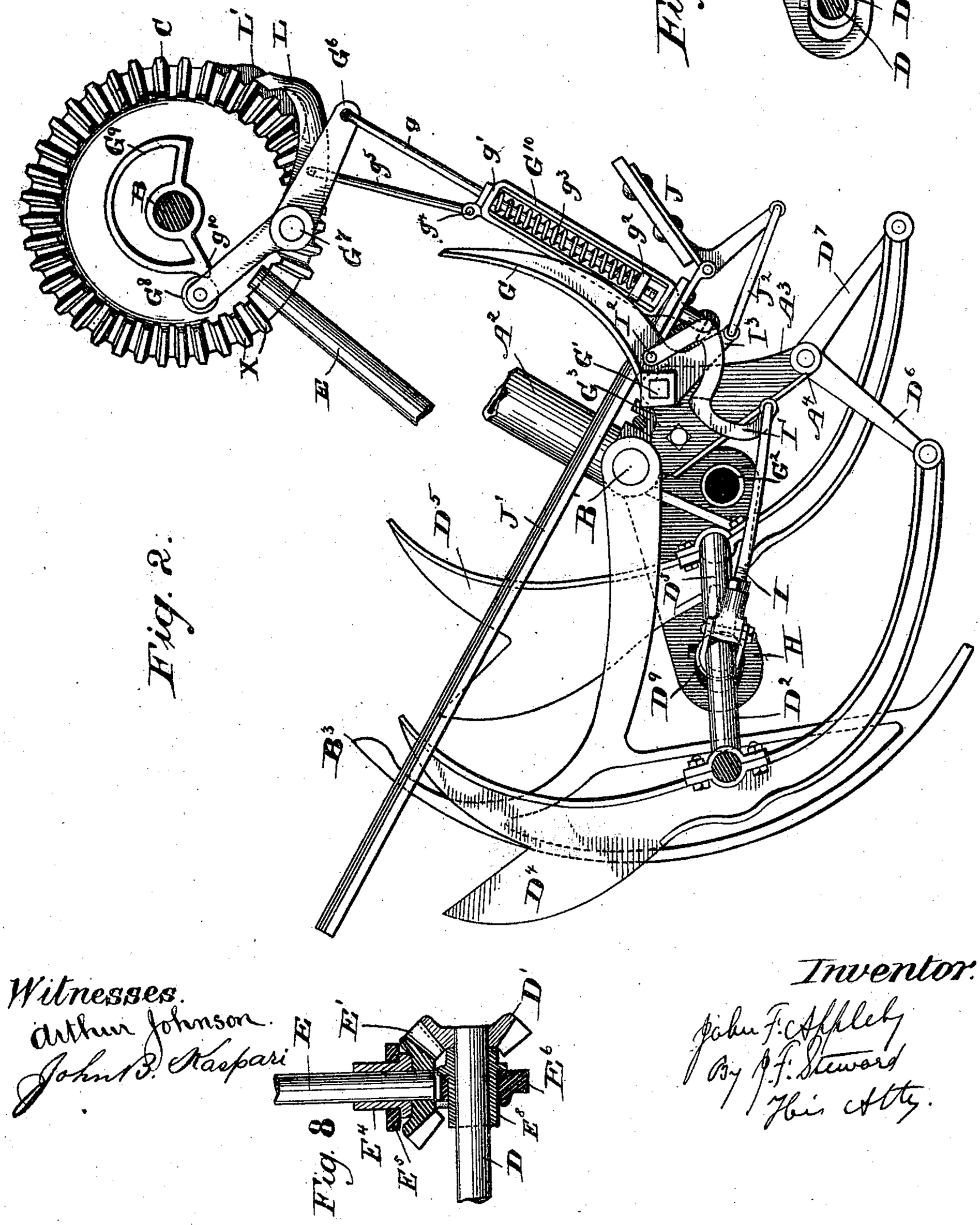

Fig. 2.

Fig. 8

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4 Sheets—Sheet 3.

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GRAIN BINDER.

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Witnesses
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(No Model.) 4 Sheets—Sheet 4.

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GRAIN BINDER.

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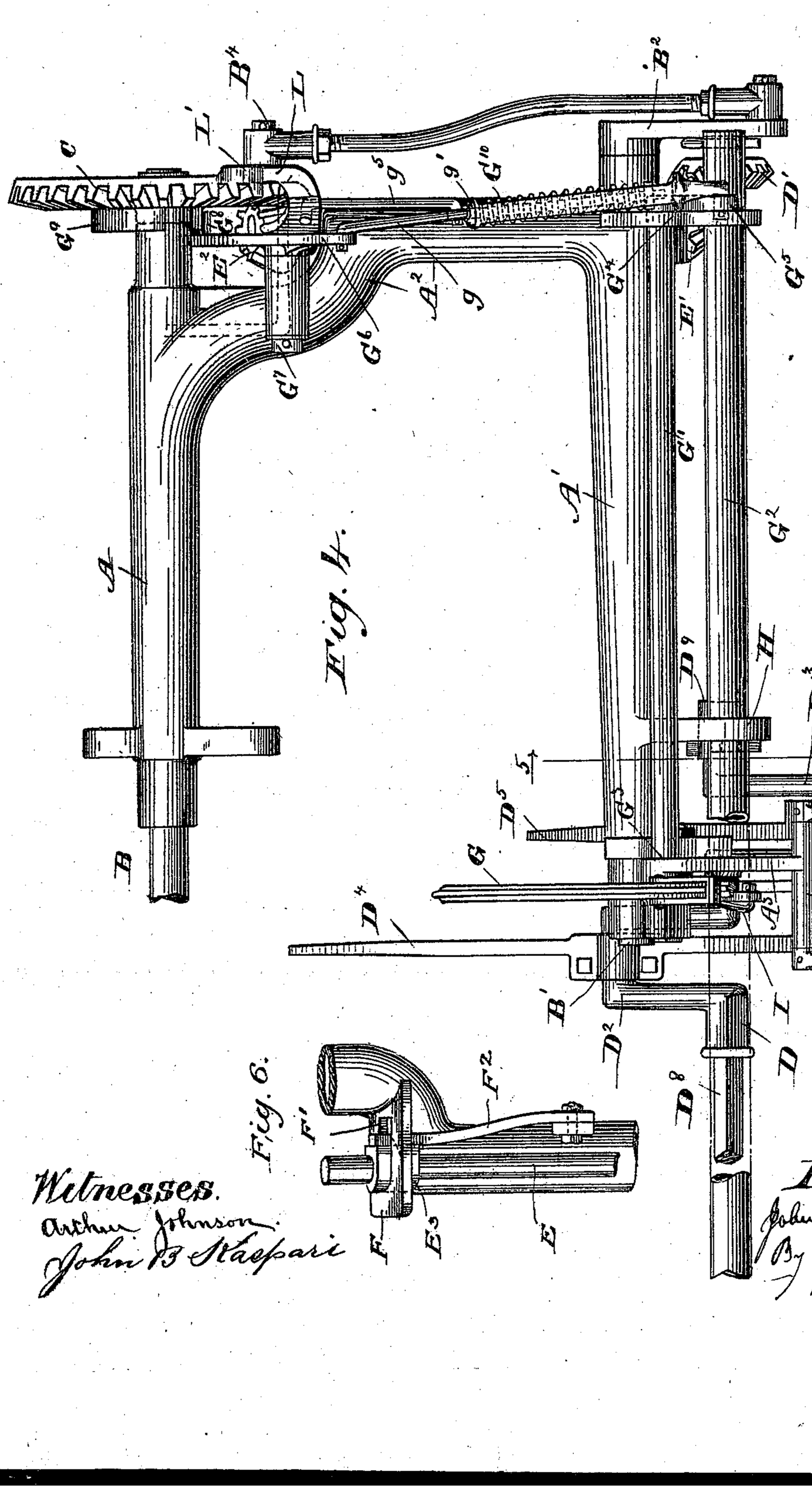

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UNITED STATES PATENT OFFICE.

JOHN F. APPLEBY, OF SANTA CRUZ, CALIFORNIA.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 502,267, dated August 1, 1893.

Application filed July 28, 1891. Serial No. 401,017. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. APPLEBY, of the city of Santa Cruz, county of Santa Cruz, and State of California, have invented certain new and useful improvements in that class of grain-binders established by me and patented February 18, 1879, No. 212,420, of which the following is a full description, reference being had to the accompanying drawings.

The object of my invention is to render grain-binders more perfect in their operation, lighter in weight, and cheaper in construction, and its nature consists in improvements in the details of construction, as will be herein fully pointed out.

In the drawings Figure 1 is a front elevation of my binder complete. Fig. 2 is a rear elevation of the machine with certain of the parts broken away. Fig. 3 is also a rear elevation with certain portions broken away. Fig. 4 is a stubble-side elevation. Figs. 5, 6, 7, 8 and 9 represent details.

My binder frame, although cast as one piece, may for the present be considered as consisting of the parallel shaft bearings, A and A′ connected by the vertical portion, A^2. Projecting from the main frame is the arm A^3, preferably having the sleeve-like fore and aft extension, A^4. The sleeve A forms a support and journal bearings for the knotter shaft B, and the sleeve A′ serves the same purpose for the needle shaft B′. Upon the needle shaft is formed the usual needle crank B^2 at the front end of the main frame. Secured to the rear end of the needle shaft is the needle B^3. Knotting devices are not shown, but they may be considered as located upon the shaft B near the over-hung end of the main frame in proper position to be approached by the needle when the latter is moved to bind a bundle.

C is the main bevel gear of the binder.

Beneath the needle is the packer shaft D that may be considered as rotating continuously.

D′ is a pinion for transmitting movement from the packer shaft to the binding devices.

D^2 and D^3 are the packer cranks carrying upon their wrists the packers D^4 and D^5, the latter controlled in their movements by the links D^6 and D^7.

D^8 is a shaft socketed in the packer cranks for giving them continuous movement.

D^9 is a journal bearing for the packer shaft formed in a lug H reaching grainward from the lower member A′ of the main frame.

E is a shaft for transmitting motion from the continuously running pinion D′ to the wheel C.

E^2 is a pinion upon the upper end of the shaft and E^3 a journal bearing for the upper end of said shaft. In order that the shaft may move at its upper end away from the gear C the thimble which forms the journal bearing is placed in a slotted lug upon the frame and would move freely therein but for a spring that holds it to its proper position of engagement.

E^4 is a sleeve placed in the lug E^5 of the main binder frame and there sustained loosely so that the shaft supported thereby may rock at that point as on a pivot. The journal bearing E^4 must be considered as a universal bearing so as to permit the rocking movement referred to, and I shall treat it as a pivoted bearing. As the rocking movement is exceedingly slight and little looseness need be provided, I have shown no space between the sleeve and the walls of the eye in the lug. The pinion E′ meshes into pinion D′. Arranged as the mechanism of my binder is, the shaft E is never rocked sufficiently far out of its position to disturb the proper mesh of the bevel pinions F′ when the binding devices are in labor. On the contrary, it is never required to shift but when the parts are performing no labor. As a result of this the misplacement of the gears relative to each other does not affect the mesh seriously.

E^6 is a vertical portion of the lug E^5. This lug is perforated as shown in Fig. 8, and a journal bearing E^8 is placed therein. This supports the front end of the packer shaft.

The lug F is recessed and in it is formed the slot F′. The journal bearing E^3 located within this slot is pressed upon by the spring F^2, suitably secured to the binder frame, and thus held elastically in the position that shall permit the pinion to mesh properly with the gear C. The purpose of thus elastically holding the shaft in position is to permit it to yield away if the teeth of the pinion should not properly mesh with the gear, which has a

few of its teeth removed to form a space in which the pinion may move while the binder is in a state of rest.

G is a tripping arm that opposes the packers and receives the grain forced onward by them, mounted upon the shaft G′, supported in the lug G^4 of the main frame at its front end, and in the lug G^3 at its rear end.

G^2 is a bar suitably connected to the harvesting machine proper, and on this the binder is adapted to slide, (the latter supported thereon.) This bar passes through the lugs of the binder frame and the latter slides along it.

G^5 is a crank upon the front end of the compressor shaft, and G^6 is a lever pivoted at G^7 upon the binder frame and having the anti-friction roller G^8.

G^9 is a cam upon the wheel C adapted to control the action of the lever G^6, and through the instrumentality of the declivity g^{10}, in turn, moved by the lever to give the binding devices the initial part of their movement in a forward direction.

G^{10} is a link connecting the compressor crank G^5 to the lever G^6 consisting of the spring rod g threaded at its lower end into the nut g^2, and receiving the compressor spring within the slotted spring support g'. This spring serves the usual purpose of a compressor and as well a tripping spring. In this application, however, it will be considered but as a tripping spring made adjustable in its tension by suitble means as the nut g^2. If it is wished to increase the tension of the spring the same may be accomplished by removing the hook of the rod g from the eye of the lever G^6 and screwing it farther into the nut, or less far, as desired.

g^5 is a rod connected to the spring support g' and to the pivoted detent L, the pivot being, preferably, coincident with that of the axis of movement of the lever G^6.

Upon the wheel C is formed a notch L′ into which the detent is adapted to engage.

Referring to Fig. 1 it will be seen that with the parts in the positions there shown, the stress of the spring being upon the nut g^2 at at its lower end, and upon the spring case g' at its upper end, it will exert itself through the rod, to pull the lever G^6 downward at the end to which it is connected and force the end having the anti-friction roller G^8 against the declivity g^{10} of the cam. If, however, the pressure of the forming gavel against the arm G be sufficient to draw the spring case downward against the resistance of the spring, the detent L will be drawn by the rod g^5 out of engagement with the notch in the periphery of the wheel. The wheel is thus set free to be moved by the pressure of the anti-friction roller G^8 upon the declivity g^{10}. When in a state of rest the driving pinion E^2 revolves idly in the space formed by the mutilated gear, but upon the latter being started forward its teeth are thrown into mesh therewith and the gear given a rotation. It will now be understood that the purpose of the spring is to permit the pinion to give way should its teeth strike upon those of the gear when the latter is thrown suddenly forward.

The mechanism just described for throwing the devices into and out of action form the subject matter of another application and will be no further considered here. The lever G^6, as far as this application goes, may be considered as any lever or other means for engaging and disengaging the main binder driving gear from its source of motion, and the detent L is any part for unlocking the binding devices so that they may be given a rotation.

From the packer shaft, connected thereto between the cranks, is the link I consisting of one part into which the main portion of the link screws, and a strap passing around the said shaft Where it connects to the shaft it is made in two parts for the purpose of placing and removing it. The link at its stubble end is hooked into the eye of the "S" shaped slotted casting I′, and the latter in turn connected to the compressor arm G. This part I′ is slotted, and an arm I^3 from the compressor passed therethrough. The purpose of this slotting is to form a stop so that when the compressor G is thrown upward the arm I^3 striking in the stubble end of the slot draws the link I, and hence the packer shaft, in that direction, the journal bearing of the latter moving in the slot provided in the lug H that supports it. The part I is given the form shown mainly to prevent it from coming in contact with various other parts, and as far as these functions are concerned may, in connection with the link, be considered as any link reaching from the packer shaft to the compressor so that the movement of the said packer shaft under the pressure of the in-fed grain may cause the tripping devices to act in this instance through the compressor shaft.

J are the drop leaves of the binding table J′ suitably pivoted to the latter and having an arm controlled by the link J^2 connected to the arm I^3 upon the compressor shaft.

I have not thought it necessary to show the knotting mechanism, nor bundle ejecting devices as either of the latter may be of the well known forms.

The operation of my binder, as far as forming the subject matter of this application is concerned, is as follows: The packer shaft may be considered as supported at the front end of the binder frame in a pivoted bearing, and at its packer end in a yielding one, and the latter, through suitable connections, held by a spring in its position nearest the exit side of the machine. The packers, bringing down the grain, force it against the arm G until the space between the lower part of the movement of the said packers, and the said arm becomes filled therewith. Upon the gavel becoming sufficiently dense the latter are forced to yield backwardly, and through the instrumentality of the various connecting devices, including the compressor shaft and

its crank, the resistance of the spring is overcome and the clutching devices, whatever they may be, put into engagement. The pressure due to the density of the forming gavel not only resists the action of the packers and moves them backward, but also tends to rock the arm G and the latter being linked to the packer shaft, simultaneously moves on its axis. The result of this is that the packers and the arm G, under the influence of the gavel, are forced in a direction to aid each other in tripping. The tripping compressor arm is permitted by the cam on the wheel C, to fall to permit the passage of the completed bundle. The linking devices I and I′ that connect the packer shaft and the compressor arm, being jointed together, may fold downward and thus permit the free dropping of the said compressor arm.

I am aware that yielding packers are broadly old, and I am aware that it is not new to so mount a shaft in bearings that it may yield. Such machines having the last mentioned kind of packer shafts have not come into use because of various complications. I avoid complications and various other objections by pivoting my packer shaft at one end and swinging the other. A yielding packer shaft shown in the patent to E. Deane, No. 291,497, dated January 8, 1884, shows that care was taken by the inventor to preserve the parallelism of his packer shaft. I have taken another course and have sought to not preserve the parallelism of the packer shaft with the other parts of the machine, and have utilized the movement from a parallel position to affect the tripping devices.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a grain binder of the kind in which the parts directly instrumental in binding are disengaged at the close of the operation of binding a bundle, an arm connected with the engaging and disengaging mechanism and adapted to control the latter, in combination with a packer shaft and packers mounted thereon, said packer shaft pivotally supported at one end and yieldingly supported at the packer end and suitably connected to said arm, substantially as described.

2. The tripping arm G suitably connected to the clutching devices to compel engagement of the same, in combination with a packer shaft pivoted at its driven end and carrying packers, and yieldingly supported at its packer end, said yielding end so connected to the arm G that the said shaft, with its packers, and the said arm will yield in directions from each other, substantially as described.

3. The clutching devices and the arm G suitably connected whereby the former is controlled by the latter, and the said arm G, in turn, connected by a linking device to the pivotally moving packer shaft by a jointed connection that shall permit the said arm G to fall, all combined, substantially as described.

4. The tripping compressor G, the pivotally yielding packer shaft connected thereto by an adjustable and jointed connection, all combined with clutching devices set free thereby, substantially as described.

5. The tripping compressor G, the pivotally yielding packer shaft and the adjustable connection I, all combined with the clutching devices, substantially as described.

6. In a grain binder the continuously rotating pinion, the mutilated gear C adapted to be moved in a forward direction to produce engagement, the said pinion elastically held in position for proper mesh with the said gear, all combined, substantially as described.

7. In a grain binder the pivoted packer shaft and packers, a yielding tripping arm, and the wheel C adapted to move in a forward direction to produce engagement, the said arm G so connected to the wheel C that the latter may be influenced thereby and started to rotate in a forward direction, the continuously driven pinion elastically held in position for proper mesh with the teeth of said wheel when moved in a forward direction, all combined, substantially as described.

8. In a grain binder a packer shaft supported in a bearing at the packer end that permits it to yield, said shaft connected at its driven end to the frame of the machine by a pivoted bearing, said shaft at said yielding end suitably connected to clutching devices whereby the movement of the free end of said shaft under the resistance of the in-fed grain may actuate said clutching devices, substantially as described.

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