(No Model.)

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J. F. APPLEBY.

SELF BINDING HARVESTER.

No. 567,934. Patented Sept. 15, 1896.

Fig. 1.

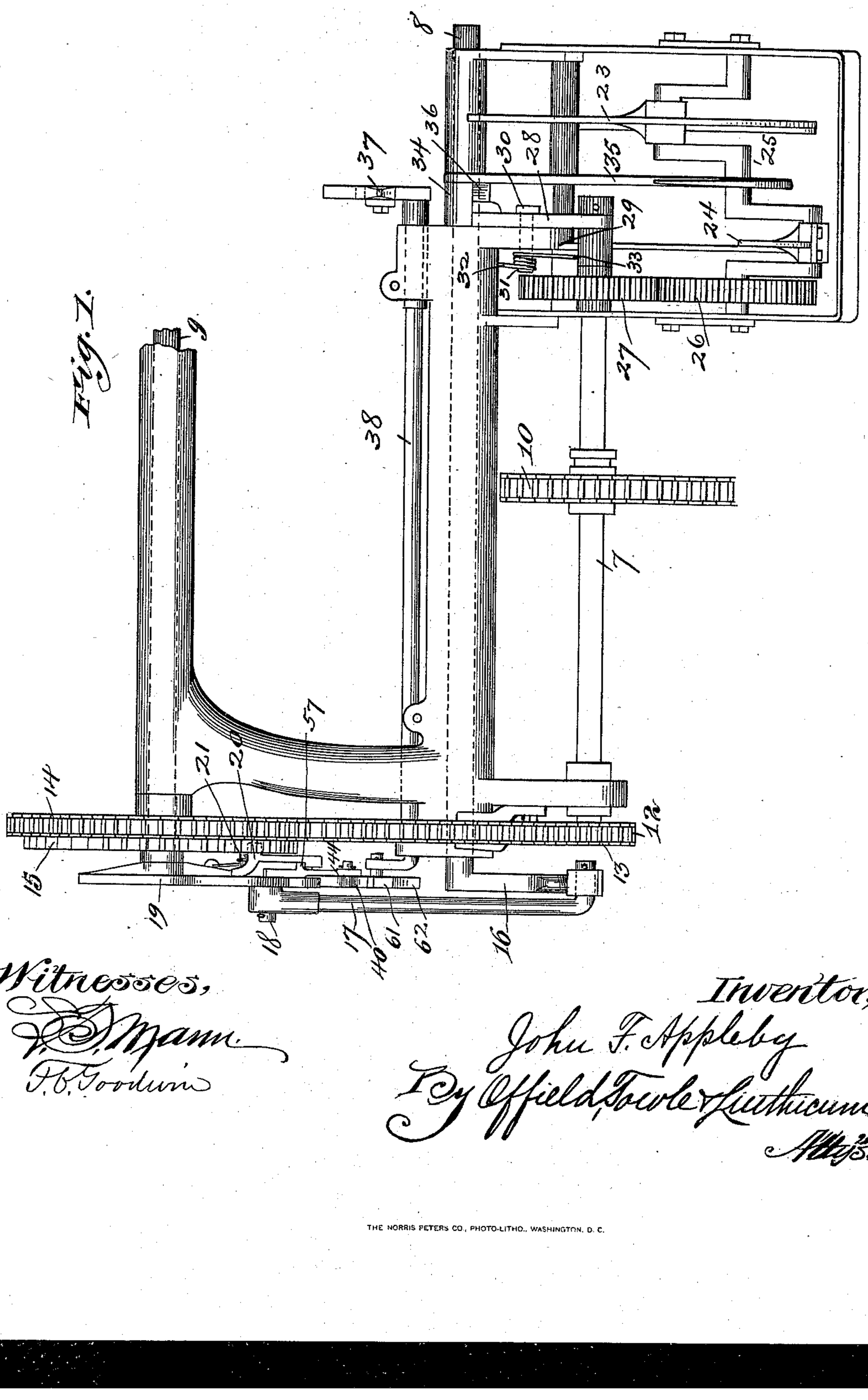

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Fig. 2.

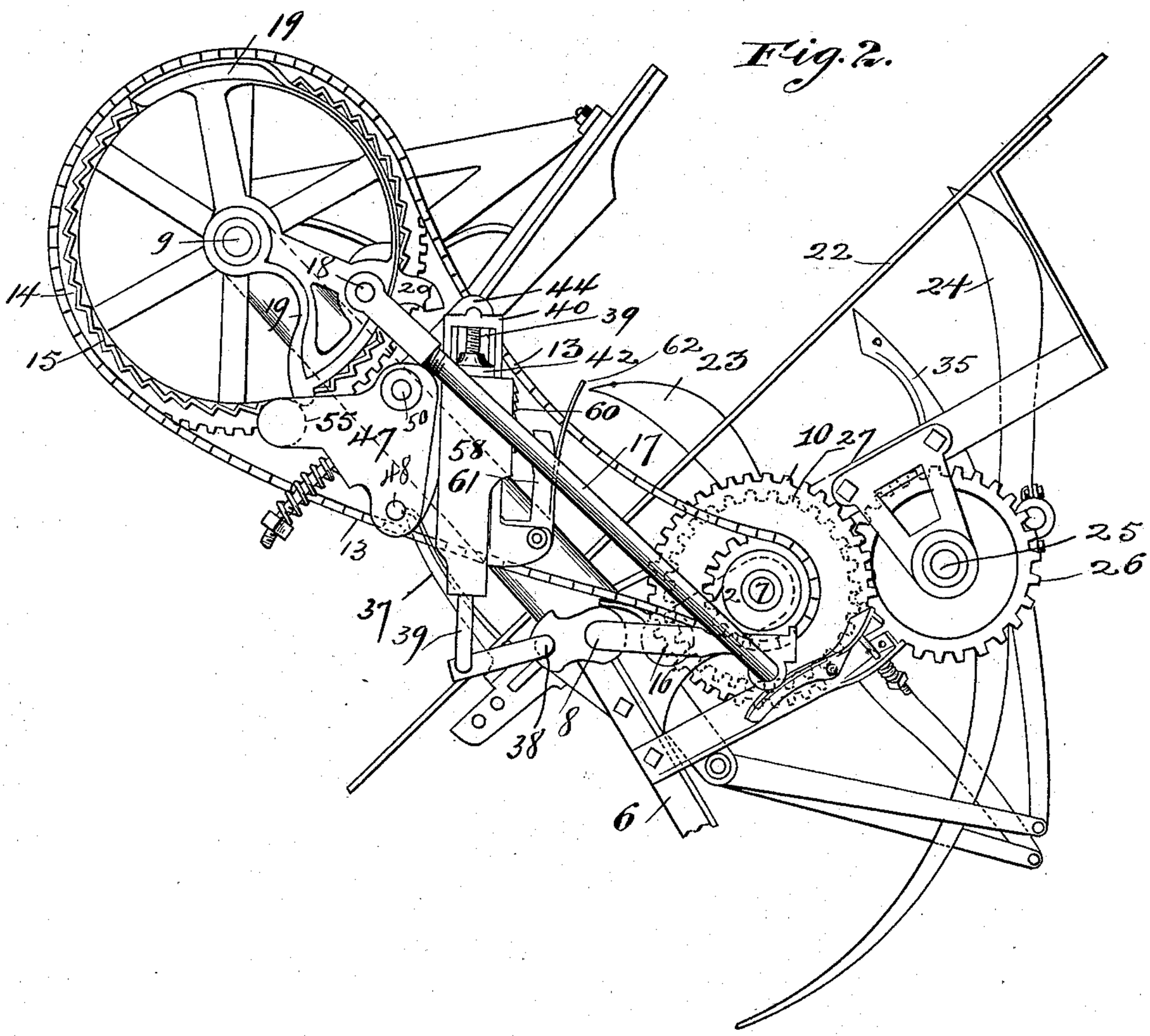

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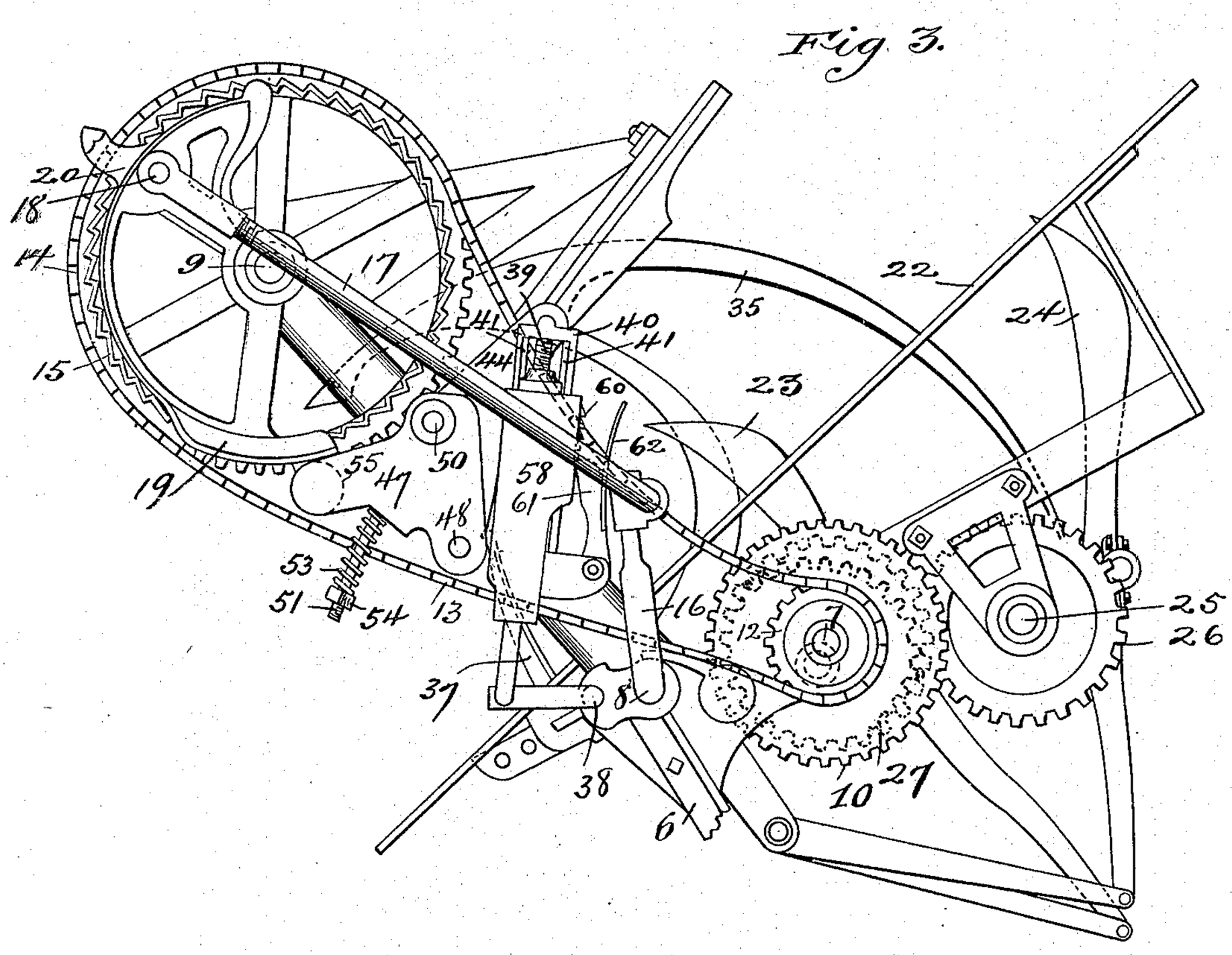
Fig. 3.



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SELF BINDING HARVESTER.

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Fig. 3a

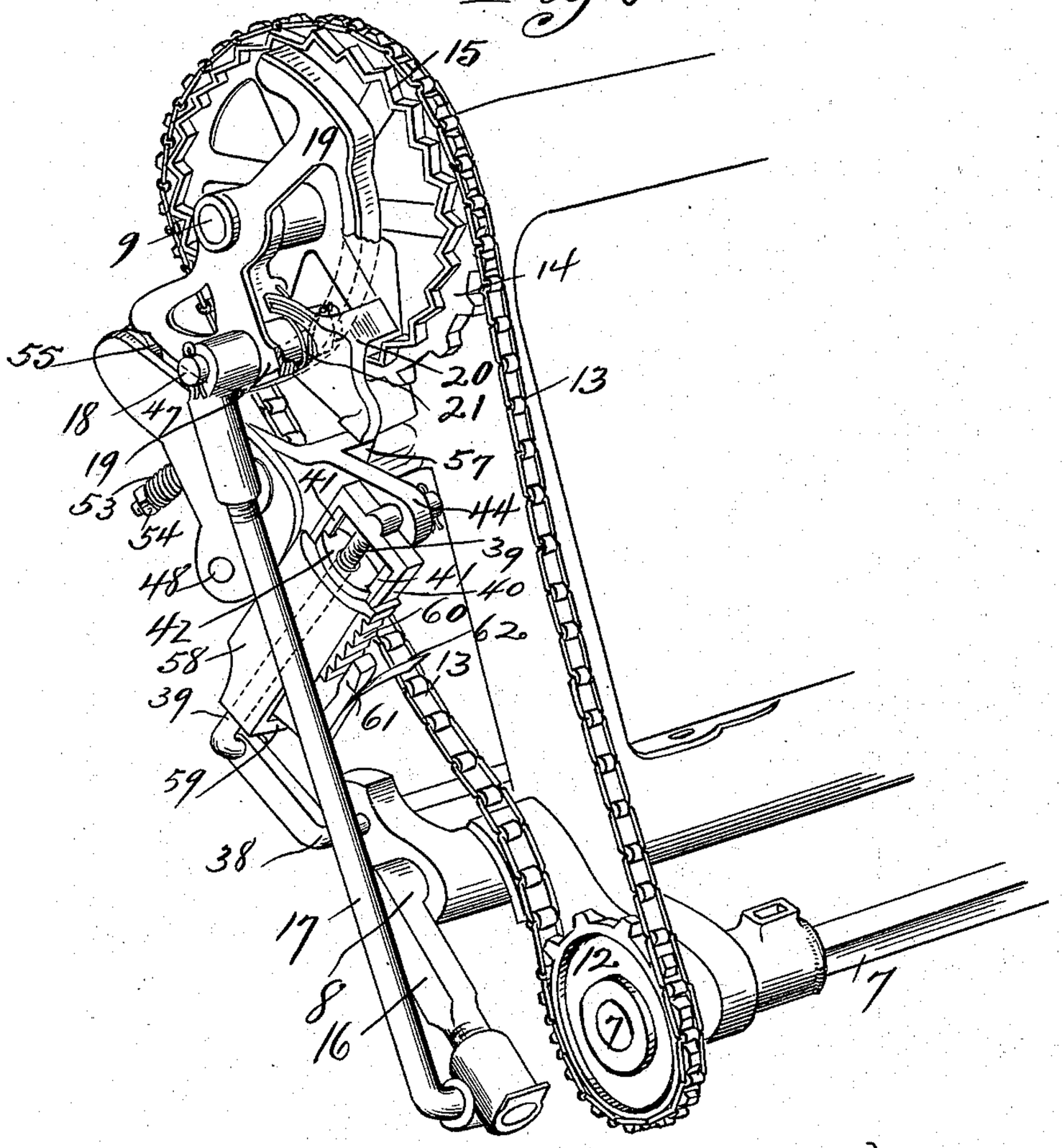
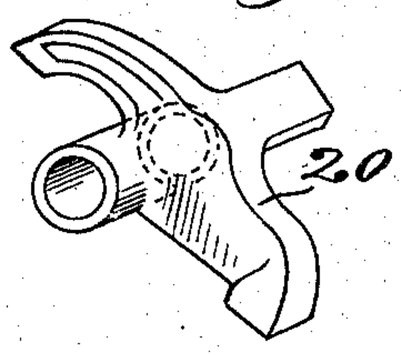


Fig. 3b



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(No Model.) 5 Sheets—Sheet 5.

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SELF BINDING HARVESTER.

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Fig. 4.

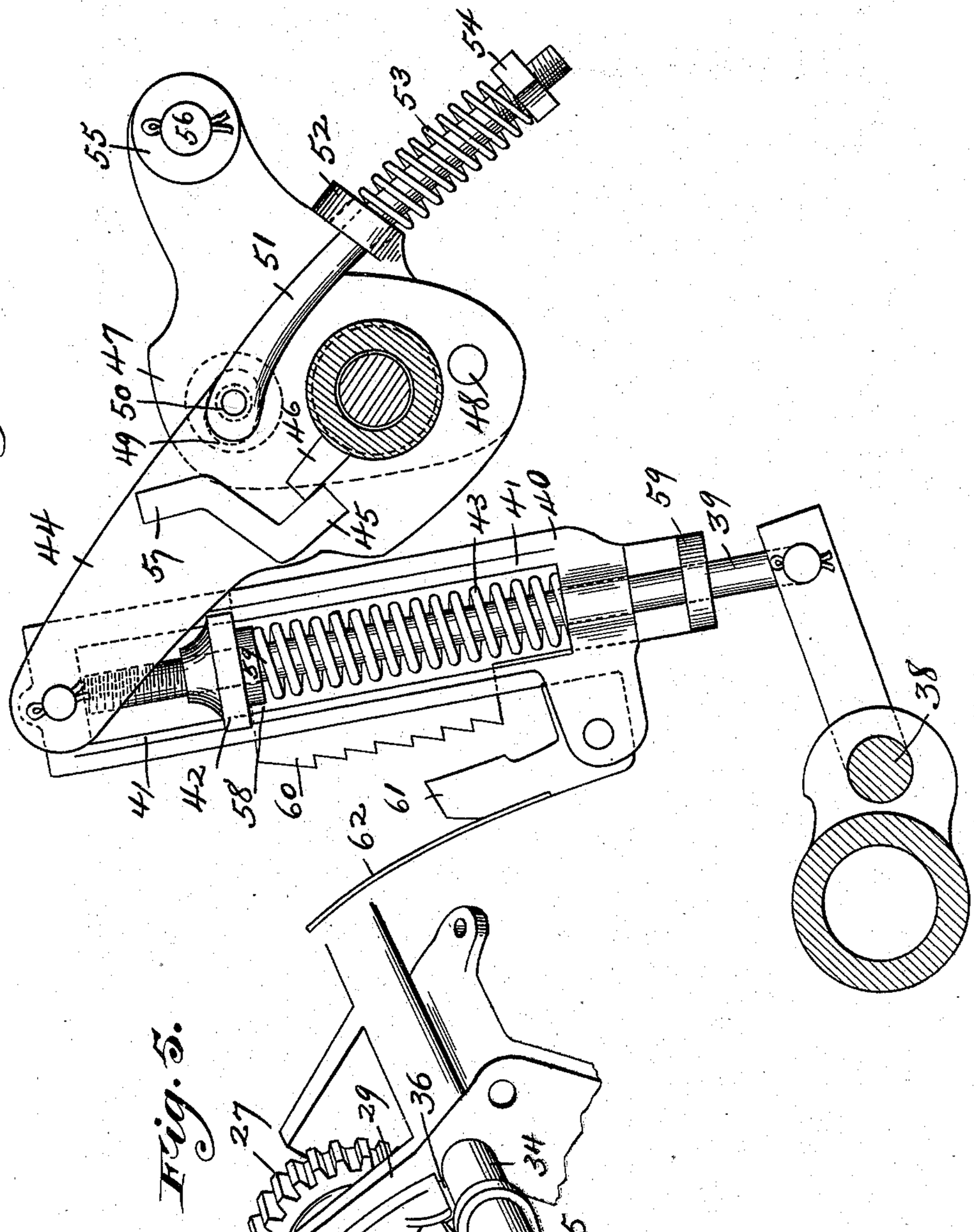
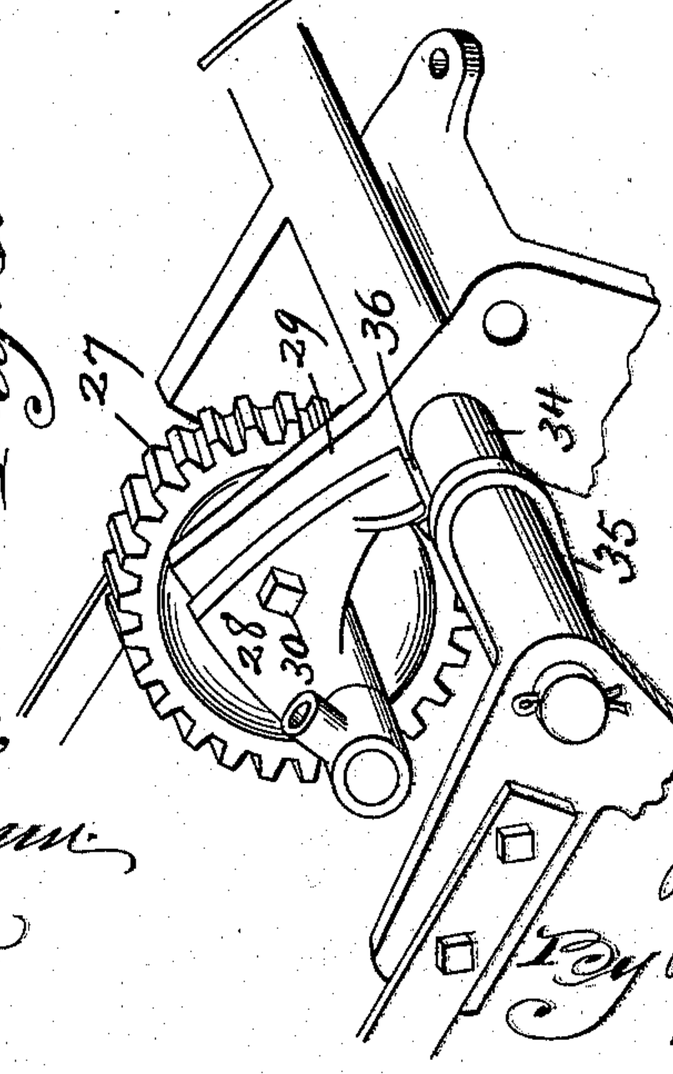


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN F. APPLEBY, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE HARVESTER KING COMPANY, OF HARVEY, ILLINOIS.

SELF-BINDING HARVESTER.

SPECIFICATION forming part of Letters Patent No. 567,934, dated September 15, 1896.

Application filed January 15, 1895. Serial No. 534,999. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. APPLEBY, of Chicago, Illinois, have invented certain new and useful Improvements in Self-Binding Harvesters, of which the following is a specification.

My invention relates particularly to means for throwing the binder into and out of gear and to means for giving an increased pressure to the bundle during the operation of tying the knot and after the packers have ceased movement.

In the accompanying drawings, Figure 1 is a plan view of a portion of the binder mechanism, particularly intended to show the gearing for operating the packers and binder-shaft. Fig. 2 is a side elevation from the rear side of the binder, showing the position of the several parts when the needle is at rest. Fig. 3 is a similar view showing the position of the parts when the needle has completed its forward movement. Fig. 3^a is a broken perspective view showing the construction of ratchet mechanism for connecting the needle-shaft and binder-shaft. Fig. 3^b is a detail view of a dog forming a part of the ratchet mechanism. Fig. 4 is an elevation of the locking mechanism for the compression devices, showing in section the tubular-frame members on which the locking mechanism is mounted. Fig. 5 is a broken perspective showing one of the gears by which the packers are driven and its relation to the hub of the needle-shaft.

The binding mechanism is mounted upon a frame, the supporting members whereof are marked 6, and said frame furnishes bearings for a driving-shaft 7, the needle-shaft 8, and the binder-shaft 9. The relation of these parts is clearly shown in Figs. 2 and 3. The driving-shaft 7 has a main driving-sprocket 10. Motion is imparted to this driving-sprocket from suitable gearing at the axle. (Not shown.) Shaft 7 has also a sprocket 12, and a link belt 13 passes from said sprocket over a large sprocket 14, loosely mounted on the binder-shaft. Said sprocket 14 has an internal circular rack 15, and mechanism is provided whereby the sprocket-wheel 14 may be locked to its shaft, so as to impart motion to the latter. Said locking mechanism is actuated by a compressor-arm. The needle-shaft 8 has a crank 16, to which is pivotally connected a pitman 17, said pitman taking hold of a wrist-pin 18 on a segmental crank or cam 19, secured on the binder-shaft 9. The wrist-pin extends through the cam-crank and has pivoted thereon a dog 20, said dog being adapted to ride upon the teeth of the internal rack 15 and being normally pressed against said teeth by a spring 21. The dog is held out of engagement with the rack-teeth by a tripping mechanism which is operated by the pressure of the forming-gavel. To understand this operation, it will be necessary first to describe the manner in which the gavel is formed.

The grain is delivered upon the sloping deck 22, which is slotted and through which work the packers 23 24. Said packers are mounted upon a cranked packer-shaft 25, Fig. 1. Said crank-shaft carries a spur-gear 26, which is intermittently driven by a spur-gear 27 on the driving-shaft 7. The bearing for the end of said driving-shaft is in a bell-crank 28, which is pivoted on an arm 29, the pivot (marked 30) having a coiled spring 31, with its extensions 32 and 33 bearing, respectively, on the frame and on one member of said bell-crank.

The end of the bell-crank opposite the shaft-bearing rides upon the hub 34 of the needle 35, said needle being secured upon the needle-shaft 8. The needle-hub 34 has a raised cam 36, which, engaging the end of the bell-crank 28, tends to rock the latter, thus carrying the spur-gear 27 out of mesh with the spur-gear 26 on the packer-shaft 25, the disengaged position of these gears being illustrated by the dotted lines in Fig. 3. The purpose of this arrangement is to throw the packers out of gear at the moment the needle commences its forward movement. The position of the parts at the inception of the movement of the needle is illustrated in Fig. 5, where it will be observed that the stubbleward end of the bell-crank 28 is resting upon the outer end of the cam 36. The needle-shaft, however, derives its movement from the locking of the large sprocket-wheel 14 with the binder-shaft, and this is effected through the instrumentality of a compressor-arm 37,

which is rigidly mounted on a rock-shaft 38, journaled parallel to the needle-shaft. This compressor-arm forms an abutment against which the grain of the forming-gavel is forced by the action of the packers. Whenever the gavel assumes a certain size, under the further pressure exerted by the packers upon the gavel said compressor-arm will be forced back, rocking its shaft. The end of said shaft opposite the compressor-arm is cranked and carries a yielding tripping mechanism, which is well illustrated in Figs. 2, 3, and 4. Said mechanism comprises a bolt 39, which passes into a skeleton frame 40, said frame being provided on opposite sides of its open interior with flanges 41, to which is fitted a sliding nut 42. The bolt 39 has threaded engagement with said nut, and a coiled spring 43 surrounds the bolt, having one end seated upon the bottom of the frame 40 and the other impinging against the traveling nut 42. The upper end of the skeleton frame 40 is pivotally connected to a rocking plate 44, having a locking stop or shoulder 45, adapted to engage a rib or stop 46 of the frame. A second plate 47 is pivoted to the frame and by pivot 48 to plate 44, and has also a slot-and-pin connection therewith, the slot being marked 49 and the pin 50. The pin 50 has a bolt 51 connected thereto, said bolt passing through a perforated lug 52 on the plate 47. A spiral spring 53 is coiled about the outer end of this bolt, and an adjusting-nut 54 is turned on threads of the bolt to vary the tension of the spring.

The plate 47 has an antifriction-roller 55 rotatably mounted on a stud 56 thereof and adapted to provide a bearing against which the cam 19 operates. The coiled spring 53 normally tends to hold the plate 47 and the plate 44 in such position that the stops 45 and 46 are in contact. In this position a shoulder 57 on plate 44 rests beneath the point of the dog 20, normally holding it out of engagement with the rack-teeth. So long as the dog 20 is held out of engagement with the rack-teeth the packers are in motion, constantly packing the flowing grain against the compressor-arm, forming the gavel, and the needle is at rest. During this operation of forming the gavel it is desirable that there shall be a capacity of yielding in the compressor-arm, which is provided for by the spring 53. Now to put the needle-shaft in motion the dog 20 must be released. This releasing is effected by the accumulation of the grain until sufficient pressure is exerted on the compressor-arm by the action of the packers to rock said arm, which has the effect to pull down the skeleton frame and rock the plate 44 until the shoulder 57 thereof disengages the dog, whereupon the spring of the latter throws it into engagement with the teeth of the circular rack 15. The result of this engagement of the dog is the locking of the large sprocket-gear 14 with the binder-shaft, and immediately the revolution of said shaft sets in the segmental cam 19 begins its rotation, and through the pitman 17 rocks the needle-shaft. When the needle-shaft begins to move, the cam on its hub rocks the bell-crank 28, thus moving the free end of the driving-shaft sufficiently to disengage the spur-gears 26 and 29, and the packers come to rest.

Differences in the character of the grain as to degree of solidity, owing to different degrees of ripeness and rankness of growth, are encountered, and to provide for these differences it is desirable to so construct and arrange the compressing parts that a yielding and adjustment thereof to the resistance of the gavel may be secured. For this purpose the spring 43 is employed, which permits of a certain amount of elasticity in the connection between the compressor-arm shaft and the gearing which is connected with the binder and needle-shafts. This spring, however, is of such a tension or strength that it is not affected by the action of the packers in forming the gavel, but when the needle advances, thus compressing the gavel against the compressor-arm, this spring 43 permits a slight yielding to the compressor-arm. Evidently if this capacity of yielding continues throughout the binding of the gavel a slack binding thereof will result, and a further difficulty presents itself in that the cord which surrounds the gavel is being pulled away from or out of the knot-tying mechanism, thus making it difficult to properly tie the knot. I have provided means whereby this yielding of the compressor-arm is arrested at a certain point, namely, at the inception of the tying movement or thereabout, and also means whereby an additional positive compression is given to the gavel while the knot is being tied, thus securing a tighter-bound gavel and avoiding any undue strain or pull upon the cord while the knot is being tied. To this end I mount upon the skeleton frame 40 a sliding ratchet-plate 58, having inturned ends 59, through which the bolt 39 passes, this ratchet-plate being provided with ratchet-teeth 60.

The skeleton frame 41 has a locking-dog 61 pivoted thereon, said locking-dog having a leaf-spring 62 secured thereto and projecting upwardly and rearwardly therefrom. As the needle advances, carrying the free end of the cord over the gavel, the segmental cam has moved to a point where a raised portion thereof engages the antifriction-roller of the plate 47, and the cranked end of the needle-shaft impinges upon the spring 62, carried by the dog 61, throwing the latter into engagement with the ratchet-teeth 60, thus locking the ratchet-plate and thereby the traveling nut and the rod 39 against further yielding movement. The compressor-arm is by this means made rigid, and as the raised portion of the segmental cam passes over the antifriction-roller 55 the shaft carrying the compressor-arm is rocked back slightly toward its original position, thus advancing the com-

pressor-arm and effecting an increased positive pressure upon the gavel. During the period of increased pressure the tying of the knot is effected by means not necessary to be described.

To recapitulate: The action of the various parts in the tying of the gavel is as follows: The grain being cut and delivered onto the grain-deck is caught by the alternately-working packers and moved forwardly and packed tightly against the compressor-arm, which arm being carried by the rock-shaft, having as one of its parts the spring before described, may yield backward slightly. As the grain accumulates and the gavel attains a size sufficient by its pressure upon the compressor-arm to trip the latter the rock-shaft is turned, thus withdrawing the latching mechanism which sustains the pivoted dog out of contact with the ratchet-teeth on the large sprocket-gear of the needle-shaft. The dog falls into engagement and the needle-shaft is connected through the segmental cam and the pitman with the binder-shaft, and the forward movement of the needle begins. As this movement continues the crank-arm of the needle-shaft strikes the dog and forces it into engagement with the teeth of the ratchet-plate of the ratchet mechanism, thus rigidly connecting the several parts. As the movement continues the rock-shaft carrying the compressor-arm is moved forward and by the raised portion of the cam caused to give an additional pressure to the bundle. While this increased pressure is being given, the tying of the knot is effected, and the knotter-hook takes up the slack of the cord passing around the bundle, thus effecting the tying of the knot without any strain upon the cord and also securing a tightly-bound bundle.

I claim—

1. In a self-binding harvester having a yielding connection between its driving-shaft and its compressor-shaft, means for locking the yielding connection whereby to give an increased positive pressure to the bundle while being bound, substantially as described.

2. In a self-binding harvester having a yielding connection between the driving mechanism and the compressor, a locking mechanism for arresting the yielding movement, said locking mechanism comprising a ratchet affording a series of stops, and a pivoted dog adapted to engage with one of the series of stops depending upon the size of the bundle, and means for operating the dog, substantially as described.

3. In a self-binding harvester, the combination with a constantly-rotating driving-shaft, of a binder-shaft adapted to be intermittently driven therefrom, a segmental cam mounted upon the binder-shaft and having a raised portion, a needle-shaft having a crank end, a pitman connecting said crank to the segmental cam, a ratchet-and-pawl mechanism for connecting the binder-shaft and the segmental cam, a compressor-arm and a rock-shaft on which said compressor-arm is mounted, a crank upon said rock-shaft, a spring-sustained bolt connected with said crank and a skeleton frame in which said bolt slides, a pivoted plate to which said frame is connected, said plate having a roller to engage the segmental cam, a ratchet-plate adapted to slide upon said skeleton frame and a pivoted dog mounted on the frame and adapted to be engaged by the crank of the needle-shaft and forced into engagement with said ratchet-plate whereby to lock said parts against yielding during the tying of the knot simultaneous with the increased pressure effected by the raised portion of the cam passing the bearing on the pivoted plate connected with the bolt-frame, substantially as described.

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Witnesses:

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