(No Model.)

2 Sheets—Sheet 1.

M. KANE.

GRAIN BINDER.

No. 547,079. Patented Oct. 1, 1895.

Fig. 1.

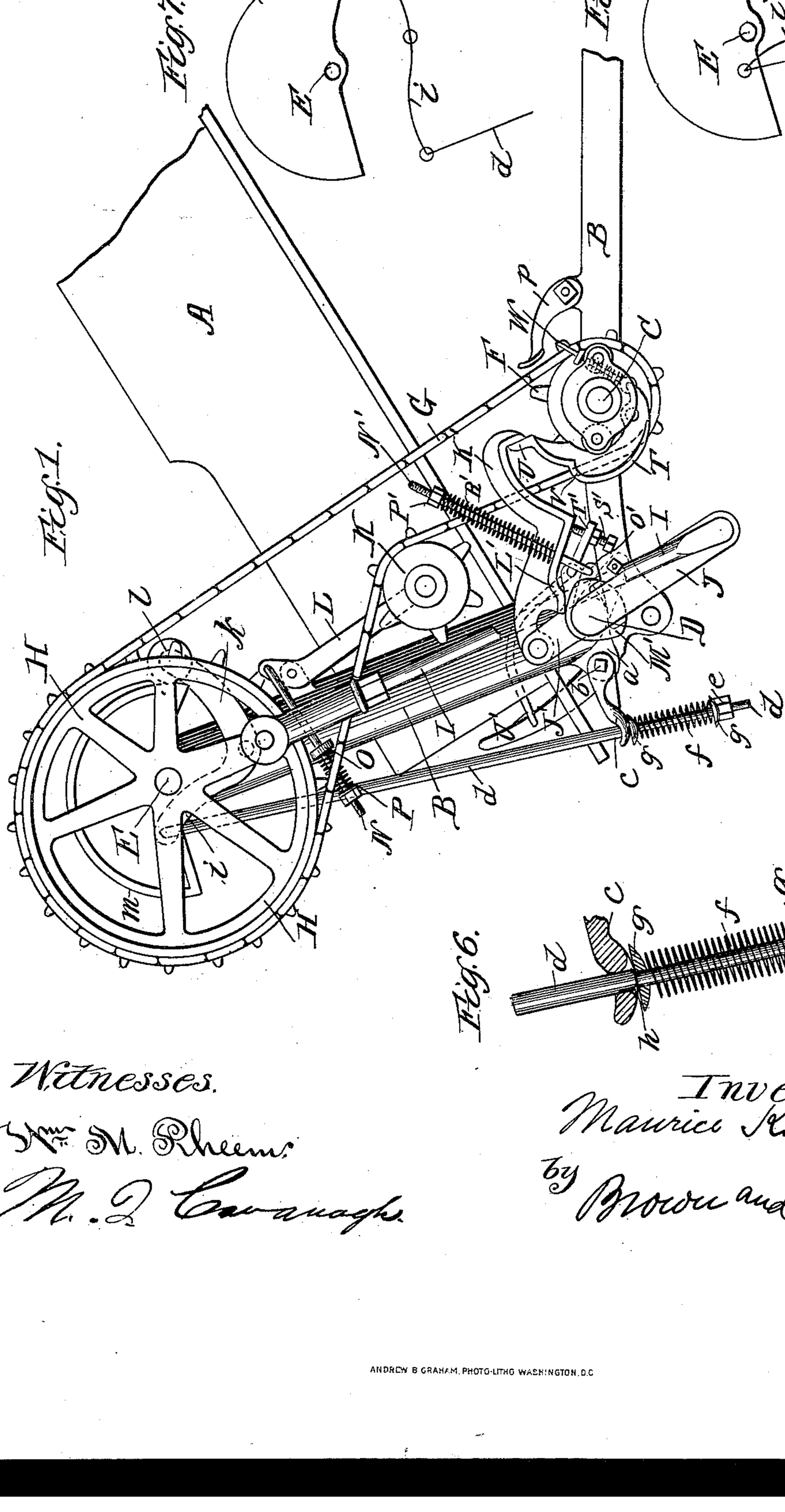


Fig. 8.

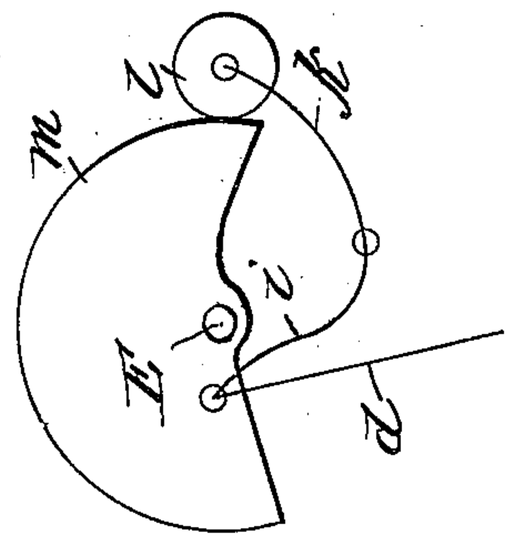


Fig. 6.

Witnesses.

Wm. M. Rheem.

M. J. Carnaghi.

Inventor

Maurice Kane

by Brown and Darby

Attys

(No Model.) 2 Sheets—Sheet 2.

M. KANE.

GRAIN BINDER.

No. 547,079. Patented Oct. 1, 1895.

Fig. 2.

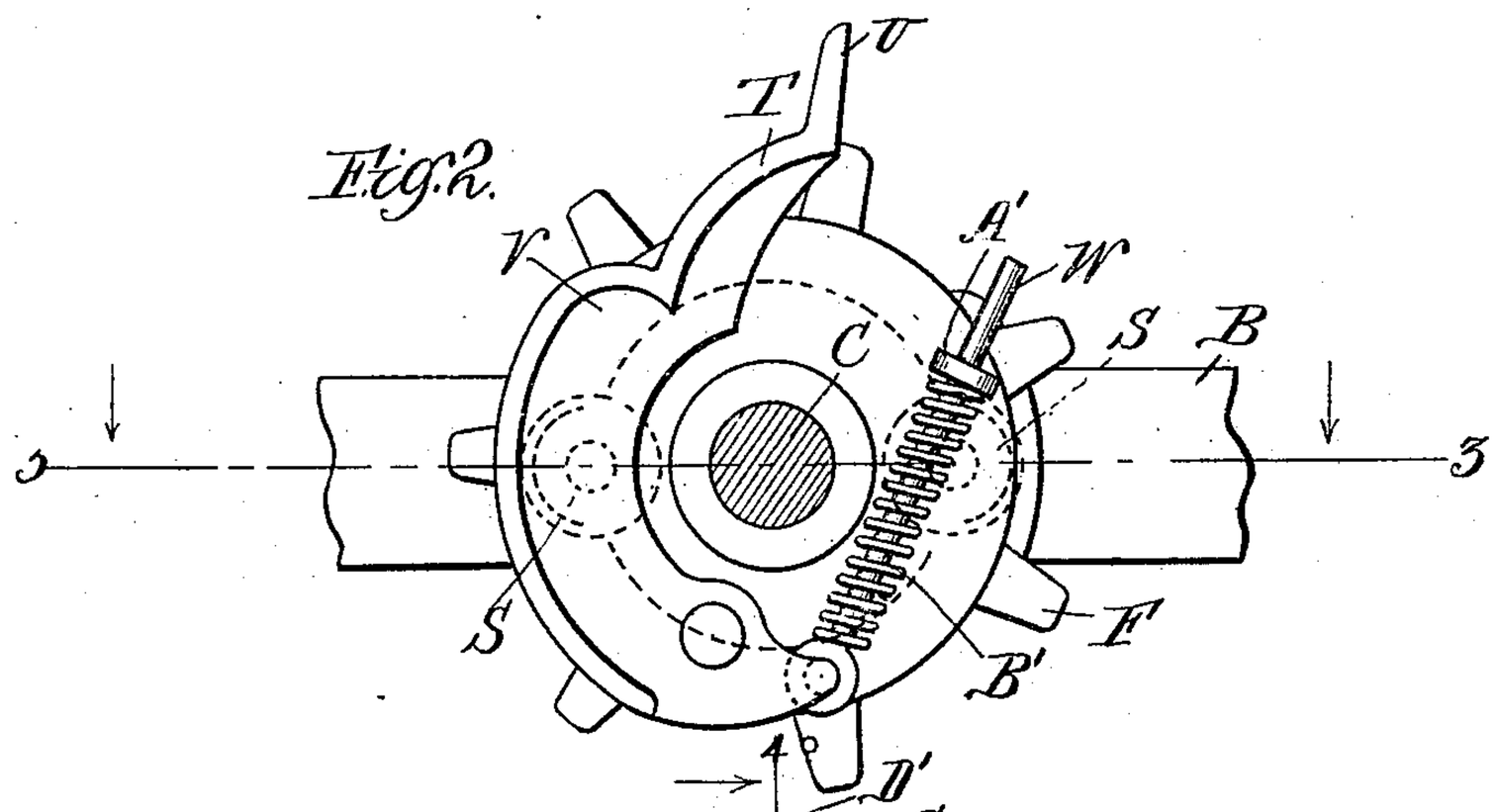


Fig. 3.

Fig. 5.

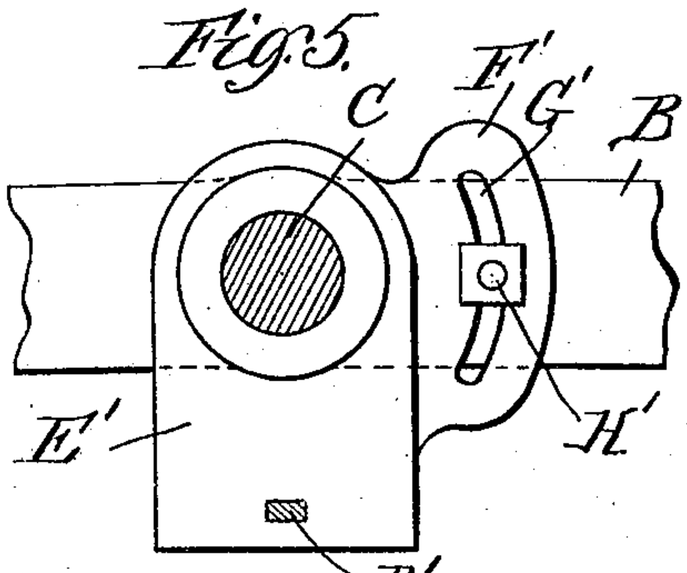
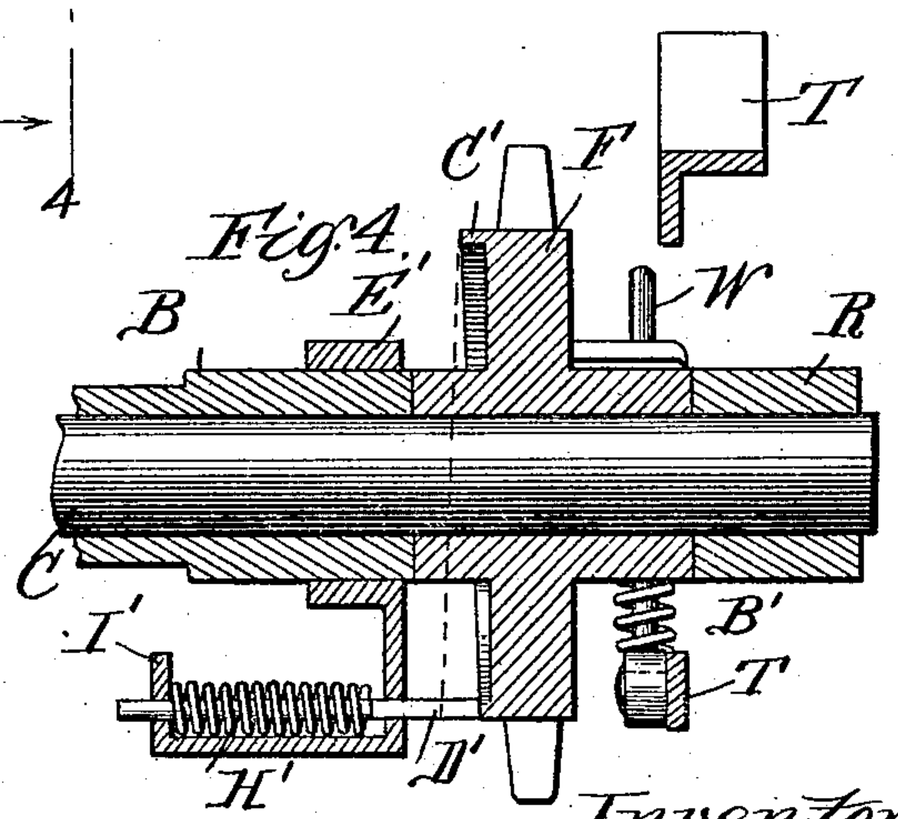


Fig. 4.



Witnesses.

Wm. M. Rheem.

M. L. Cavanaugh.

Inventor.

Maurice Kane

by Brown and Darby

Attys.

UNITED STATES PATENT OFFICE.

MAURICE KANE, OF AUSTIN, ILLINOIS.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 547,079, dated October 1, 1895.

Application filed April 4, 1894. Serial No. 506,243. (No model.)

To all whom it may concern:

Be it known that I, MAURICE KANE, a citizen of the United States, residing at Austin, in the county of Cook and State of Illinois, have invented new and useful Improvements in Grain-Binders, of which the following is a specification.

This invention relates to improvements in grain-binders, and its object is to correct and avoid certain defects found to exist in the construction, location, and arrangement in the old form of grain-binders—such, for instance, as is shown in my prior patent, No. 499,838, granted to me June 20, 1893—and to simplify the construction of the same and to render it more efficient.

With these objects in view the invention consists in the novel details of construction and arrangement more particularly hereinafter referred to, shown in the accompanying drawings, forming a part of the specification, and finally pointed out in the appended claims.

Reference is now had to the accompanying drawings, wherein similar reference-signs are employed throughout the several views to indicate similar parts, and wherein—

Figure 1 is a view in side elevation of the rear end of the upper platform or binder-deck of a grain-binder machine with my invention applied thereto. Fig. 2 is a view in side elevation of the clutch mechanism on the packer-shaft for throwing into and out of gear the mechanism for transmitting motion to the knotter-shaft. Fig. 3 is a horizontal sectional view taken on the line 3 3, Fig. 2, looking in the direction of the arrows. Fig. 4 is a vertical sectional view taken on the line 4 4, Fig. 3, looking in the direction of the arrows. Fig. 5 is a detail view of the adjustable locking-bolt plate. Fig. 6 is a detail of the lower end of the presser-finger operating-rod. Figs. 7 and 8 are diagrams showing the operation of the curved or bent crank-arm with reference to the cam on the knotter-shaft.

A designates a portion of the binder-deck or upper platform of a grain-binding machine.

B designates the framework or castings, in which are mounted in suitable bearings the packer-shaft C, the needle-shaft D, and the knotter-shaft E.

F is a gear-wheel mounted upon the packer-shaft and adapted, through a sprocket-chain G, to transmit rotary motion to the knotter-shaft.

H is a gear-wheel mounted eccentrically upon the knotter-shaft E and adapted to receive motion from the packer-shaft through gear-wheel F and sprocket-chain G. The needle-shaft D receives a variable rocking motion from the eccentric gear H, through a pitman-rod I, attached to a crank-pin on the eccentric gear, and pivoted at its opposite end to a crank-arm J on the needle-shaft.

In order to keep the sprocket-chain taut, notwithstanding the eccentricity of gear H, I provide an idler K, which is mounted on the end of a swinging arm L, pivoted on a lug projecting from a convenient point on the framework or casting B. A pin or rod N is loosely attached to a projecting end of arm L and slides through a perforated lug O, cast on the frame or casting B. A coiled spring P is mounted on said pin or rod N and bears at one end against said lug O and at the other against a nut screwed on the end of the rod or pin. By turning said nut the tension of the spring can be easily and readily regulated. The action of the spring P is to keep idler K pressed against the sprocket-chain and at the same time permit a yielding movement to accommodate the varying tension on said chain by reason of the eccentricity of gear H.

I will now describe a convenient form of clutch mechanism for throwing into and out of operation the mechanism for driving the knotter-shaft. The gear F is loosely sleeved on shaft C. Adjacent to gear F is a flanged collar R, carrying one or more friction-rollers S. This collar is adapted to be secured to shaft C to rotate therewith. Pivoted intermediate its ends and on the face of gear F is a shouldered arm T, having an upturned or projecting lip U, and shouldered, as at V. To the end of this arm, on the opposite side of the pivot from the lip or end U, is loosely attached a bolt or rod W, adapted to slide loosely through a perforated lug A′ cast on the face of gear F. A spiral spring B′ is coiled around this rod and has one end bearing against lug A′ and the other against the head of said rod. The shoulder V is adapted and intended to be engaged by one or the other of the friction-rollers S carried by flanged collar R.

The tendency of spring B′ is to throw shoulder V of arm T into the path of the rollers carried by the constantly-revolving flanged collar R, and at the same time permit said arm T to be swung or rocked upon its pivot so as to move shoulder V out of the path of travel of the friction-rollers S, thus constituting a clutch mechanism adapted to throw into and out of rotation the gear F, and consequently the knotter and needle shafts. Upon the face of gear F is cast a cam-flange C′, having a shoulder adapted to be engaged by a shouldered bolt D′, sliding in suitable perforations in a flanged collar E′, mounted on the frame B. Flanged collar E′ is provided with or has cast thereon a projecting ear or flange F′, slotted, as at G′, said slot being curved concentric with the axis of the shaft C. A headed bolt H′, passing through a part of the framework B, works in said slot and is adapted to hold flanged collar E′ in any position of angular adjustment relative to its supporting-shaft C. Shouldered bolt D′ has coiled thereupon a spiral spring H′, which bears at one end against an upturned flange I′ of flanged collar E′ and at its opposite end against the shoulder upon said bolt D′. The tendency of this spring is to constantly press said bolt into engagement with the shouldered cam on the face of gear F, and thus at the proper time in its rotation to lock said wheel against backward rotation. The ear projection F′, with its circular slot G′ and the bolt H′, permits of an angular adjustment of said collar E′ with its depending flange, in order to compensate for wear or to adjust the point at which the backward rotation of wheel F′ should cease, and this constitutes an important feature of my invention.

The shouldered arm T is automatically swung or rocked upon its pivot in order to unclutch the clutching mechanism by the mechanism now to be described.

To a lug J′ cast on the framework, or to the housing of the needle-shaft, is pivoted a trip-latch K′, having a hook at its outer or free end adapted to be projected into the path of rotation of lip U on arm T. Trip-latch K′ is provided with a flange or shoe L′, which bears upon a cam M′, mounted upon and rotating with needle-shaft D. The operation of this cam is to periodically elevate trip-latch K′, so as to carry the hook on the free end thereof out of the path of rotation of lip U on the clutch jaw or arm T. In order to provide a yielding resistance to the action of cam M′, and to assist gravity in keeping trip-latch K′ pressed against cam M′, I provide a rod N′ and attach the same loosely to a lug O′, cast with or formed on the housing for shaft D or a convenient part of the framework. This rod passes through a perforation in flange L′ or trip-latch K′, and is screw-threaded at its outer end to receive a nut P′. Interposed between this nut and flange L′ is a spiral spring R′, coiled around the rod, the tension of which can be readily adjusted by the nut P′. Heretofore trip-latch K′ has been journaled on the needle-shaft, and the rod around which spring R′ was coiled was secured to the needle-crank arm J. Trip-latch K′ was supported in its normal position of rest upon a lug on the framework. This position of rest was reached before the needle-crank reached its normal position of rest, and hence, through rod N′, which was secured to crank-arm J, spring R′ was compressed and the movement of the crank-arm was unduly retarded before its position of rest was reached, and therefore tending to retard driving-wheel H, and consequently the knotter-driving and packer-shafts, before reaching their normal or locking position. This is due to the fact that trip-latch K′ must be tripped before a complete revolution of drive-wheel H is effected, thus making the completion of the revolution thereof dependent upon its momentum, and any tendency to retard that momentum is detrimental to the effective operation of the machine. This defect I entirely avoid in my construction, as above described, and instead of retarding the movement of the parts the tendency in my construction is to assist the needle-crank in coming to its normal position of rest. A suitable set-screw S′ in the cranked end of the trip-shaft bears against the under side of trip-latch K′ and thus serves to regulate and adjust the position of trip-flap U′, which projects up into the path of travel of the grain.

The operation of this part of my invention is as follows: In the position shown in Fig. 1 the pitman I is on its dead-center, the clutch-jaw T is open, and the knotter and needle shafts are at rest, while a continuous rotation is being imparted to the packer-shaft C. Crank arm or rod U′ is depressed. This raises crank T′ and with it set-screw S′, which in turn raises trip-latch K′ against the action of the spring R′ until the hook on the outer free end of said trip-latch becomes disengaged from lip U′ of the clutch-jaw T. Spring B′ of the clutch thereupon rocks said clutch-jaw upon its pivot, so as to bring shoulder V into the path of travel of rollers S. Gear F is thus rotated and through sprocket-chain G imparts a rotary motion to eccentric-gear H and to the knotter-shaft, and also through pitman I and crank-arm J a rocking motion to the needle-shaft. During the rotation of the knotter-shaft E and rocking of needle-shaft D, and consequently during the bundling, compressing, and tying operations, trip-latch K′ is kept elevated out of the path of lip U′ by means of cam M′ bearing against shoe L′. After one complete oscillation of shafts D and E shoe L′ is brought into contact with that portion of cam-surface M′ that permits trip-latch K′ to descend until the hook at the free end thereof engages lip U on the clutch-jaw T and effects an unclutching of gear F from shaft C. Bolt D′ shoots into po-

sition behind the shoulder of the cam-flange on the face of said gear and locks the same in position against rearward rotation.

As shown in the patent heretofore granted me and referred to hereinbefore, a compressor-finger against which the grain is fed when it is delivered upon the binder-deck or upper platform of the machine projects through a slot in the stubble-side portion of said deck or frame. It is desirable to provide this finger with a yielding support.

I will now describe the mechanism for securing this result. Rock-shaft *b*, carrying this finger, is journaled in a lug or projection *a* of the framework or housing B, and attached thereto is a crank-arm *c*. Passing through a perforation in the end of this crank-arm is a rod *d*, screw-threaded at one end and pivotally attached at its other end to the bent-up or curved arm *i* of a crank-lever pivoted intermediate of its ends upon a part of the housing B, adjacent to the knotter-shaft E. Rod *d* is shouldered at *h* at a point adjacent to the perforated crank-arm *c*. Bearing against this shoulder is a washer *g*. A similar washer is supported by a nut *e* on the threaded end of rod *d*. Interposed between the washers *g* and coiled about rod *d* is a spiral spring *f*. The curved or bent-up bell-crank lever to which the other end of rod *d* is attached is of peculiar construction, which peculiarity forms an important part of my invention. This lever has two arms *i* and *k*. Arm *k* carries a friction-roller *l*, adapted to be engaged by a mutilated or broken-away flange *m*, carried by knotter-shaft E. These two arms *k* and *i* are bent into nearly a U shape. The flange *m* is adapted to engage friction-roller *l* just as shaft E begins its periodic rotation, and continues in engagement therewith during about half its rotation, when the friction-roller is allowed to fall into the mutilation or broken-away part of said flange. So long as roller *l* is engaged by flange *m*, the end *i* and consequently the rod *d* are kept elevated, the spring *f* compressed between the washer *g*, one of said washers being forced away from its seat against shoulder *h* by crank-arm *c*, and consequently the presser-finger, before referred to, is kept strongly pressed upward. When however, said roller *l* reaches the end of the flange, it is permitted to fall down in the cut-away portion thereof, and the end *i*, and consequently rod *d*, are permitted to descend, thus relieving the tension of the spring *f* and permitting the presser-finger to be rocked. This point in the operation is reached just as the bundle-ejecting mechanism is brought into operation, and consequently just as the greatest strain is brought to bear on the presser-finger. In my prior constructions the pivoted lever, in which one end of rod *d* was attached, was practically in a straight line. The pressure exerted by the bundle of grain upon the presser-finger was transmitted through its shaft *b*, crank-arm *c*, and spring *f* to rod *d*. This rod in turn exerted a pull on the end of arm *i* of the pivoted lever (see diagram Fig. 7) when said arm was nearly horizontal or on a line with the pivot and roller carried by the opposite end, and consequently in a position where the pull exerted by rod *d* on said arm would be at its maximum by reason of the longer leverage possessed by the said arm. This, too, was just at the point where flange *m* was beginning to engage roller *l*, and consequently throughout the period of engagement between said flange and roller the maximum pressure was being exerted thereon. This resulted in wearing away either the friction-roller *l* or the surface of flange *m*, or else flattening the surface of the roller, as frequently in operation the enormous pressure at the point of contact *w* between said roller and flange was sufficient to stop the rotation of the friction-roller. This was extremely objectionable, not only on account of the rapid wear, but also on account of the consumption of power due to the unnecessary friction, which in machines of this character is an important consideration. To avoid this serious objection I have so constructed the pivoted lever-carrying roller *l* that the arms *i* and *k* thereof are bent up into a U shape, thus shortening the leverage due to the pull on arm *i* through rod *d* and reducing the strain on roller *l* and the friction between said roller and the surface of circular flange *m* to a minimum.

I have found in actual practice that, notwithstanding the spring-actuated idler K, the sprocket-chain G frequently jumps out of gear with gear-wheel F on account of the rapid changes in its tension due to the eccentricity of gear H, thus causing annoying delays and endangering the life of the chain itself, as well as the gear-wheels. In order to correct this defect and to maintain the chain in engagement with gear F, notwithstanding the sudden variations in its tension, I provide a chain guide or guard *p*, which is bolted to a fixed part of the framework and projects out over the chain in proximity to the gear F and serves to keep said chain constantly in mesh with said gear and prevents it from becoming disengaged therefrom.

While I have described in detail the specific construction, arrangement, and relative location of the several parts of my improvement in their preferred form, I do not desire to be limited thereto, for many changes may be made without departing from the spirit or scope of my invention.

What I desire to claim as my own invention and to secure by Letters Patent of the United States is—

1. In a grain binder a rotating shaft carrying a mutilated circular flange, a bell crank lever pivoted intermediate its ends adjacent thereto thereby forming two arms and having one of the arms thereof arranged to be engaged by said flange, the other arm of said lever bent up acutely with reference to said first mentioned arm, a presser finger supporting shaft, a perforated crank arm carried

thereby, a rod arranged to pass through said perforation and attached to said acutely bent up arm of said bell crank lever, and a spring arranged to bear at one end against said crank arm and at the other against said rod; combined and arranged as and for the purpose set forth.

2. In a grain binder, a housing, a shaft journaled to rotate therein, a mutilated circular flange carried by said shaft, a bell crank lever pivoted intermediate its ends upon said housing and having one of the arms thereof arranged to be engaged by said circular flange, the other arm thereof bent up acutely with reference to said first mentioned arm, a presser finger supporting shaft, a crank arm carried thereby provided with a perforation at the outer end thereof, a rod pivotally attached at one end to the acutely bent-up arm of said bell crank lever, and provided with a reduced portion at the other end thereof, said reduced portion terminating with a shoulder, said rod arranged to pass through the perforation in said crank arm, and provided with an adjustable nut at the end thereof, a spring mounted upon the reduced portion of said rod and interposed between said shoulder and nut, and said crank arm adapted, when its supporting shaft is rocked, to engage and compress said spring; as and for the purpose set forth.

3. In a grain binder the combination with a shaft and a gear wheel mounted thereon and provided with a shouldered flange on the face thereof, of an adjustable collar supported by said shaft carrying a spring pressed bolt, substantially as and for the purpose set forth.

4. In a grain binder the combination with a shaft and a gear wheel mounted thereon having a shouldered flange on the face thereof, of a collar supported by said shaft carrying a spring pressed bolt, and also provided with a circularly slotted ear adapted to receive a securing bolt whereby said spring pressed bolt may be adjusted in its relation to the shouldered flange on the face of said gear wheel; substantially as shown and described.

In witness whereof I have hereunto set my hand, this 2d day of April, 1894, in the presence of two subscribing witnesses.

MAURICE KANE.

Witnesses:
SAMUEL E. DARBY,
FRANK T. BROWN.