No. 746,155. PATENTED DEC. 8, 1903.

C. A. A. RAND.

GRAIN BINDER.

APPLICATION FILED MAY 25, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 2.

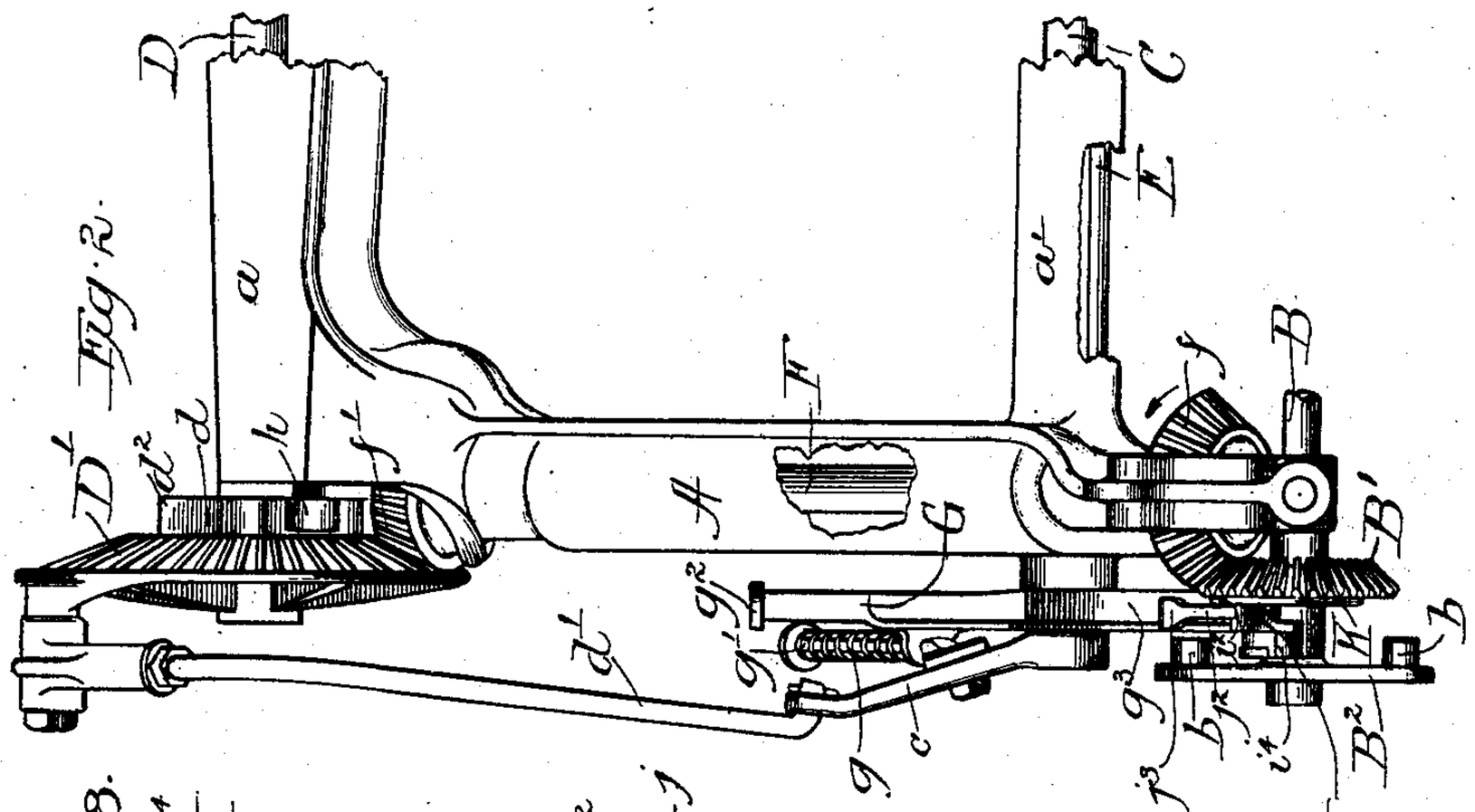

Fig. 8.

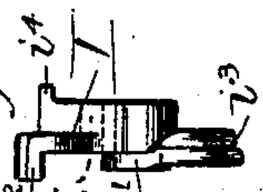

Fig. 7.

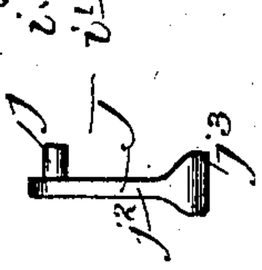

Fig. 6.

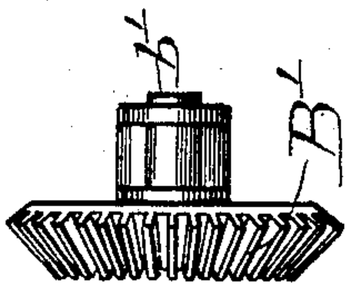

Fig. 3.

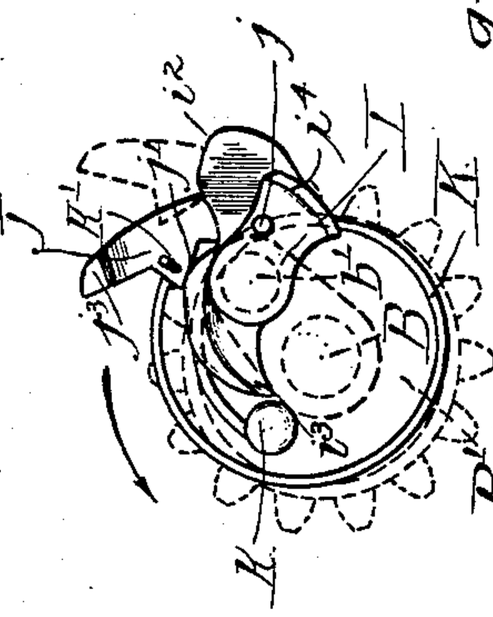

Fig. 4.

Witnesses:
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Lenora Frieley.

Fig. 1.

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 5.

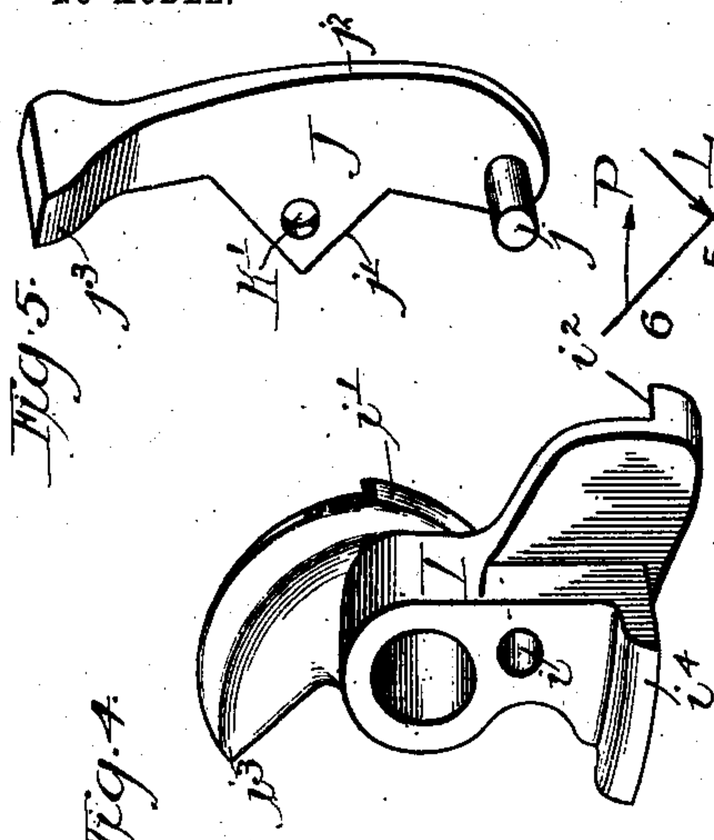


Fig. 4.

Fig. 6.

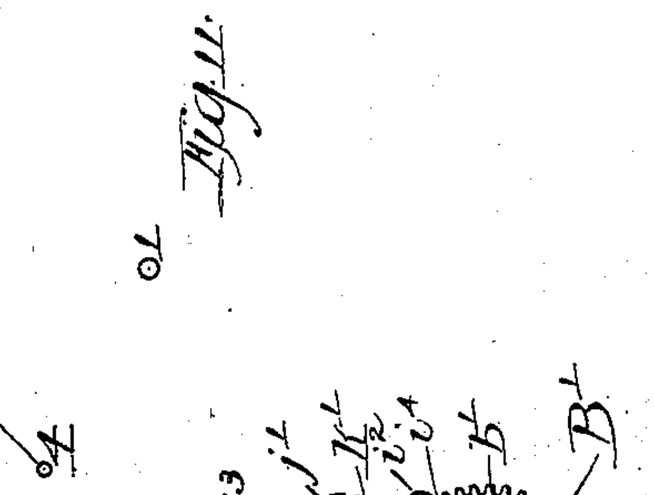


Fig. 7.

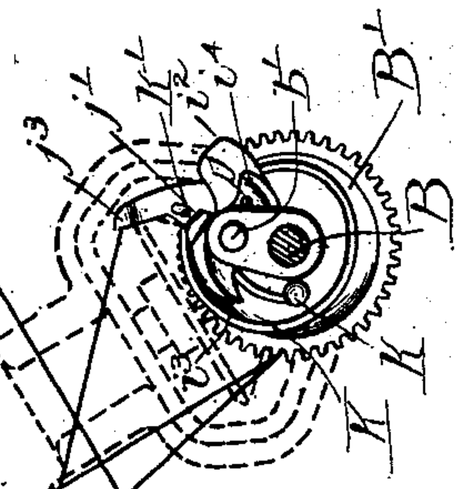


Fig. 10.

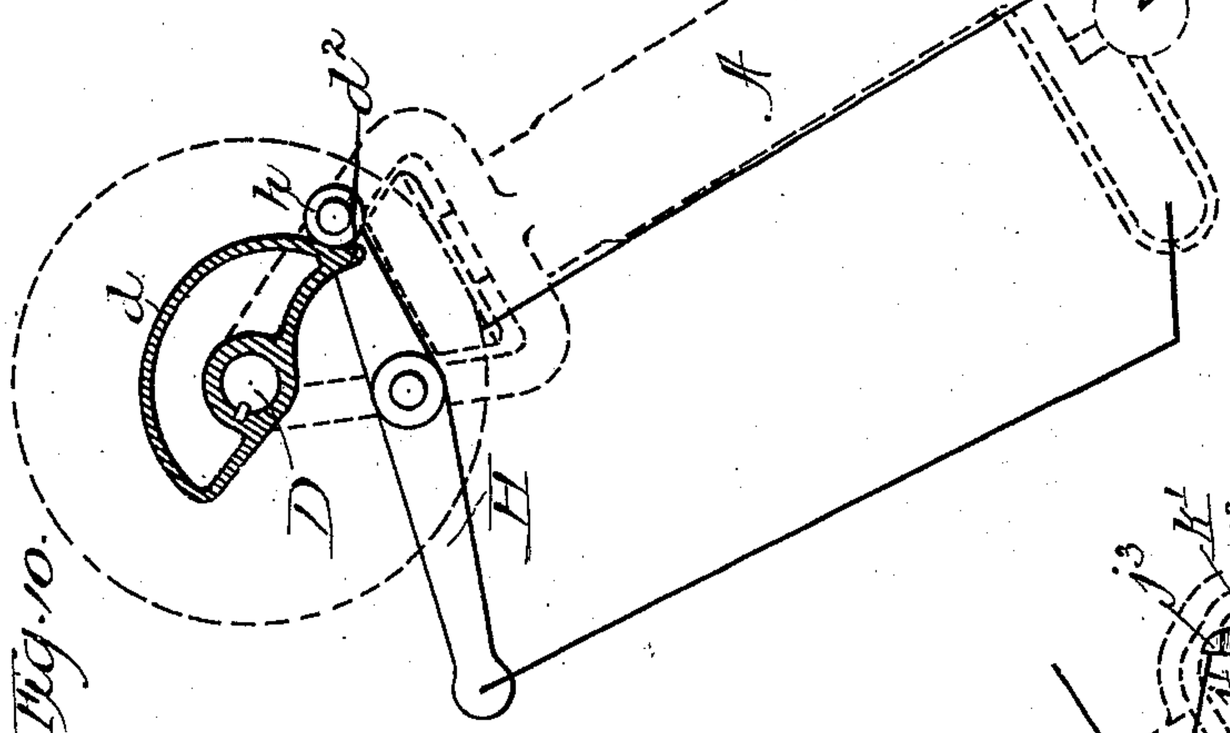


Fig. 8.

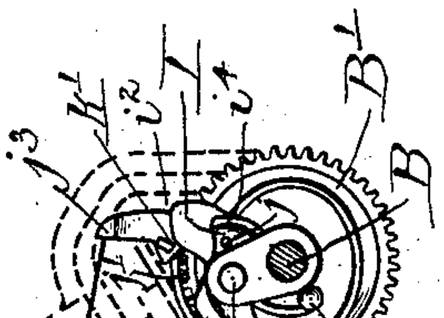
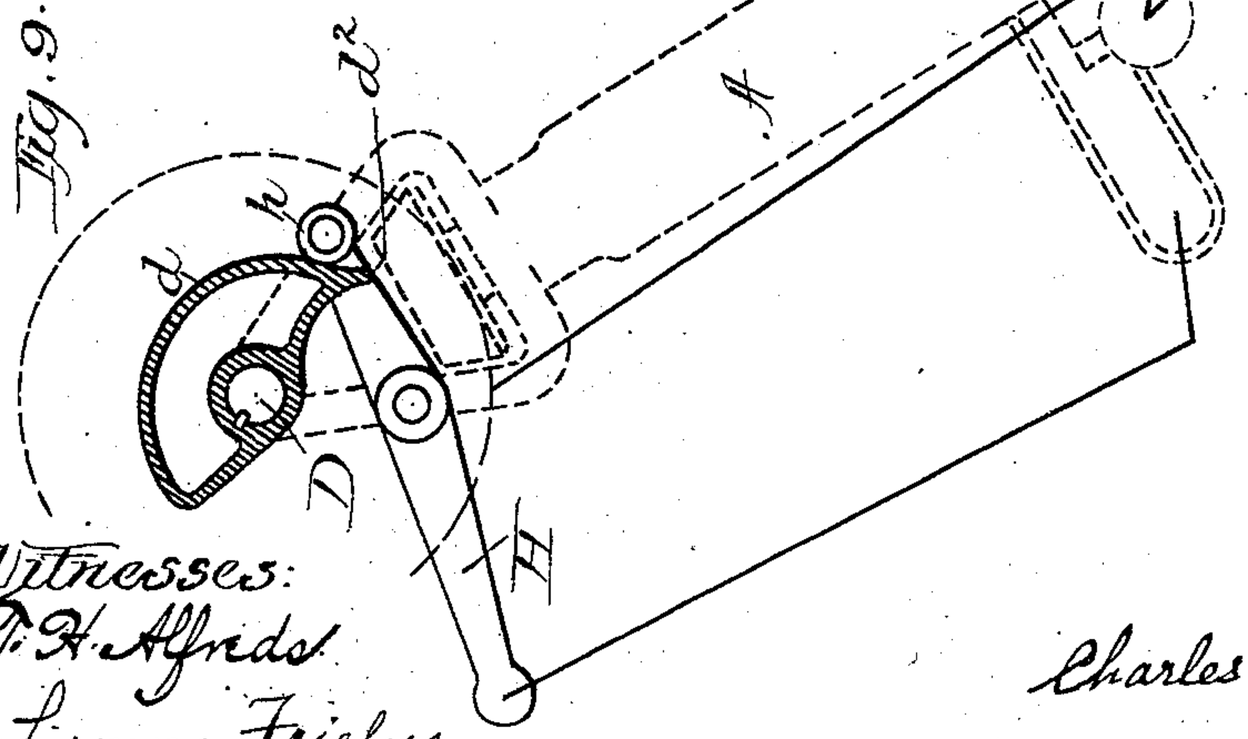


Fig. 9.



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GRAIN BINDER.

APPLICATION FILED MAY 25, 1903.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 13.

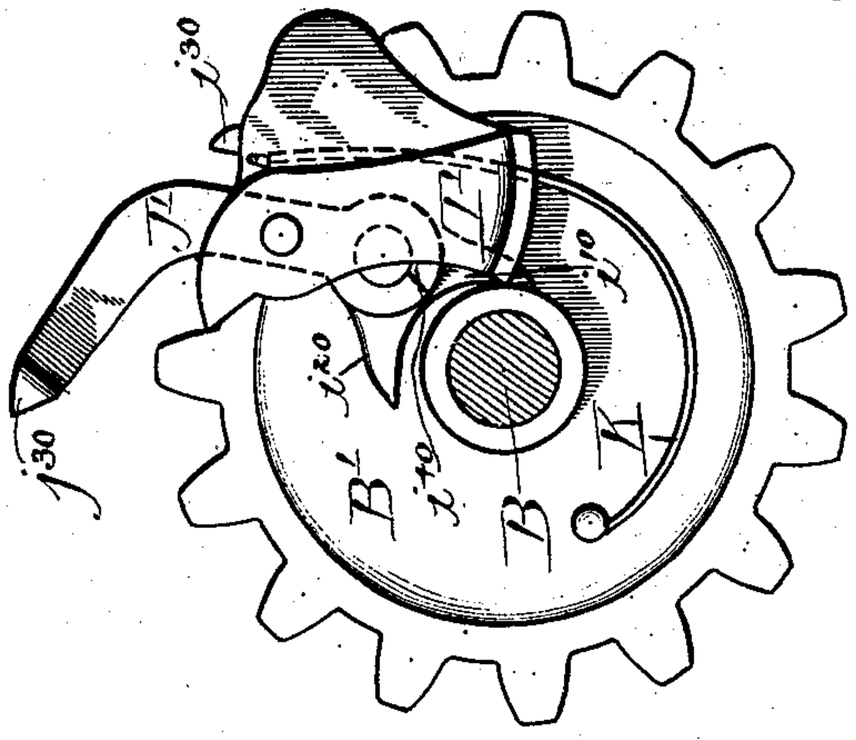
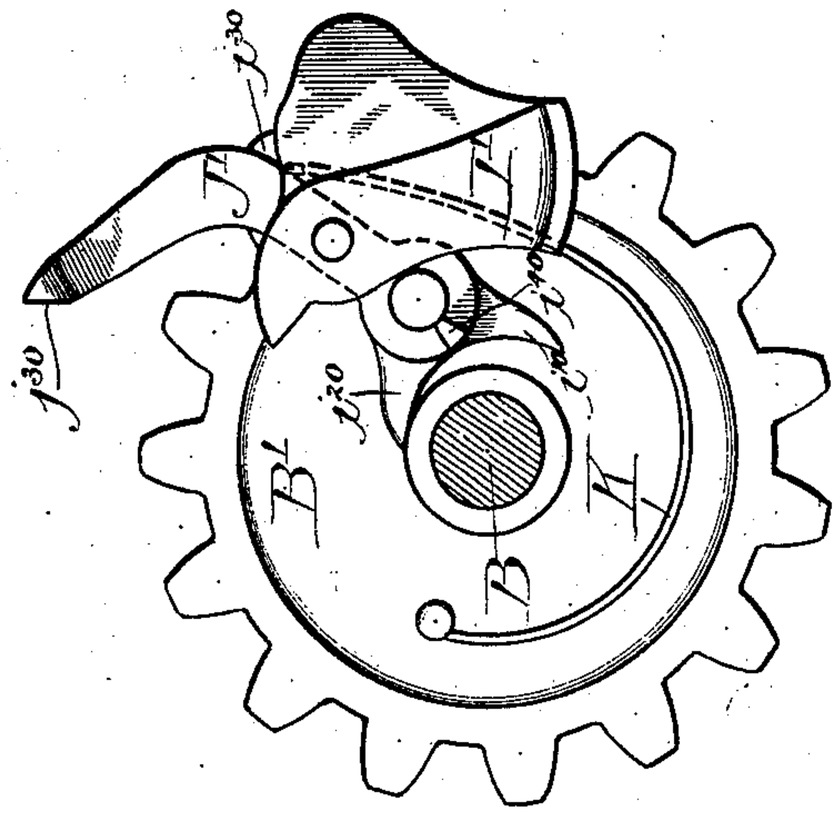


Fig. 12.



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No. 746,155. Patented December 8, 1903.

UNITED STATES PATENT OFFICE.

CHARLES A. ANDERSON RAND, OF CHICAGO, ILLINOIS, ASSIGNOR TO INTERNATIONAL HARVESTER COMPANY, A CORPORATION OF NEW JERSEY.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 746,155, dated December 8, 1903.

Application filed May 25, 1903. Serial No. 158,595. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. ANDERSON RAND, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Grain-Binders, of which the following is a complete specification.

This invention relates to the driving and tripping mechanism of grain-binders, and more specifically to the construction of the driving-dog on the clutch-gear.

Grain-binders as usually built are open to the evils arising from a construction which makes it necessary to bring the moving members to a sudden stop after each operation, and consequently the difficulty of driving the various elements completely and positively to their locked positions and at the same time to effect the disengagement of the intermittently-moving from the constantly-moving parts.

The object of this invention is to avoid the above-mentioned evils by so constructing certain parts that the binder will be driven home positively without jar and the driving-dog will be readily disengaged from its driving member.

A further object of the invention is to provide means for automatically compensating for the effects of long-continued wear.

Briefly and broadly stated, the invention relates to the substitution of a two-part driving-dog in the binder-driving mechanism for a single dog, as heretofore used, the two parts being yieldingly held and movable within limits with respect to each other and with respect to the member upon which they are mounted.

One of the chief virtues of this invention lies in the fact that the above-mentioned yielding pawl will permit the moving parts of the binder to be carried slightly beyond their normal locking position, and the spring which actuates said pawl will operate to return them to their normal position and also tend to hold the driving-dog in a non-engaging position.

In the drawings, Figure 1 represents an end view of a grain-binder embodying my invention. Fig. 2 is a fragmentary elevation of the same. Fig. 3 is an elevation of the binder-driving dog and the trip-stop-engaging pawl in connection therewith. (The clutch-gear to which the driving-dog is pivotally secured is shown in dotted lines.) Fig. 4 is a perspective view of the binder-driving dog. Fig. 5 is a perspective view of the trip-stop-engaging pawl. Fig. 6 is a plan view of the clutch-gear. Fig. 7 is a plan view of the trip-stop-engaging pawl. Fig. 8 is a plan view of the binder-driving dog. Figs. 6, 7, and 8 show the relative positions of the parts before being assembled. Fig. 9 is an end elevation of a binder, largely diagrammatic, intended to illustrate the action and relative positions of the binder-driving dog and trip-stop-engaging pawl in connection with the roller on the compressor-lever and cam on the cam-gear, this view showing the several parts in a position slightly past their normal locking positions. Fig. 10 is a view similar to the one shown in Fig. 9, but with the parts returned to their normal locked positions by the action of the yielding trip-stop-engaging pawl. Fig. 11 is a diagram showing the relative location of the pivotal axes of the driving-dog, the pawl, and point of attachment of the spring. Fig. 12 illustrates a modified form of the pivotal support of the driving-dog and trip-stop-engaging member, the driving-dog being shown in an engaging position relative to the binder-driver. Fig. 13 represents a similar view, but the driving dog shown in a non-engaging position relative to the binder-driver.

Referring to the drawings, A designates the frame of a well-known type of grain-binder, and *a* and *a'* portions of the upper and lower limbs, respectively, thereof.

B represents the binder-driving shaft; C, the needle rock-shaft; D, the cam-gear shaft, and E the compressor rock-shaft.

F is the bevel-gear shaft driven through the bevel-gear *f* thereon, the bevel-gear *f* meshing with and being intermittently driven by the clutch-gear B', which sleeves loosely upon the binder-driving shaft B.

On the upper end of the bevel-gear shaft F is secured the bevel-pinion *f'*, meshing with and driving the cam-gear D', which is secured to the cam-gear shaft D. The cam-gear is provided with the cam *d*, upon which rides the roller *h* of the compressor-arm H, the said compressor-arm connecting with the

compressor-link h' through the compressor-spring h^2. The lower end of the compressor-link engages with the cranked end of the compressor rock-shaft E, and in this way actuates the said compressor crank-shaft in a manner well understood. The needle rock-shaft C is controlled by means of the connecting-rod d', extending from the cam-gear D′ to the cranked end c of the said needle-shaft.

Pivotally mounted upon the needle rock-shaft is the trip-stop G, held yieldingly relative thereto by the spring g, which is engaged by a bolt g', passing through a lug on said trip-stop and pivotally connected to the arm c of the needle-shaft, as shown in Fig. 1. The trip-stop G is provided with a suitable end g^2 for engaging the dog on the gear-clutch mechanism, which will hereinafter be described. Integral with the trip-stop is the arm g^3, adapted to be engaged and actuated by the foot h^3 on the lower end of the compressor-link h'. B^2 is the binder-driver rigidly secured to the binder-driving shaft B, and b represents the rollers through which motion is communicated from said binder-driver to the gear-clutch.

The clutching mechanism, which constitutes the essential element of this invention, will now be described. As the parts of the binder above mentioned are of present importance only in so far as they are associated with and consequently affect or are affected by the clutching mechanism, the general description given will suffice.

On turning to Fig. 3 will be seen in dotted lines the clutch-gear B′ and in connection therewith the driving-dog I and the trip-stop-engaging pawl J. The driving-dog I is pivotally and eccentrically mounted upon the driving-clutch B′, the pivotal bearing being formed by the pin b'. (See Figs. 3 and 6.) The trip-stop-engaging pawl J is pivotally mounted, preferably upon this driving-dog I, the aperture i in said dog receiving the pin j on the pawl J. This arrangement of the pivotal bearing of the pawl upon the driving-dog, it is to be noted, is by preference merely, since it is evident that similar results could be attained should the trip-stop-engaging pawl be sleeved upon the gear-clutch or driving-shaft and the driving-dog sleeved either upon the gear-clutch or upon the pawl itself. Figs. 12 and 13 illustrate such a modified form of the pivotal supports of the driving-dog and trip-stop-engaging member thereof. In its modified or alternate construction the trip-stop-engaging member J′ of the driving-dog is pivoted upon the clutch-gear B′ instead of on the driving-dog I′ and the driving-dog I′ in this case being pivotally mounted upon the member J′. The principle of the operation in this case is the same as in the preferred construction, as heretofore set forth. The stops i^{10} and i^{20} limit the vibratory movement of the trip-stop-engaging member J′ relative to the clutch-gear B′, and the stops i^{30} and i^{40} limit the movement of the driving-dog I′ relative to member J′, on which it is mounted. The spring K acts upon the two parts of the driving-dog in this construction the same as in the other, the part marked j^{30}, corresponding with j^3 in the other figures, engaging the trip-stop G.

The driving-dog I receives the pawl J, the two members occupying the relative positions in engagement as indicated by their detached views in Figs. 4 and 5 or in Figs. 7 and 8. The stops i' and i^2 on said driving-dog limit the vibratory movement of the pawl J relative to said driving-dog, the edge marked j' on said pawl contacting the stop i' when in the forward position and the rear edge thereof (marked j^2) contacting the stop i^2 in its rearward position. The end j^3 of the pawl J is adapted to contact the portion g^2 of the trip-stop G. A spring K, having one of its ends secured to the clutch-gear B′ at the point k and the other end engaging the trip-stop pawl J at the point k', exerts a stress acting upon the said pawl in the direction of a line passing through the points of the attachment-spring. The relation of the points of attachment of the spring to the pawl-and-clutch gear, the location of the pivotal axis of the driving-dog on the clutch-gear, and the pawl on the driving-dog are of such a nature that when no resistance is interposed in the path of the pawl the spring K operates to hold the driving-dog I in what may be regarded as its forward position, which is an engaging position relative to the binder-driver, the beak i^3 of said driving-dog contacting the hub of said clutch-gear, as shown in Fig. 3, and the lipped portion i^4 being engaged by the roller b on the binder-driver B^2; but should resistance be interposed in the path of the trip-stop-engaging pawl, as occurs when the trip-stop intercepts its path, the spring K will operate to hold the driving-dog in a non-engaging position relative to the binder-driver, as is shown in Figs. 1, 9, and 10, in which position the lip i^4 is held away from the path of movement of the binder-driver. A location of the pivotal points as indicated by Fig. 11 will give the desired results. In this figure, 1 designates the center of the clutch-gear; 2, the pivotal center of the driving-dog; 3, the pivotal center of the pawl on said driving-dog; 4, the point of attachment of the spring to the clutch-gear; 5, the point of attachment of the spring to the pawl, and 6 the point of application of resistance to the pawl. It will be seen from this diagram that, assuming the resistance of the force P (the trip-stop) to be removed and the line 2 3 (the driving-dog) fixed relative to the line 3 6, (the pawl,) a force L (the spring) acting along the line 4 5 and in the direction indicated by the arrow will cause rotation of both said lines 2 3 and 3 6 to the left or forward, viewed in the light of the direction of rotation of the parts which they represent. If, however, the force P (the trip-stop) is interposed at the point 6 and the lines 2 3 and 3 6

pivotally connecting at the point 3, then the force L, acting in the same direction, will evidently cause rotation of the line 2 3 (the driving-dog) in the opposite direction, as indicated by the line and arrow leading from 3. This will bring the dog to a non-engaging position relative to the binder-driver, as required whenever the pawl is intercepted by the trip-stop.

Other arrangements of the points 2, 3, 4, and 5 could be devised to produce the same result, and the above is merely intended to be illustrative of the preferred arrangement.

The operation of the device will readily be understood. When the tripping mechanism is actuated through the compressor rock-shaft E, the foot h^3 on the compressor-link h' presses the arm g^3 of the trip-stop until the portion g^2 thereon is raised and releases the trip-stop-engaging pawl J. Immediately upon the release of this pawl the spring K throws both the said pawl and the binder-driving dog I to the left or forward, the portion j' on the pawl contacting the stop i' on the dog and the beak i^3 on the dog resting against the hub of the clutch-gear B'. This movement will cause the lip i^4 on the driving-dog to be thrown outward and into the path of the rollers b of the constantly-rotating binder-driver B^2. Motion is thus communicated to the clutch-gear B', which, being in mesh with the bevel-gear f, will impart motion through it, the bevel-gear shaft F and the pinion f' to the cam-gear D'. This cam-gear is caused to make one complete revolution from the position shown in Fig. 10, the cam d in connection with said gear operating the compressor mechanism in the usual way. On the completion of the revolution the tripping mechanism will come to a position in which it will intercept the trip-stop pawl J, and simultaneously with the engagement of the said trip-stop and pawl the roller h will pass over the crest d^2 of the cam d. It necessarily follows, of course, that the clutch-gear must rotate sufficiently after the pawl J impinges the trip-stop to disengage the driving-dog I. Such disengagement is effected by both the driving-dog and pawl moving together from a position as indicated in Fig. 1 to a position as indicated in Fig. 10 or to a position intermediate of those shown in Figs. 9 and 10. After reaching the position shown in Fig. 10 the driving-dog remains fixed relative to the gear-clutch B', on which it is mounted. Further rotation of the said gear-clutch is made possible by the yielding connection between the pawl and the driving-dog. The virtue of the invention lies largely in this provision for additional movement of these parts, for because of such provision for additional movement the clutch-gear is made to rotate further, thus causing the cam-gear to rotate further and also preventing the disengagement of the driving-dog until after the roller h is in its locked position on the cam d of the cam-gear D'. This additional movement will bring the parts to the position shown in Fig. 9, the roller h being carried past its normal locking position and the pawl J engaging the rear stop i^2 on the driving-dog. The spring K will then cause the gear-clutch to retreat slightly until the several parts occupy their normal locked positions, as shown in Fig. 10. If the resistance offered to the binding mechanism exceeds the inertia effect of the moving parts, then it is evident there will be no shock or jar incident to the said moving parts of the binder coming "home" or to their locked position. On the contrary, however, if the inertia effect of the moving parts should exceed the resistance offered thereto, as is frequently the case in straight grain, then there would be a tendency to produce a shock; but the spring K, acting on the pawl J, operates as a cushion to absorb the effects of such shock.

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

1. In a binder-driving mechanism, tripping mechanism, a trip-stop in connection therewith, a constantly-rotating driving-shaft, a binder-driver rigidly secured thereto, a clutch-gear loosely sleeved upon said shaft, a binder-driving dog pivotally secured to said clutch-gear, a trip-stop-engaging pawl pivotally secured to and yieldingly held in relation with said driving-dog and having a limited vibratory movement relative thereto, the said trip-stop-engaging pawl adapted to engage the trip-stop on the said tripping mechanism and by such engagement to force the said binder-driving dog to a non-engaging position relative to the binder-driver, all combined substantially as described.

2. In a binder-driving mechanism, tripping mechanism, a trip-stop in connection therewith, a constantly-rotating driving-shaft, a binder-driver rigidly secured thereto, a clutch-gear loosely sleeved upon said shaft, a binder-driving dog pivotally secured to said clutch-gear, a trip-stop-engaging pawl pivotally secured to and yieldingly held in relation with said driving-dog and having a limited vibratory movement relative thereto, the said pawl adapted to contact the trip-stop on the said tripping mechanism, such contacting operating to disengage the binder-driving dog from said binder-driver and permit of a slight continued rotation of the latter, all combined substantially as described.

3. In a grain-binder in combination, a cam-gear, and a cam integral therewith, compressing mechanism actuated by said cam and operating as a lock therefor, means for actuating the said cam-gear and cam from the binder-driving mechanism, a tripping device, and a binder-driving mechanism having the trip-stop-engaging portion of the driving-dog yieldingly secured relative to said dog, thereby enabling the said binder-driving mechanism to drive the cam-gear slightly beyond its normal locked position before the binder-driver becomes disengaged from its operating member substantially as described.

4. In a grain-binder in combination, a cam-gear, and a cam integral therewith, compressing mechanism actuated by said cam and operating as a lock therefor, means for actuating the said cam-gear and cam from the binder-driving mechanism, a tripping device, and a binder-driving mechanism having the trip-stop-engaging portion of the driving-dog pivoted upon and yieldingly secured relative to said dog, thereby enabling the said binder-driving mechanism to drive the cam-gear slightly beyond its normal locked position before the binder-driver becomes disengaged from its operating member substantially as described.

5. In a grain-binder in combination, a cam-gear, a cam as one piece therewith, a binder-driving mechanism having in connection therewith a two-part driving-dog with an interposed actuating-spring, means for actuating the said cam-gear from the binder-driving mechanism, tripping mechanism, a compressing device having a roller acting as a stop in conjunction with the cam on said cam-gear, the said two-part driving-dog and its actuating-spring permitting the said cam and cam-gear to be driven slightly beyond their normal locked position relative to the stop on the compressing device and to then cause the said cam-gear and associated parts to retreat to their normal locked position, substantially as described.

CHARLES A. ANDERSON RAND.

In presence of—
MARY TRIEB,
J. C. WARNES.