No. 669,494. Patented Mar. 5, 1901.

J. N. WILSON.

BAND CUTTER AND FEEDER.

(Application filed Oct. 6, 1900.)

(No Model.) 6 Sheets—Sheet 1.

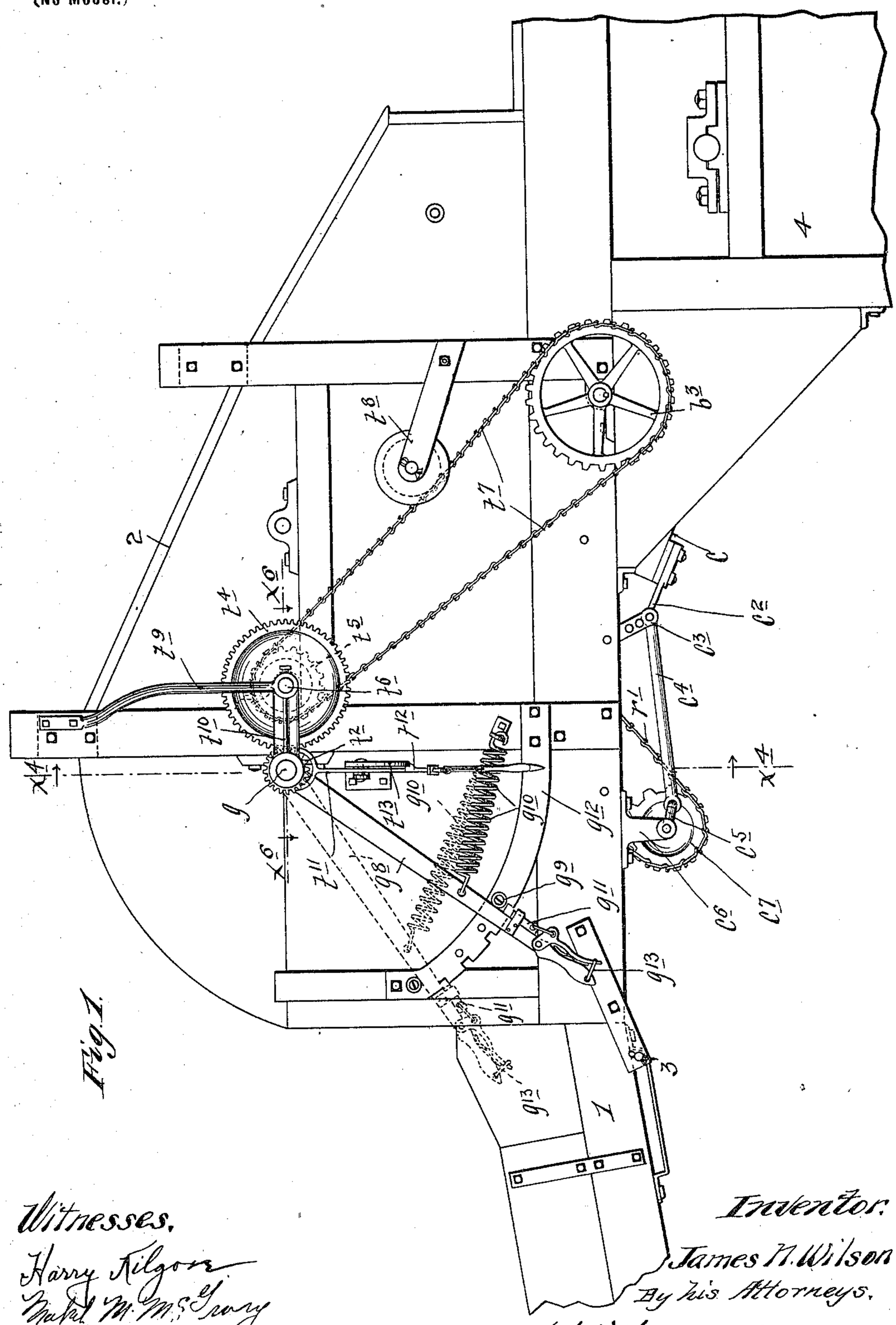

Fig. 1.

Witnesses.
Harry Kilgore
Mabel M. McGarry

Inventor.
James N. Wilson
By his Attorneys.
Williamson & Merchant

No. 669,494. Patented Mar. 5, 1901.

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(Application filed Oct. 6, 1900.)

(No Model.) 6 Sheets—Sheet 2.

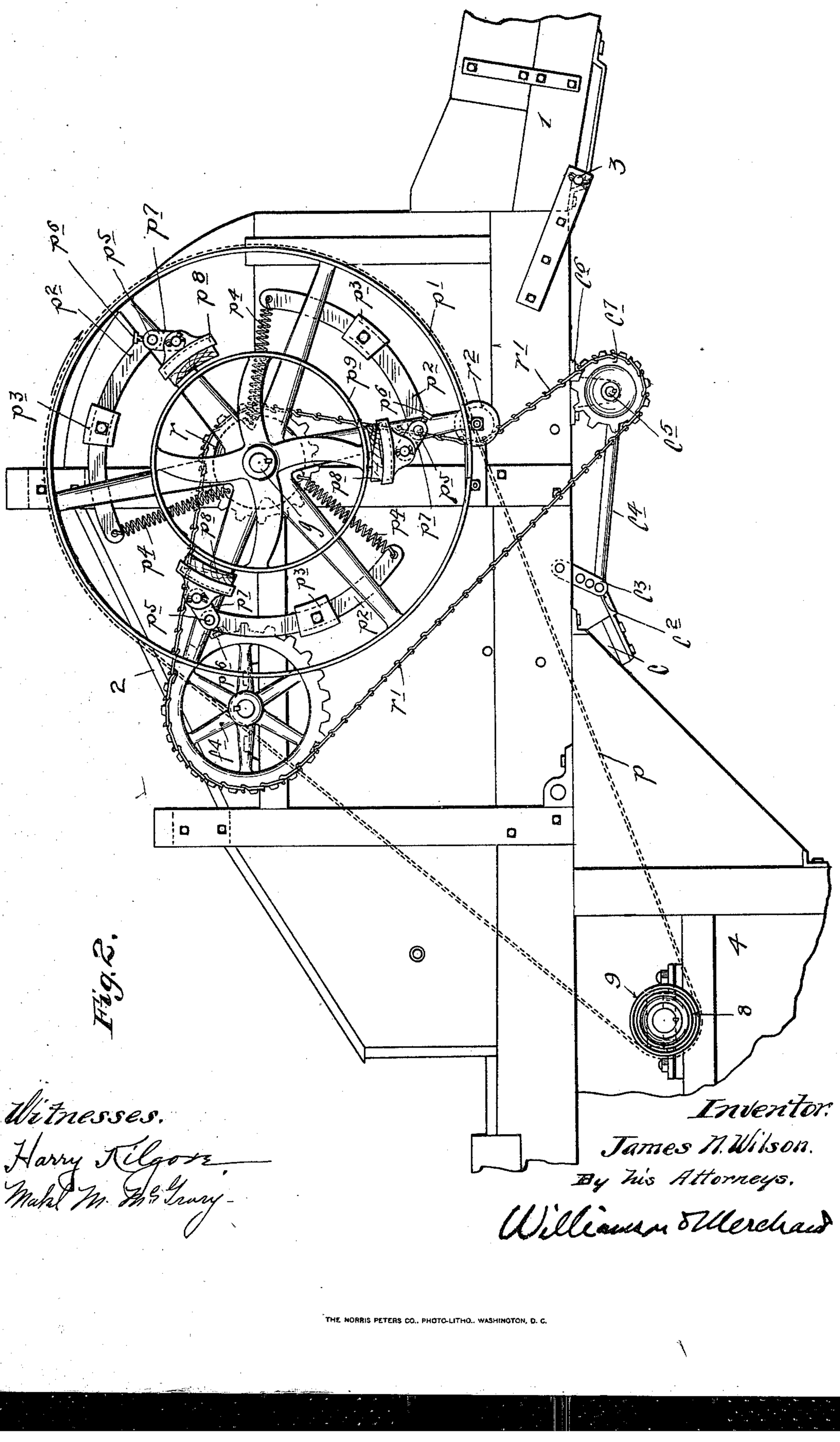

Fig. 2.

Witnesses.
Harry Kilgore.
Mabel M. McGary.

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6 Sheets—Sheet 3.

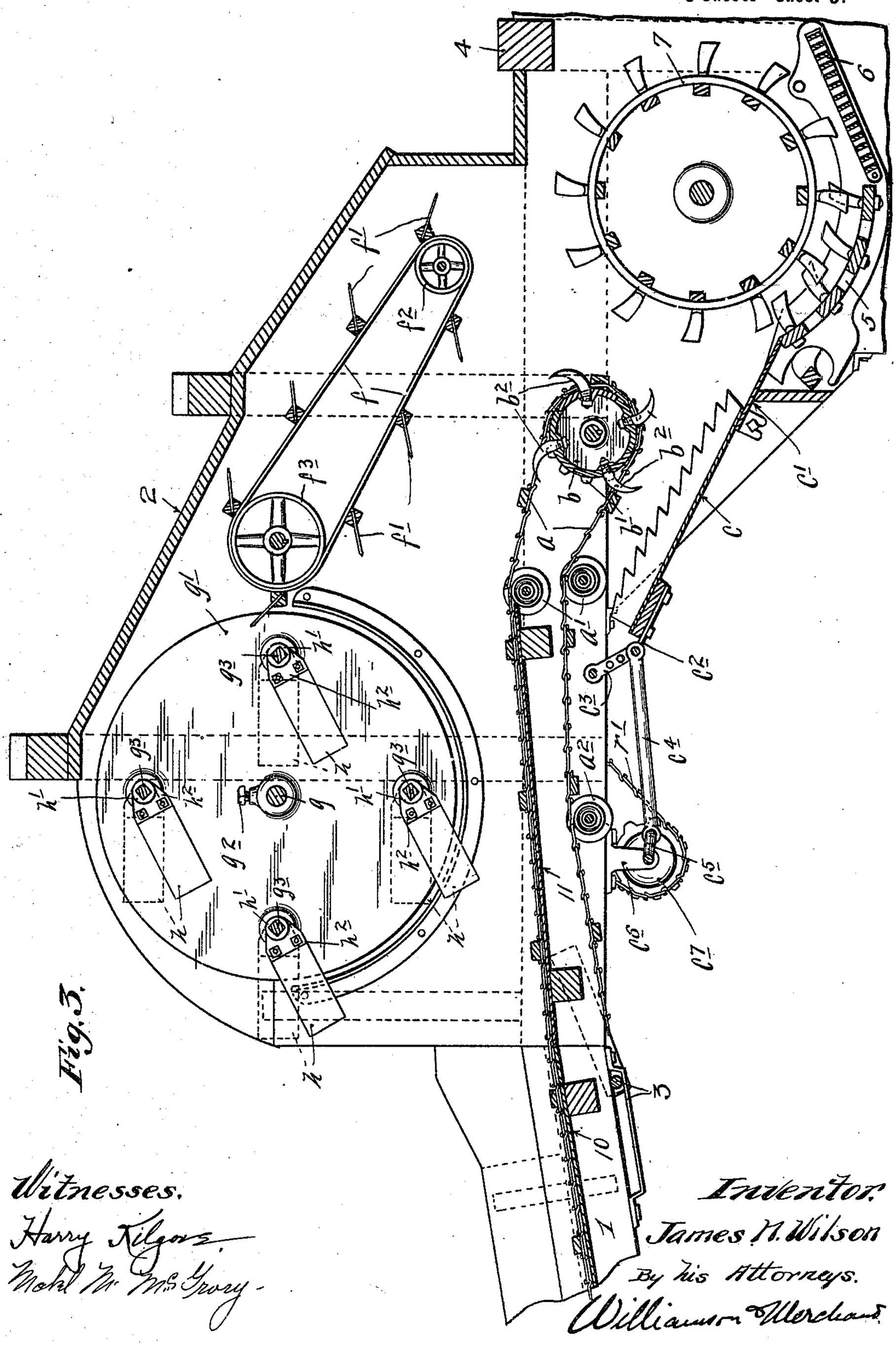

Fig. 3.

Witnesses.
Harry Kilgore.
Mohl W. McGrory.

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No. 669,494.

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J. N. WILSON.

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(Application filed Oct. 6, 1900.)

(No Model.)

6 Sheets—Sheet 4.

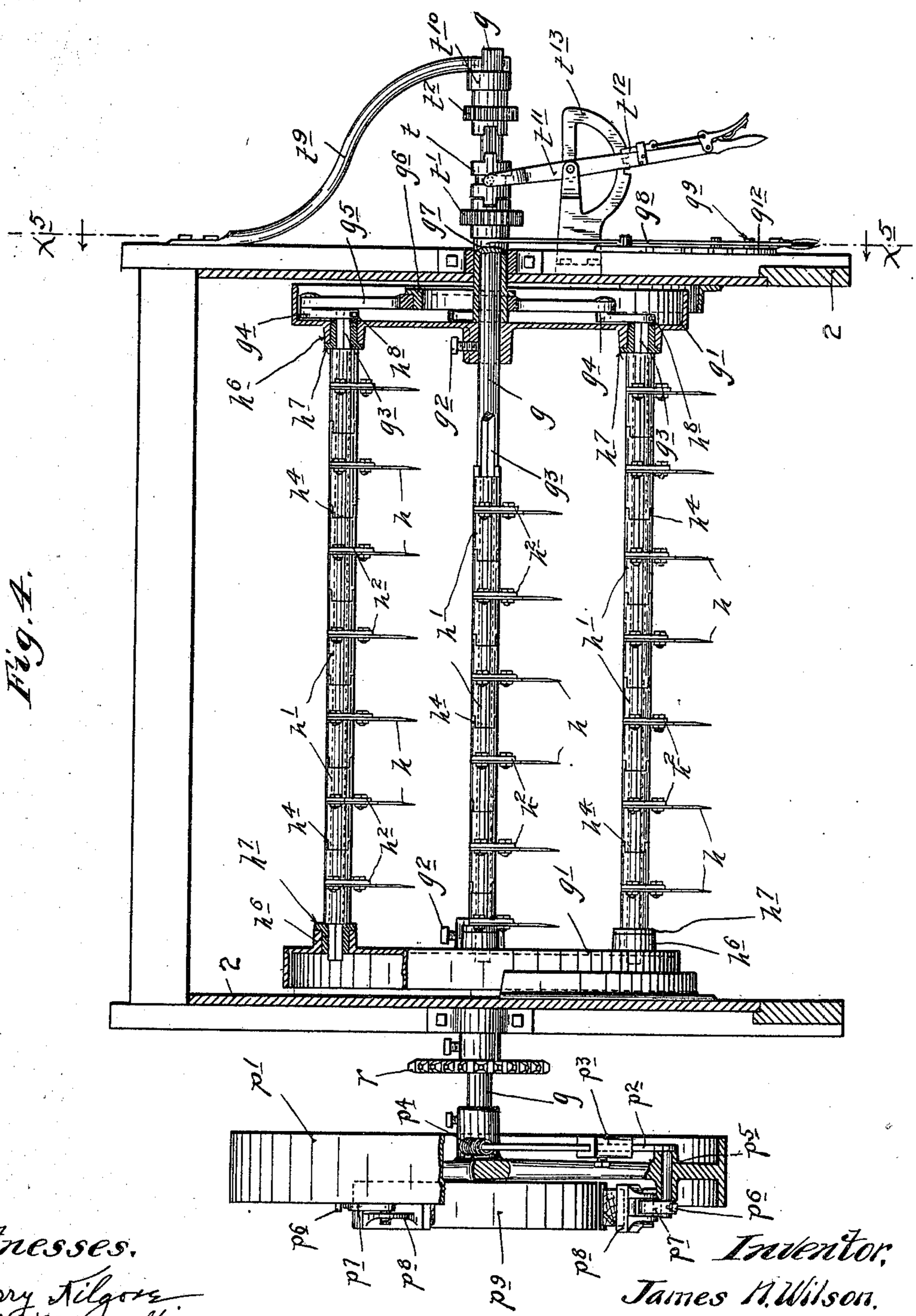

Fig. 4.

Witnesses.
Harry Kilgore
Mabel M. McGroy.

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James N. Wilson.
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J. N. WILSON.

BAND CUTTER AND FEEDER.

(Application filed Oct. 6, 1900.

(No Model.)

6 Sheets—Sheet 5.

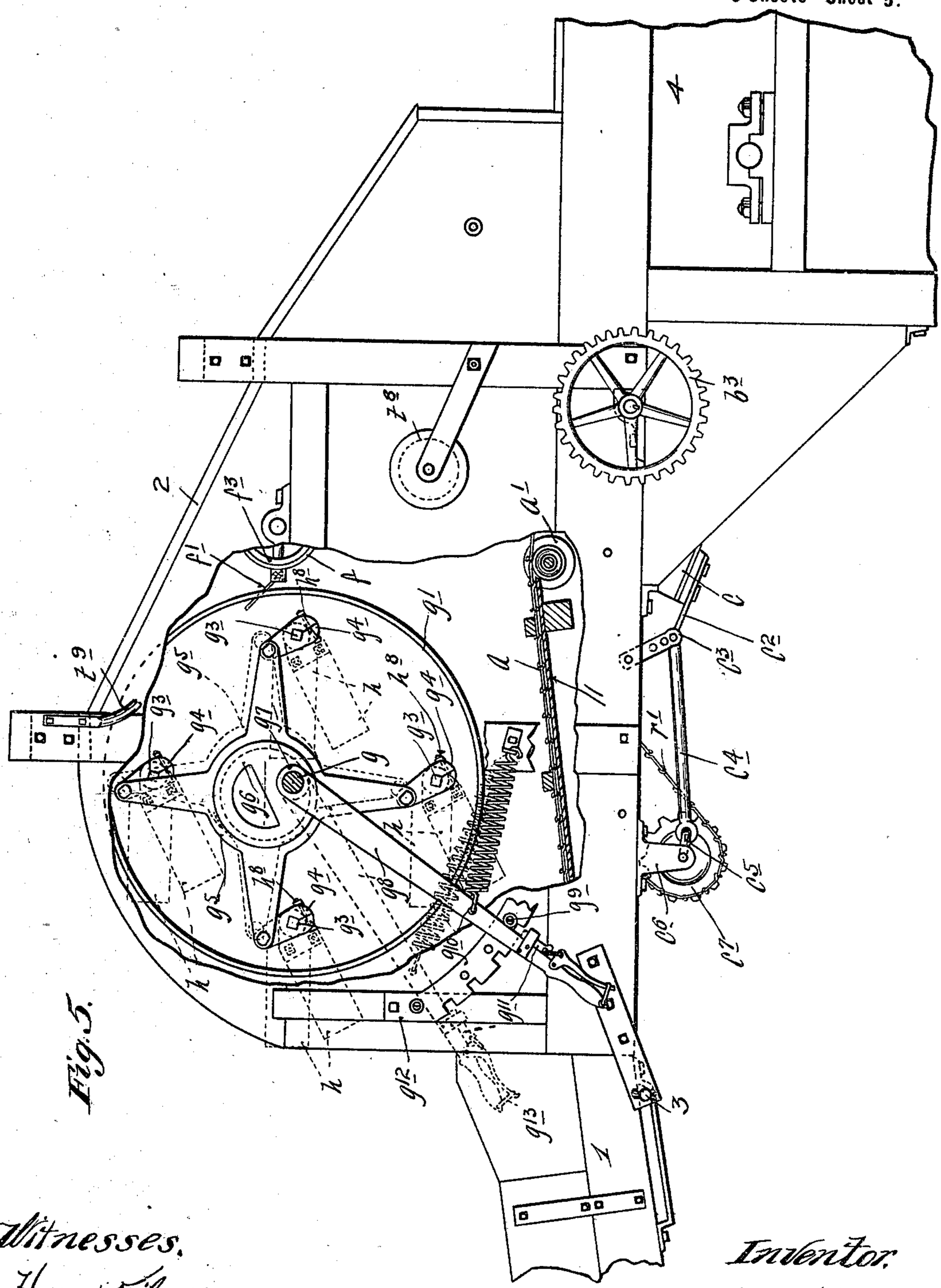

Fig. 5.

Witnesses.

Harry Tilgor

Nahl. M. McGeorge

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No. 669,494.

Patented Mar. 5, 1901.

J. N. WILSON.

BAND CUTTER AND FEEDER.

(Application filed Oct. 6, 1900.)

(No Model.)

6 Sheets—Sheet 6.

Fig. 6.

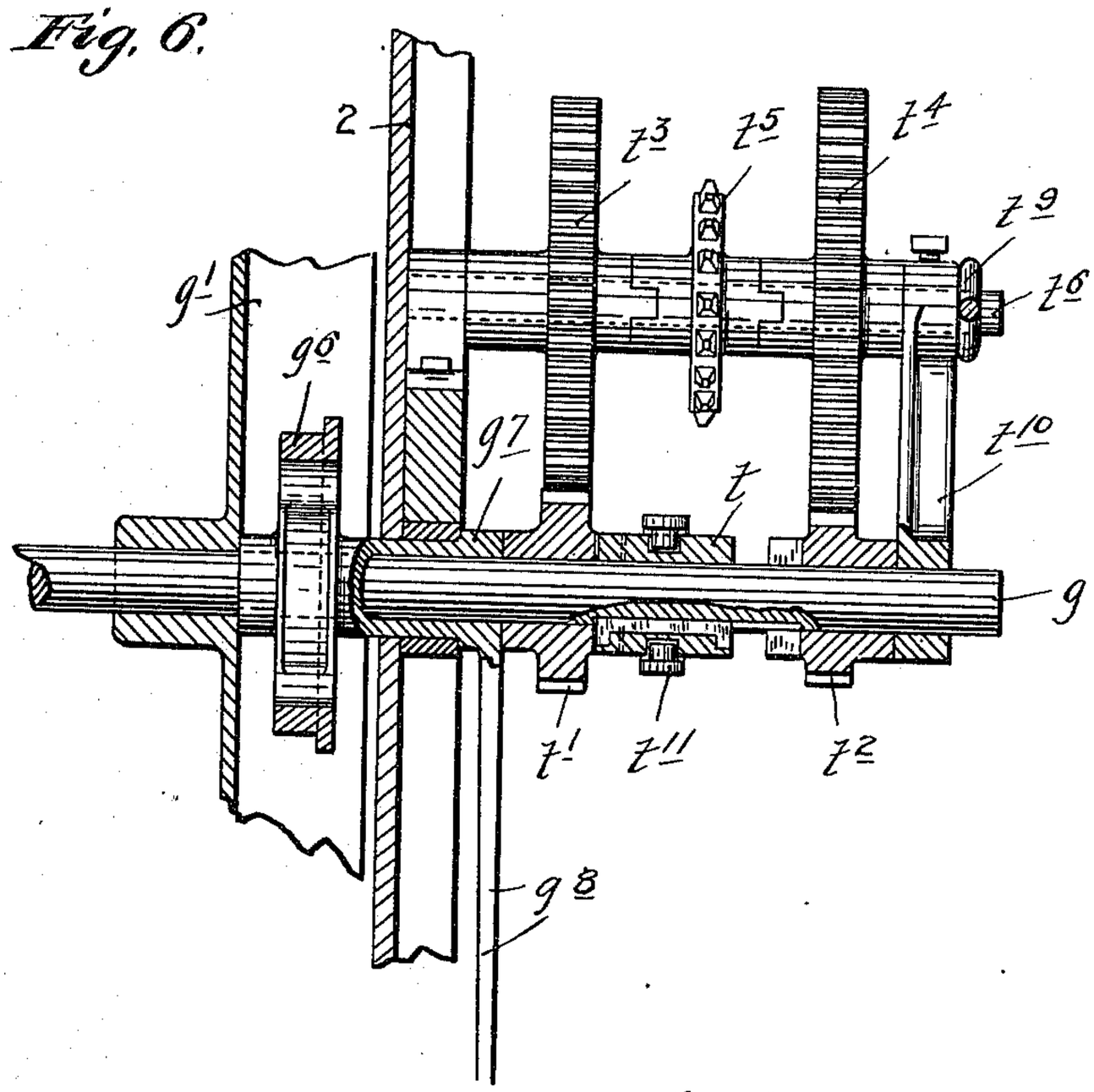


Fig. 7.

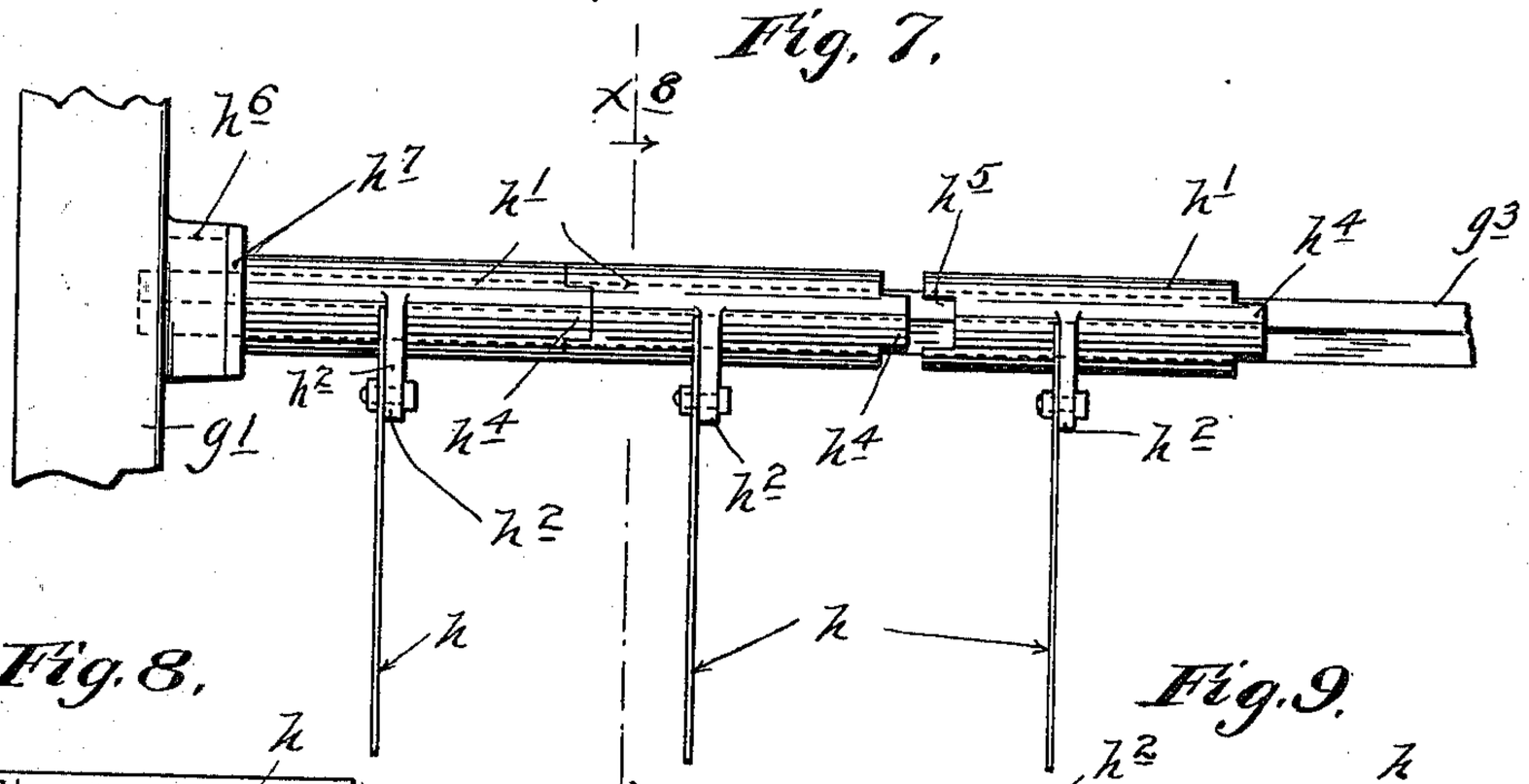


Fig. 8.

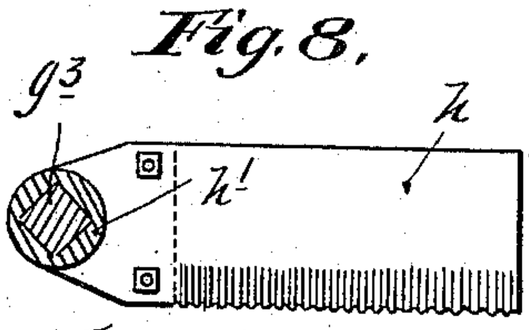
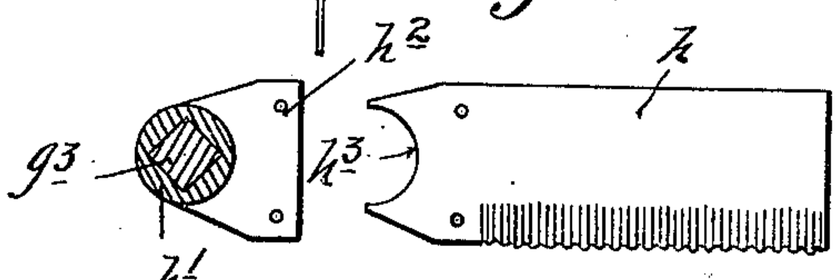


Fig. 9.



Witnesses,
Harry Kilgore,
Nahl. M. McGrory

Inventor,
James N. Wilson,
By his Attorneys,
Williamson & Merchant.

UNITED STATES PATENT OFFICE.

JAMES N. WILSON, OF CEDAR FALLS, IOWA.

BAND-CUTTER AND FEEDER.

SPECIFICATION forming part of Letters Patent No. 669,494, dated March 5, 1901.

Application filed October 6, 1900. Serial No. 32,277. (No model.)

To all whom it may concern:

Be it known that I, JAMES N. WILSON, a citizen of the United States, residing at Cedar Falls, in the county of Blackhawk and State of Iowa, have invented certain new and useful Improvements in Band-Cutters and Feeders; and I 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 appertains to make and use the same.

My invention has for its object to provide an improved automatic band-cutter and feeder.

To this end my invention consists of the novel devices and combinations of devices hereinafter described, and defined in the claims.

The invention is illustrated in the accompanying drawings, wherein like notations refer to like parts throughout the several views.

In said drawings, Figure 1 is a view in side elevation, showing my improved band-cutter and feeder as applied in working position to a threshing-machine, with some parts broken away and some parts removed. Fig. 2 is a similar view in left side elevation. Fig. 3 is a view in central vertical section lengthwise of the band-cutter and feeder and a part of the threshing-machine. Fig. 4 is a view in vertical cross-section on the line x^4 x^4 of Fig. 1 with some parts broken away and others shown in elevation. Fig. 5 is a view in vertical section on the line x^5 x^5 of Fig. 4 with some parts removed and a portion of the casing broken away. Fig. 6 is a view in horizontal section on the line x^6 x^6 of Fig. 1 with some parts broken away and others removed. Fig. 7 is a detail in plan with some parts broken away to illustrate the mounting of the knives on the feathering-shafts of the band-cutter. Fig. 8 is a detail in cross-section on the line x^8 x^8 of Fig. 7; and Fig. 9 is a detail showing the same parts as in Fig. 8, but with the knife pulled apart from its holder.

This invention and certain prior patents covering certain features disclosed in the machine herein illustrated are owned by the same parties, which patents are identified as follows, to wit: The Dorton patents, No. 482,677, of date September 13, 1892, and No. 506,422, of date October 10, 1893, and the Wilson patents, No. 507,771, of date October 31, 1893, and No. 649,120, of date May 8, 1900.

The general organization is similar to that disclosed in my prior patent, No. 649,120. I employ a rotary band-cutter and feeder with feathering-knives within the principle of the two Dorton patents, Nos. 482,677 and 506,422, above noted, but modify the construction in important respects with a view of securing certain improvements in the action, as will hereinafter appear. A portion of the feed mechanism—to wit, the bundle-conveyer, with the retarding-cylinder, herein disclosed—is identical with the corresponding features contained in my prior patent, No. 649,120; but I now combine therewith an overhanging rake in the form of an endless conveyer similar to that disclosed in my older patent, No. 507,771, above noted. As in the said prior patents to Dorton and my own prior patent, No. 649,120, I employ a friction-clutch governor for imparting motion to the band-cutter and feeder from the threshing-cylinder. In the present instance both the band-cutter and the feeding mechanism are driven by the friction-clutch governor. Hence the band-cutter and the feeding mechanism will stop whenever the threshing-cylinder loses proper working velocity and will again start automatically whenever the cylinder recovers its proper speed. The importance of this feature to the successful action of a band-cutter and feeder is well understood, being fully set forth in the said prior patents.

With the foregoing general statements in mind it will be easy to follow the detail description, which will now be given.

The bundle-table 1 is connected to the main casing 2 of the band-cutter and feeder by a sliding and pivotal joint, as shown at 3 in Figs. 1, 2, 3, and 5. This permits the table to fold under the main casing 2 when so desired. The main casing 2 is rigidly connected in any suitable way to the casing or framework 4 of the threshing-machine or separator.

The numerals 5, 6, and 7 represent, respectively, the concave, the grating, and the cylinder of the threshing-machine. The shaft of the cylinder 7 is provided with a pair of pulleys 8 and 9 on its left end, the former of

which receives motion from the engine, (not shown,) and the latter of which communicates motion to the band-cutter and feeder, as will herein more fully appear.

The bundle-table 1 is provided with a decking-section 10 for coöperation with the decking-section 11 in the main casing 2 to make up the complete deck for the bundle-conveyer *a*.

The bundle-conveyer *a* is of the chain-and-slat type and is mounted to run over a suitable adjustable roller (not shown) at its outer end, journaled in the table 1, and over the retarding-cylinder *b* at its inner end. The cylinder *b* is the driving member and has sprockets *b'* engaging with the chains of the bundle-conveyer. The deck-section 11 stops short of the retarding-cylinder *b*, and guide-rollers *a'* are applied to the conveyer in such position as to make the conveyer take an angular path within the casing 2, moving on an upward incline to a point inward beyond the band-cutter, and thence downward to the retarding-cylinder *b*, which is located near to the threshing-cylinder and concave. Other guide-rollers a^2 are also applied to the bundle-conveyer *a* for keeping the underrunning fold of the same from interfering with certain underlying mechanism. The retarding-cylinder *b* has four rows of teeth b^2, which are curved backward. The slats on the bundle-conveyer *a* and the rows of teeth b^2 on the retarding-cylinder *b* are so spaced in respect to each other that two rows of teeth will rise through the overrunning fold of the conveyer into the stock thereon, with one row directly behind a conveyer-slat, and hence the said roller-teeth will withdraw from the underrunning fold of the conveyer adjacent to the slat, thereby securing a stripping action in respect to the stock and preventing the wrapping of any stock about the retarding-cylinder. The retarding-cylinder *b* is provided on its left end with a sprocket b^3, which receives motion as will hereinafter appear.

A grain-pan *c*, with fish-back cleats of the ordinary construction, is mounted with its lower end movable over a detachable mouthboard *c'* near the concave and with its upper end connected by hinges c^2 to the cross-rod of a hanger c^3. The hanger c^3 is connected by pitman c^4 to a crank-shaft c^5, mounted in bearing-brackets c^6, depending from the main casing 2 and having at its left end a sprocket c^7, receiving motion as will later appear.

Above the delivery-section of the bundle-conveyer *a* and over the retarding-cylinder *b* I mount within the casing 2 an overhanging rake in the form of an endless conveyer *f* of the belt-and-slat type, the slats of which are provided with back-turned teeth *f'*. The conveyer *f* is mounted to run over suitable supporting-rollers f^2 f^3, journaled in the casing 2. Of said rollers the upper member f^3 is provided on its left end with a sprocket f^4, receiving motion as will later appear.

The band-cutter shaft *g* is suitably journaled in the casing 2 and has fixed thereto flanged heads *g'*, as best shown in Fig. 4. The said heads *g'* are shown as detachably secured to the shaft by set-screws g^2. The feathering-shafts g^3 (shown as four in number) extend outward through the heads *g'* and are provided with crank-arms g^4, rigidly secured thereto. The crank-arms g^4 of the feathering-shaft are pivotally connected to the outer ends of spider-arms projecting from an eccentric-strap or spider-hub g^5, which is loosely mounted on an eccentric g^6. The eccentric g^6 is normally subject to a suitable spring, tending to hold the same at one extreme of its possible angular adjustment. As shown, the said eccentric g^6 has an extended hub g^7, sleeved on the band-cutter shaft *g* and extending outward beyond the casing 2. At its outer end the eccentric-hub g^7 has rigidly secured thereto a lever g^8, which is normally held against a fixed stop g^9 by a suitable spring g^{10}, as best shown in Fig. 1. The lever g^8 is also shown as provided with an ordinary spring-pawl g^{11} for engagement with the notches of a lock-segment g^{12}. The spring-pawl, however, is normally held in its idle position by a keeper-link g^{13}. Normally, therefore, the eccentric g^6 will be held by the lever g^8 and the spring g^{10} at one extreme of its angular adjustment.

Inasmuch as the spider or eccentric-strap g^5 turns around on the eccentric g^6, it follows that under the rotation of the band-cutting cylinder the shafts g^3 will receive a feathering motion.

The band-cutting knives *h*, one of which is shown detached in Fig. 9, are detachably securable to suitable holders *h'*, sleeved to the feathering-shafts g^3. The shafts g^3 and the passage for the same in the holders *h'* are of angular form in cross-section, both being square or of rectangular form, as shown. The hubs of the holders *h'* have radially-projecting lugs h^2, to which the knives *h* are bolted, and the knives have their shanks recessed, as shown at h^3 in Fig. 9, to embrace the hubs of the holders, thereby interlocking with the said hubs when in working position, as shown in Fig. 8. These details rigidly connect the knives to the holders and relieve the bolts to a large extent from the shearing strains in virtue of the locking engagement with the hubs of the holders. The hubs of the holders *h'* are also of such construction that all the holders on a given feathering-shaft g^3 interlock with each other when the parts are in working position, as best shown in Figs. 4 and 7. As illustrated, the interlocking engagement is secured by forming each hub with a lug h^4 at one end and a corresponding notch h^5 at the other. Hence when the said holders are strung on the shaft g^3 the said lugs h^4 and said notches h^5 of adjacent holders will engage with each other, thereby locking together all of the holders. As the shaft g^3 and the passage for the same in the holders *h'* are

of angular form in cross-section, the holders are of course locked to the shaft against any rotary motion thereon. As all the holders on a given shaft are interlocked, the strain thrown on any given holder from the knife supported thereby in the working action of the machine will be distributed to all the holders, and thereby be divided up equally on the supporting-shaft g^3.

As a further detail for the mounting of the feathering-shaft g^3 the heads g' are provided with bearing-lugs h^6 for receiving a bushing h^7, through which the shaft passes outward, and which bushing is rounded on its exterior to serve as the journal for the feathering-shaft, as best shown in Fig. 4. The crank-arms g^4 are detachably secured to the feathering-shafts g^3 by set-screws h^8, as best shown in Fig. 4. In virtue of the details described for the mounting of the knives h and the feathering-shafts g^3 it is obvious that the parts of the band-cutting cylinder can be readily taken apart and put together.

Having regard now to the driving connections, the pulley 9 on the threshing-cylinder 7 is connected by belt p to the large or main wheel p' of the friction-clutch governor. This wheel p' is loosely mounted on the band-cutter shaft g, near the left end of the same outside the casing 2, as best shown in Figs. 2 and 4. To certain spokes of the wheel p' are pivoted segmental levers p^2, bearing adjustable weights p^3 and connected by springs p^4 with the hub of the wheel p'. The pivot-studs p^5 for the governor-levers p^3 extend through the spokes of the wheel p' and have secured thereto by set-screws p^6 short links or crank-arms p^7, which carry the friction-shoes p^8, pivoted thereto, as best shown in Fig. 2. The shoes p^8 are adapted to engage with the pulley p^9, which is made fast to the band-cutter shaft g. Hence the parts marked p' to p^9, inclusive, constitute a friction-clutch governor for communicating motion from the threshing-cylinder to the rotary band-cutter and the parts driven therefrom. The large pulley p' is of course kept in constant motion, and whenever the threshing-cylinder reaches proper velocity the shoes p^8 will engage with the pulley p^9, fixed to the band-cutter shaft, and turn the latter with the pulley p'. The band-cutter shaft g has attached to its left end portion, between the governor and the casing, a sprocket-wheel r, which is engaged by a chain r'. The chain r' also passes over the sprocket f^4 on the upper roller of the conveyer-rake f and over the sprocket c^7 on the crank-shaft c^5, imparting motion to the grain-pan c, as best shown in Figs. 2 and 3. The chain r' is also subject to a tightener r^2, as shown in Fig. 2. The right-hand end of the band-cutter shaft g is extended outward and has loosely mounted thereon a pair of pinions t' t^2, adapted to be engaged by a shifting-clutch t, splined to the shaft between the said pinions, as best shown in Figs. 4 and 6. The hubs of the pinions t' and t^2 are provided with clutch-faces for engagement with the clutch-teeth. The pinion t' engages a gear-wheel t^3, loosely mounted on a stud-shaft t^6, and the pinion t^2 engages a gear-wheel t^4, also loosely mounted on the shaft t^6. The said shaft t^6 also carries between the gear-wheels t^3 and t^4 a sprocket-wheel t^5, which is loose on the shaft, but is interlocked to both of said gear-wheels t^3 and t^4. As shown, the hubs of said wheels t^3, t^4, and t^5 are constructed to interlock with each other, as shown in Fig. 6. The sprocket t^5 is engaged by chain t^7, passing over the sprocket b^3 on the right end of the retarding-cylinder b, as shown in Fig. 1. The chain t^7 is subject to a belt-tightener t^8.

The stud-shaft t^6 has its inner end suitably seated in the casing 2, and its outer end is mounted in a curved bracket-iron or brace-rod t^9, fixed above to the framework of the casing 2. The stud-shaft t^6 is also connected by a rigid link t^{10} with the band-cutter shaft g. This link t^{10} ties the shafts g and t^6 together and properly spaces the same apart for the coöperation of the pinions t' and t^2 with the gear-wheels t^3 and t^4. The pinion t' has more teeth than the pinion t^2, and the gear-wheel t^3 has less teeth than the gear-wheel t^4. Hence the parts t to t^5, inclusive, constitute a differential gearing or positive variable-speed drive for communicating the motion from the band-cutting cylinder to the retarding-cylinder b and the bundle-conveyer a. The clutch t is subject to a shipper-lever t^{11}, having a spring-pawl t^{12}, engageable with the lock-segment t^{13}, as best shown in Fig. 4. By the shipper-lever t^{11} the clutch t may be held locked in engagement with either of the pinions t' or t^2, or it may be thrown into a central or idle position and there locked for throwing the retarding-cylinder b and the bundle-conveyer a out of gear in respect to the band-cutter.

As a detail relating to the governor it should be noted that by the set-screws p^6 the crank-arms p^7 may be angularly adjusted on the pintles p^5 of the governor-levers p^2, so as to set the friction-shoes p^8 nearer to or farther away from the small pulley p^9. Hence this detail affords a convenient means for adjusting the friction-shoes p^8 to compensate for the wear and tear on the faces of the shoes.

All the parts of the mechanism have now been specified.

The general action may be briefly summarized as follows: As the bundles are carried up by the conveyer a they become subject to the knives h of the rotary band-cutter working against the conveyer as a base of resistance. Under this action the bands are cut and the bundles are more or less opened up. The band-cutting cylinder runs at a relatively high rate of speed as compared with the bundle-conveyer a and the retarding-cylinder b. Hence under the action of the band-cutter and the bundle-conveyer the cut bundle is not only opened up, but a stripping action takes place, thereby producing

an endwise division of the stock at that point. The stock thus fed forward becomes subject to the overhanging rake *f* from above and the retarding-cylinder *b* from below. The rake *f* is speeded higher than the retarding-cylinder *b* and the bundle-conveyer *a*, and hence a further stripping action will take place on the stock under the coöperation of the retarding-cylinder *b* and the overhanging rake *f*. By these successive stripping actions or subdivisions in the body of stock the same will be delivered to the threshing-cylinder and concave in the form of a thin sheet or, in other words, under the most favorable conditions for the threshing action.

The pitch or angular relation of the feathering-shafts g^3 and the knives *h*, carried thereby, of course depends upon the angular adjustment of the eccentric g^6, which supports the spider-like eccentric-strap g^5. The spring g^{10}, applied to the lever-arm g^8, tends to hold the said lever and the eccentric g^6 at the lowermost limit of its angular adjustment, with the lever abutting against the fixed stop g^9; but if the condition of the stock should so require the said spring g^{10} would yield under the reaction from the knives *h*, thereby permitting the lever g^8 to turn outward and upward, thus rotating the eccentric g^6 and changing the pitch or angular relation of the feathering-shafts g^3 and the knives *h*, carried thereby, to the band-cutting cylinder. For example, if at the normal position of the eccentric g^6 as held by the spring g^{10} the pitch of the knives *h* should be assumed to be as shown in full lines in Figs. 3 and 5, then, under the yielding of the spring g^{10} and the adjustment of the eccentric g^6, the said feathering-shafts g^3 and the knives *h* might take the positions shown in dotted lines in said views. This provision for the automatic adjustment of the feathering mechanism to vary the pitch or angular set of the knives *h* as may be required, according to the character or condition of the stock, is a most important feature of improvement over the prior patents hereinbefore noted and the whole of the prior art, so far as known to me.

It is well known that the pitching of the bundles or other stock to the bundle-conveyer *a* is liable to be most irregular. Moreover, the bundles will come in all sorts of ways. They should come one after the other lengthwise on the bundle-conveyer; but instead of so doing they will come crosswise, piled on top of each other, matted together, and in all sorts of ways. Moreover, the stock may be wet or the bands be tough for other reasons, and all kinds of foreign materials may be wrapped up with the grain. The bundles will also differ greatly in size. Hence under the old plan if the feathering-shafts and knives were set at a pitch for normal conditions the abnormal conditions would not be met. If the knives were set sufficiently low for small bundles or a thin layer of stock, then the knives and all the mechanism for operating the same would be subjected to excessive strains when acting on large bundles, mixed-up piles of bundles, or tough stock. These excessive strains prove to be so great in practice that it was found difficult to hold the knives on their feathering-shafts when applied thereto in the old way and the teeth would be stripped from the gearing when applied for feathering purposes, as shown in the said prior patents. By the automatic adjustment of the feathering mechanism under the action of the knives themselves on the stock, as herein disclosed, all these difficulties are overcome, and, what is still more important, the feeding action is more efficient and the machine is given greater capacity for any given unit of time.

If the machine be working on stock where no automatic adjustment is needed, it is of course obvious that the lever g^8 may be locked to the notch-segment g^{12} in any desired position by the spring-pawl g^{11}.

It should be further noted in respect to the band-cutter that the knives *h* have no rearwardly-projecting teeth or heel-pieces and that the holders are round and free from set-screws or other projecting parts. Hence there is nothing to catch on the stock and wrapping is avoided. It should be further noted that the surface speed of the band-cutting cylinder and the speed of the conveyer-rake *f* are so related that one of the slats of the conveyer *f* will always come opposite to the feathering-shafts of the band-cutter, thereby bringing the teeth *f'* of the rake in position to pass downward close to the feathering-shaft and operate thereon with a stripping action, thereby avoiding any wrapping of the band-cutting cylinder. These features to avoid wrapping, as well as the corresponding feature in the relation of the retarding-cylinder *b* to the bundle-conveyer *a*, are of large importance when using the machine for threshing flax and some other kinds of stock.

The addition of the differential drive *t'* to t^5, inclusive, under the control of the clutch *t* for transmitting the motion from the band-cutter to the retarding-cylinder *b* and the bundle-conveyer *a* constitutes another important feature of improvement. To those familiar with fieldwork it is well known that it is desirable to have the bundle-conveyer *a* and the retarding-cylinder *b* or other feeding parts used for the same functions to run at different speeds for different kinds of stock. For example, when using the machine for threshing flax the said parts *a* and *b* should run at a lower speed than when using the machine to thresh dry grain. By the differential drives described two rates of speed are thus secured, thereby increasing the efficiency of the machine.

It will be understood that details of the mechanism shown might be changed and that some of the mechanism might take different forms without departing from the spirit of

my invention. By actual usage I have demonstrated the efficiency of the mechanisms herein disclosed for the purposes set forth.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In a band-cutter and feeder, the combination with a rotary cylinder having feathering-shafts and parts carried thereby which operate on the stock, of automatically-adjustable feathering mechanism for varying the pitch or angular set of said feathering parts, under the action of said feathering parts themselves on the stock, substantially as described.

2. In a band-cutter and feeder, the combination with a rotary cylinder having a series of crank-shafts journaled in its heads carrying parts for action on the stock, of an eccentric angularly adjustable on the cylinder-shaft and yieldingly held at one limit of its angular adjustment, and an eccentric-strap or spider-hub mounted on said eccentric and having radial arms pivoted to the cranks of said shaft, whereby the said shafts and the parts carried thereby receive a feathering motion, under the rotation of the shaft, and the pitch of the feathering parts will be automatically adjusted, according to the condition of the stock, substantially as described.

3. In a band-cutter and feeder, the band-cutting cylinder having feathering-shafts with knives rigidly secured thereto, the crank-arms rigidly secured to the ends of said shafts, the eccentric angularly adjustable on the cylinder-shaft and provided with the extended hub, the eccentric strap or spider on said eccentric having its radial arms connected to the cranks of said shaft, the lever rigidly secured to said eccentric-hub, and the spring applied to said lever and tending to hold the said eccentric at the lowermost limit of its angular adjustment, all substantially as and for the purposes set forth.

4. In a band-cutter and feeder, the combination with the threshing-cylinder and the band-cutting cylinder receiving motion therefrom, of the underlying bundle-conveyer, the toothed retarding-cylinder embraced by the delivery end of said conveyer, and the clutch-controlled differential gearing made up of the parts t to t^5, inclusive, forming a part of the drive for imparting motion to said bundle-conveyer and said retarding-cylinder from said band-cutting cylinder, substantially as described.

5. The combination with a rotary band-cutting cylinder having feathering-knives, of an overhanging feed-rake in the form of a toothed endless conveyer for action on the stock between the band-cutter and the threshing-cylinder, with said parts so spaced and timed, relative to each other, that the teeth of the rake will have a stripping action on the knives of the cutter, substantially as described.

6. The combination with the rotary band-cutter having the feathering-knives, of the underlying bundle-conveyer extending inward beyond said band-cutter, the toothed rotary retarder embraced by the delivery end of said bundle-conveyer, with the slats of the conveyer and the teeth of the retarder spaced and related, for the retarding and clearing actions as described, and the overhanging rake f, f' between the band-cutter and the threshing-cylinder, with the band-cutter and the rake so spaced and timed, relative to each other, that the teeth of the rake will have a stripping action on the knives of the cutter, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES N. WILSON.

Witnesses:
MABEL M. MCGRARY,
JAS. F. WILLIAMSON.