

No. 767,412.

PATENTED AUG. 16, 1904.

E. A. JOHNSTON.  
AUTOMATIC TRIP FOR GRAIN BINDERS.

APPLICATION FILED FEB. 17, 1904.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

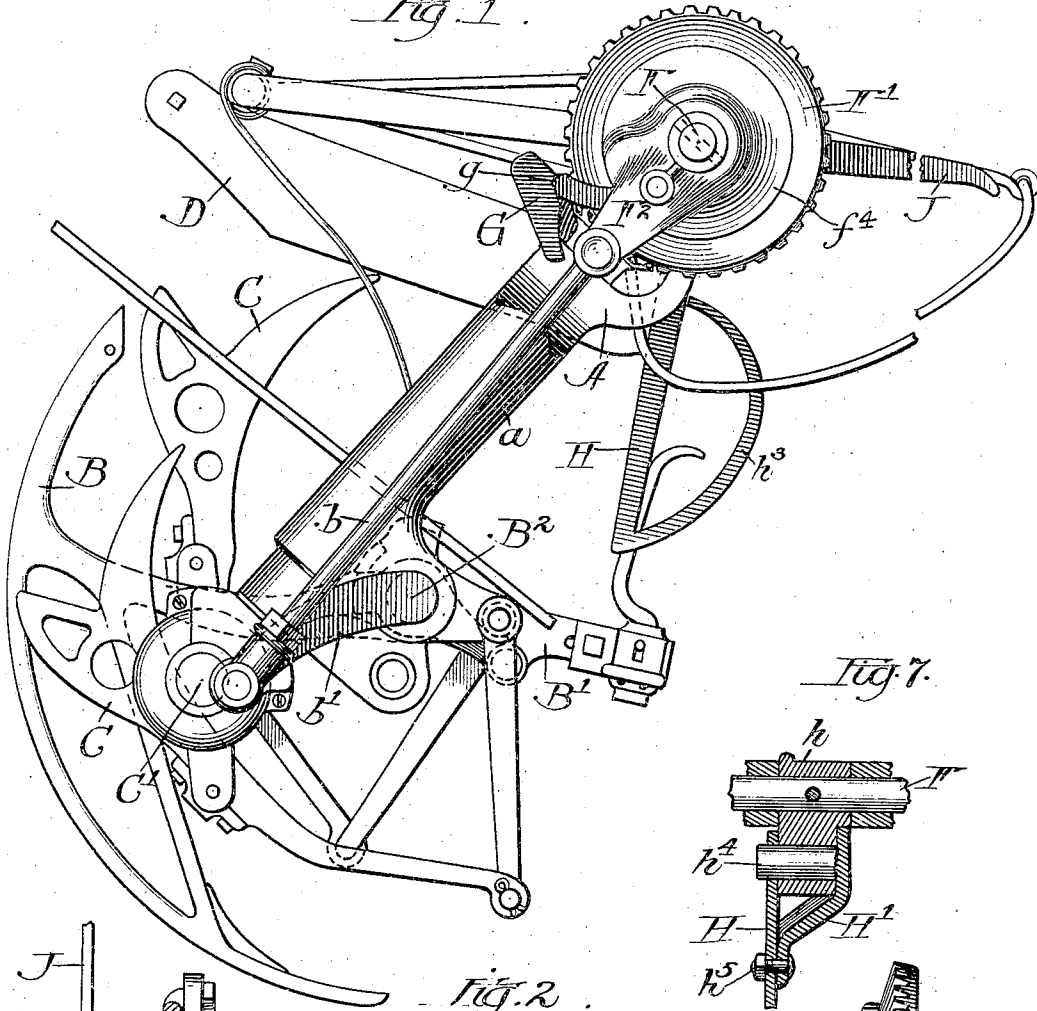


Fig. 7.

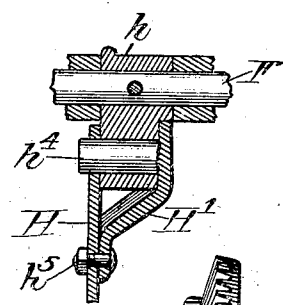
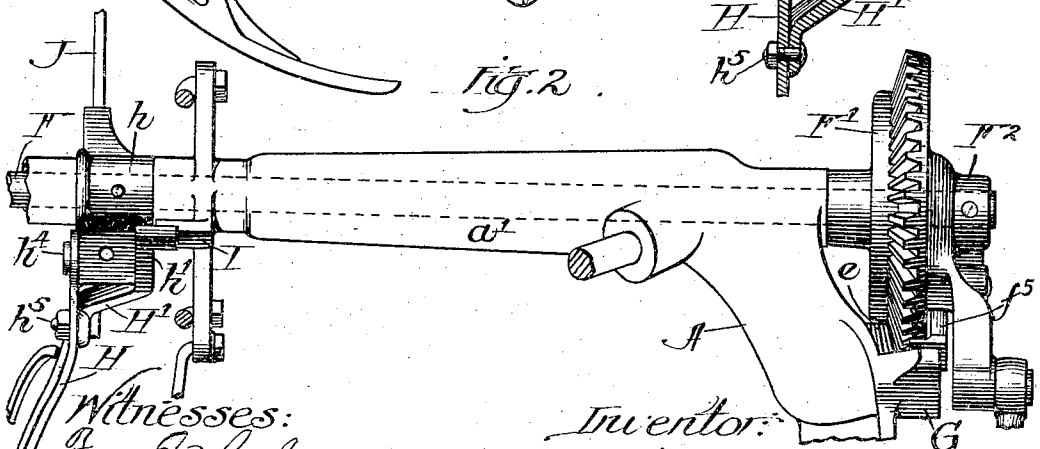


Fig. 2.



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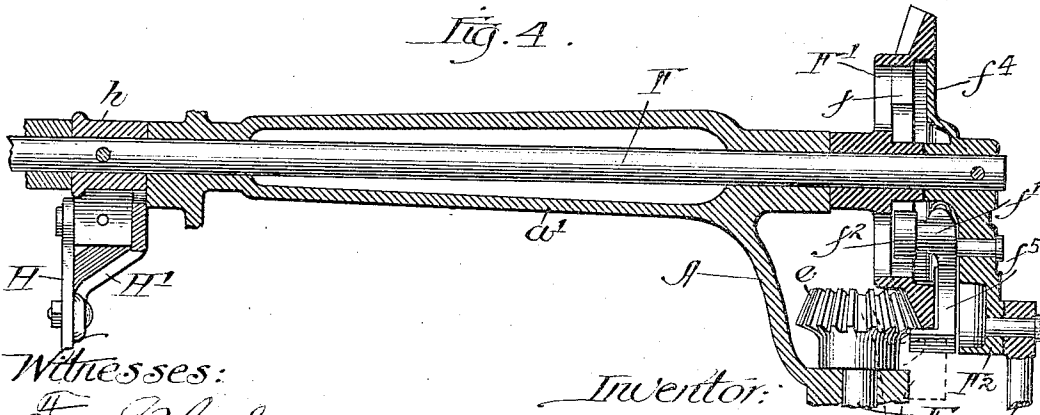
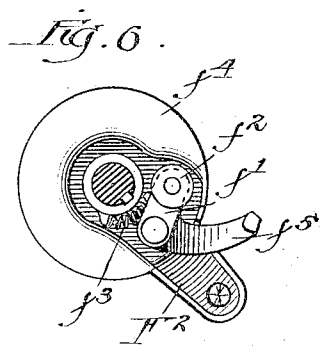
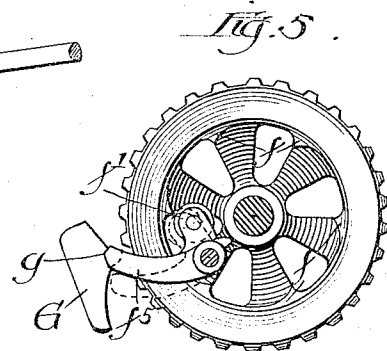
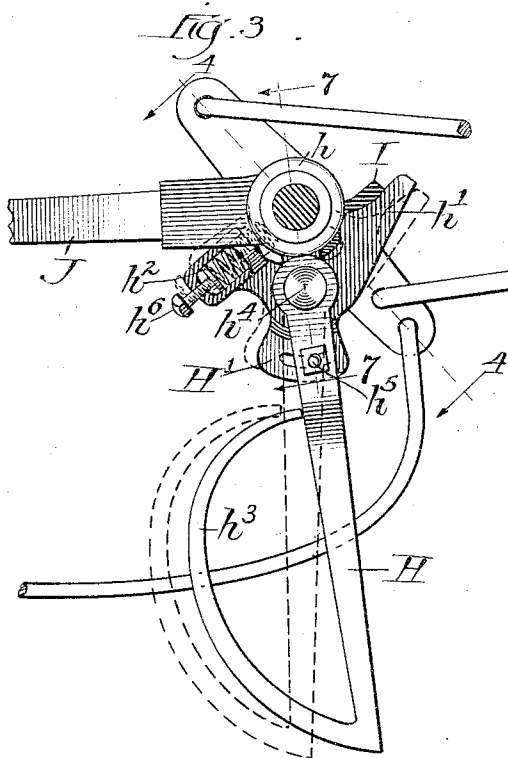
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

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## AUTOMATIC TRIP FOR GRAIN-BINDERS.

SPECIFICATION forming part of Letters Patent No. 767,412, dated August 16, 1904.

Application filed February 17, 1904. Serial No. 194,061. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD A. JOHNSTON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Trips for Grain-Binders, of which the following is a specification, sufficiently clear and exact to enable those skilled in the art to which it appertains to make and use the same.

The invention relates to grain-binders, and more especially to the means for automatically tripping the binding mechanism to throw it into connection with the driving-gearing when the grain has been packed to a predetermined density.

It has for its object to provide means whereby the knotter-shaft may be utilized to effect this connection, to provide a clutch which shall operate as a back-latch, and to provide a stop which is independent of the clutch.

Heretofore grain-binders have usually been provided with a trip-shaft independent of the knotter-shaft, having at one end an arm which forms or is connected with a stop for the pawl of the clutch and at the other end an arm against which the grain is forced by the packers during the formation of the bundle. Such a trip-shaft is operated against the action of a spring by the pressure of the grain against the trip-arm, whereby the trip-stop releases the pawl, which is thrown into connection with the ratchet or corresponding part of the clutch to connect the binding mechanism with the driving-gearing to bind the bundle. A back-latch is also provided to prevent the binding mechanism from running backward from its normal position at rest and throwing the clutch again into operation.

In the construction herein set forth, which embodies the present invention, the trip-arm is connected with the knotter-shaft, making the latter serve also as a trip-shaft. The pawl of the clutch is operated by contact with a cam with which it forms a back-latch, and the stop for the binding mechanism is engaged by the trip-arm or part connected therewith, whereby the trip-arm also serves two

purposes. By these means the construction of grain-binders is cheapened and their operation very materially improved. The usual trip-shaft and back-latch are dispensed with. The shock caused by throwing the clutch suddenly into connection with the rapidly-rotating driving-shaft is reduced, thereby preventing breakage, and the power required to overcome the inertia and friction of the binding mechanism is lessened by the initial rotation imparted to the knotter-shaft by the trip-arm, and also the shock incident to stopping the binding mechanism at the completion of its cycle is removed by making the stop independent of the clutch, thereby preventing breakage.

Referring to the drawings forming a part of this specification in which like characters for reference designate like parts throughout the several views, Figure 1 is an end elevation of a grain-binder, showing the application of the invention. Fig. 2 is a fragmentary side elevation of the upper arm of the binder-frame and the parts carried thereby. Fig. 3 is an elevation of a portion of the parts shown in Fig. 2, showing the trip-arm and also its operation. Fig. 4 is a longitudinal sectional elevation taken on a plane indicated by line 4 4 of Fig. 3. Fig. 5 is an elevation showing the outer side of the ratchet-gear, also the relative position of the pawl and its cam. Fig. 6 is an elevation showing the inner side of the crank-arm, the pawl carried thereby, and the ratchet-shield. Fig. 7 is a sectional elevation taken on a plane indicated by line 7 7 of Fig. 3.

Referring to Fig. 1, A designates the binder-frame; B, the needle; C, the packers; D, the breastplate, which is similar to corresponding parts common to grain-binders, and B' the compressor-arm, the construction and operation of which is described in my Patent numbered 690,964 and dated January 14, 1902, all of which parts need no further description here. The packer-shaft C' is driven in the usual manner by suitable gearing connected with the traction-wheel. At the outer end of the packer-shaft is secured a bevel-gear, which

meshes with a corresponding bevel-gear secured to the transverse shaft E, journaled in the transverse member *a* of the binder-frame, at the opposite end of which shaft is secured  
 5 the bevel-gear *e*. Journaled in the usual manner is the upper arm *d'* of the binder-frame is the knotter-shaft F, upon the outer end of which is journaled a bevel-gear F', which meshes with the bevel-gear *e*. All of  
 10 these gears are adapted to rotate continuously when the harvester is in gear and in operation. Secured to the outer end of the knotter-shaft outside of the bevel-gear is a crank F<sup>2</sup>, which is connected by means of the pitman *b*  
 15 to the crank *b'* of the needle-shaft B<sup>2</sup> in the usual manner.

An automatic clutch is provided to connect the continuously-rotating bevel-gear F' with the knotter-shaft, whereby the latter may be  
 20 rotated intermittently. This clutch, as herein shown, consists of the ratchets *f*, formed in the bevel-gear F', and the pawl *f'*, pivotally connected with the knotter-shaft through the agency of the arm of the crank F<sup>2</sup>. The  
 25 pawl is provided with the usual antifriction-roller *f*<sup>2</sup>, which engages the ratchets, whereby the pawl is readily disengaged, and the spring *f*<sup>3</sup>, which reacts between the pawl and the crank-arm to hold the former in engagement  
 30 with the ratchets when unrestrained. The clutch is preferably located in a recess in the bevel-gear F' and is inclosed by the shield *f*<sup>4</sup>, which protects it from obstruction by foreign bodies. An operating-arm *f*<sup>3</sup> is secured to  
 35 the pawl, by which it is thrown out of engagement with the ratchets. Mounted upon the binder-frame in the path of the operating-arm is a cam G, which, as herein shown, is integral with the binder-frame and is adapted  
 40 to deflect the operating-arm sufficiently to disengage the pawl from the ratchets when the binding mechanism reaches its normal position. This cam is provided with a notch or recess, with which the operating-arm en-  
 45 gages, thereby forming a back-latch, which prevents retrograde rotation of the knotter-shaft.

From the above construction it will readily be seen that when the knotter-shaft is given  
 50 an initial rotation in a forward direction the operating-arm of the pawl will be disengaged from the cam and the pawl thrown by the spring *f*<sup>3</sup> into engagement with the ratchets of the bevel-gear F', thereby connecting the  
 55 bevel-gear with the knotter-shaft. This connection will remain until the binding mechanism completes its cycle and the operating-arm again contacts with the cam, by which it is deflected, throwing the pawl out of engage-  
 60 ment with the ratchets against the action of the spring *f*<sup>3</sup>.

To make such a construction successfully operative, there remains only the necessity of providing means for imparting to the knotter-  
 65 shaft the initial rotation necessary to effect

the connection between it and the bevel-gear F' and to provide a stop which shall arrest the forward movement of the binding mechanism when it reaches its normal position. The means herein shown for accomplishing  
 70 these ends consist of a trip-arm H, which is pivotally connected to a hub or collar *h*, secured to the knotter-shaft, and a detent *h'*, integral or connected with the trip-arm, which is adapted to engage a stop I, forming a part  
 75 of the binder-frame, as shown in Figs. 2 and 3. The trip-arm and the parts carried thereby are maintained in their normal position relative to the knotter-shaft by means of a spring *h*<sup>2</sup>, which reacts between the trip-arm and the  
 80 hub *h*. These parts are so proportioned that when the trip-arm is deflected out of its normal position against the action of the spring *h*<sup>2</sup> by the pressure of the grain the detent is disengaged from the stop. The trip-arm is  
 85 then free to impart to the knotter-shaft the initial rotation necessary to disengage the operating-arm *f*<sup>3</sup> from the cam G to throw the pawl into engagement with the ratchets of the bevel-gear, as above described. Since the  
 90 trip-arm is pivotally connected with the hub *h*, the knotter-shaft is rotated thereby through the agency of the spring *h*<sup>2</sup> when its resilience is sufficient to overcome the resistance or the arm carrying it when it contacts with the  
 95 hub. When once the clutch has been thrown into operation, it remains so until thrown out, as above described, at which time the detent again contacts with the stop, preventing further forward rotation. The trip-arm is preferably provided with a curved member *h*<sup>3</sup> on  
 100 its advance side, which serves to deflect the grain out of the path of the arm to prevent the possibility of winding. To provide an adjustment for the trip-arm, it is preferably  
 105 made in two parts. The arm H' is Y-shaped in general outline and is provided at its center with a pivot *h*<sup>4</sup>, which has a bearing in the hub *h*. The inner upper portion, which contacts with the hub, carries the detent *h'* and  
 110 the outer the spring *h*<sup>2</sup>, which permits a limited movement sufficient to disengage the detent from the stop. On the pivot *h*<sup>4</sup> on the opposite side of the hub is mounted the trip-arm, which is held in its proper position rela-  
 115 tive to the arm H' by means of a bolt *h*<sup>5</sup>, carried by the lower portion thereof or other suitable means. A slot is provided for the bolt to slide in to permit adjustment of the trip-arm, and a set-screw *h*<sup>6</sup> provides adjust-  
 120 ment for the tension of the spring *h*<sup>2</sup>. By these means the size and density of the bundle may be regulated. For convenience one of the usual discharge-arms J is secured to the hub *h* and bears such a relation to the  
 125 trip-arm that the bundle is completely discharged before the parts reach their normal position. The trip-arm is also so located that it passes into the throat in advance of the needle before the needle recedes far enough  
 130

to permit the grain to pass down into the throat preparatory to binding a succeeding bundle.

From the above description of the construction and function of the several parts of the invention it is thought that its operation will be readily understood without further comment. To make it more explicit, it might be said, however, that when the binding mechanism is in its normal position it is securely locked against rotation either forward or backward, and it is only when the grain has been packed to a predetermined density that the trip-arm is moved by the pressure of the grain against the action of its spring a sufficient amount to disengage the detent from the stop. This done the knotter-shaft may be turned by the trip-arm to throw the clutch into operation. As above described, the operating-arm  $f^5$  is disengaged from the cam G and the pawl  $f''$  is thrown into engagement with the ratchets, whereby the binding operation is completed. Upon completion of the cycle of movement the pawl is disengaged from the ratchets by the operating-arm when it contacts with and is deflected by the cam. Simultaneously with the engagement of the detent of the trip-arm with the stop the operating-arm drops into the notch of the cam, whereby the parts are again locked against further rotation in either direction until the above-described operation is again repeated.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a grain-binder, the combination of a knotter-shaft, a trip-arm connected therewith and a clutch carried by said knotter-shaft and actuated by the initial movement thereof imparted by said trip-arm.

2. In a grain-binder, the combination of a knotter-shaft, a trip-arm connected therewith, a detent operated by said trip-arm and a clutch for said knotter-shaft which is actuated by the initial movement thereof imparted by said trip-arm.

3. In a grain-binder, the combination of a knotter-shaft, a trip-arm connected therewith, a clutch for said knotter-shaft which is actu-

ated by the initial movement thereof imparted by said trip-arm and means cooperating with said clutch to form a back-latch.

4. In a grain-binder, the combination of a knotter-shaft, a trip-arm connected therewith, a detent operated by said trip-arm, a clutch for said knotter-shaft which is actuated by the initial movement thereof imparted by said trip-arm and means cooperating with said clutch to form a back-latch.

5. In a grain-binder, the combination of a knotter-shaft, a trip-arm pivotally connected therewith, a detent operated by said trip-arm, a stop with which said detent contacts, a spring for holding said detent in contact with said stop, and a clutch for said knotter-shaft which is actuated by the initial movement thereof imparted by said trip-arm when said detent is released.

6. In a grain-binder, the combination of a knotter-shaft, a trip-arm connected therewith, a driving-gear having ratchets journaled on said knotter-shaft, a pawl pivotally connected with said knotter-shaft and adapted to engage the ratchets, an operating-arm connected with said pawl and a cam with which said operating-arm contacts to disengage said pawl from the ratchets and with which it engages to form a back-latch.

7. In a grain-binder, the combination of a knotter-shaft, a trip-arm pivotally connected therewith, a detent operated by said trip-arm, a stop with which said detent contacts, a spring for holding said detent in contact with said stop, a driving-gear having ratchets journaled on said knotter-shaft, a pawl pivotally connected with said knotter-shaft and adapted to engage the ratchets, an operating-arm connected with said pawl and a cam with which said operating-arm contacts to disengage said pawl from the ratchets and with which it engages to form a back-latch.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD A. JOHNSTON.

Witnesses:

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