(No Model.) 3 Sheets—Sheet 1.

S. V. KENNEDY & C. A. ANDERSON.

GRAIN BINDER.

No. 385,059. Patented June 26, 1888.

Fig. 1.

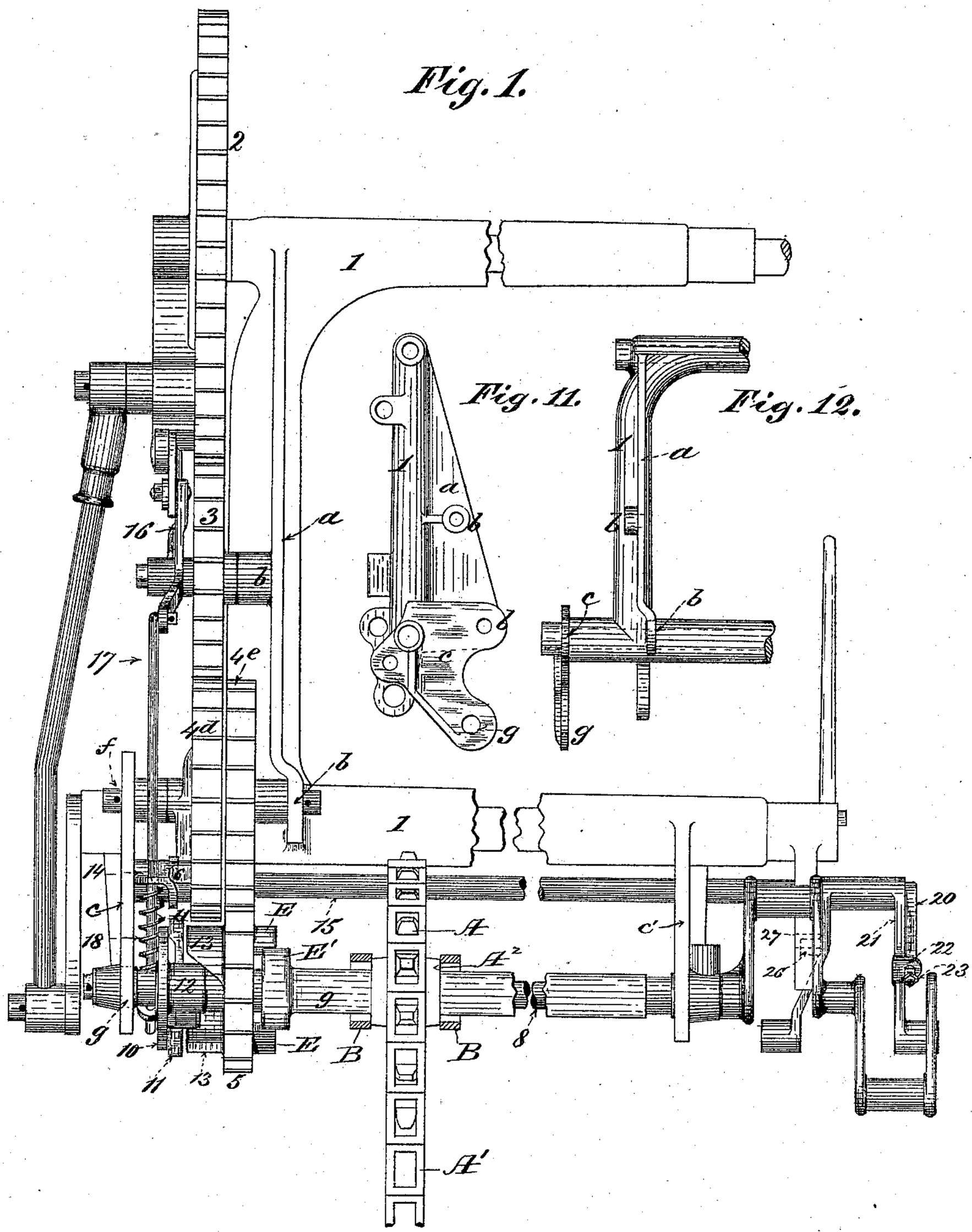

Fig. 11.

Fig. 12.

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S. V. KENNEDY & C. A. ANDERSON.

GRAIN BINDER.

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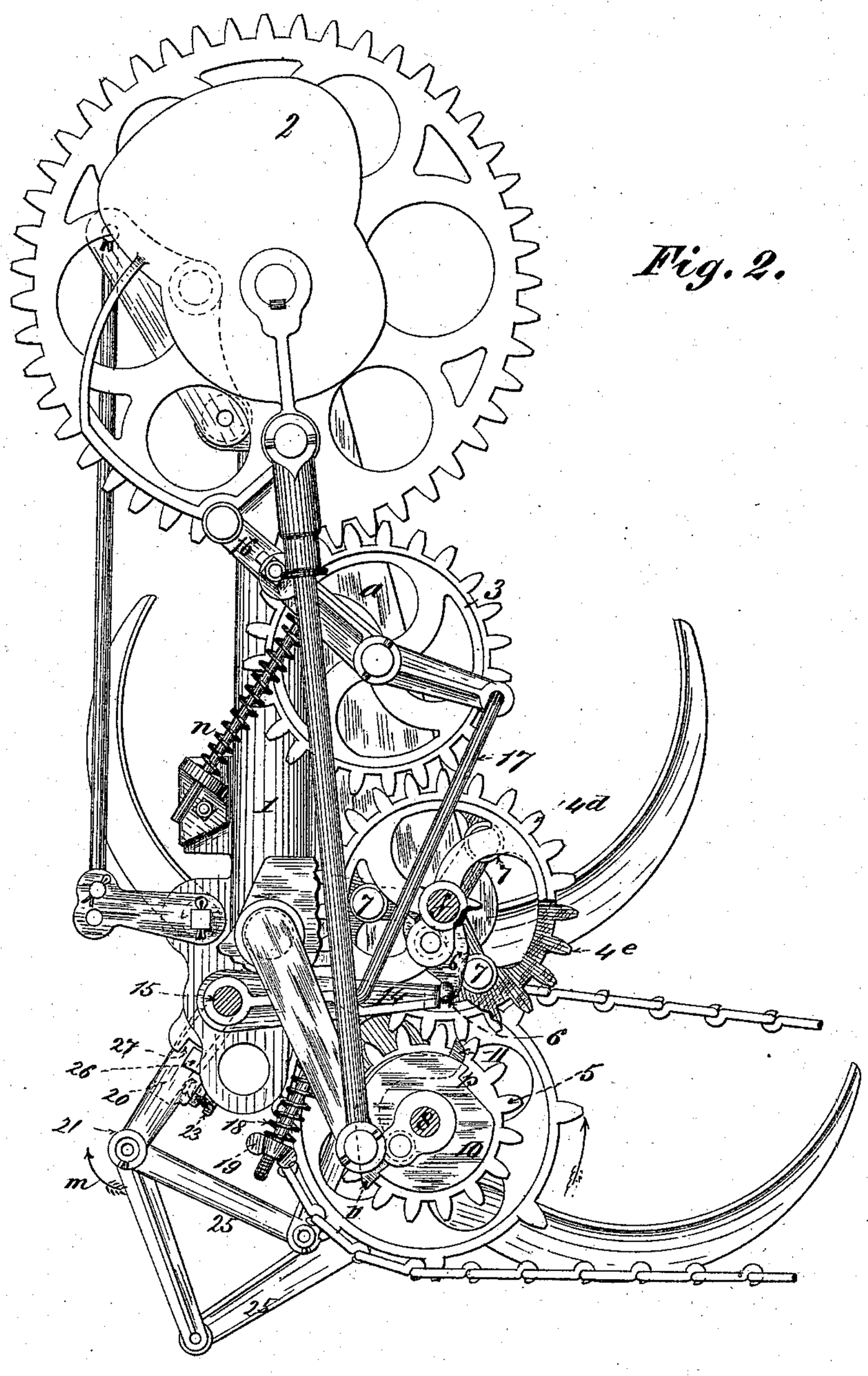

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

S. V. KENNEDY & C. A. ANDERSON.

GRAIN BINDER.

No. 385,059. Patented June 26, 1888.

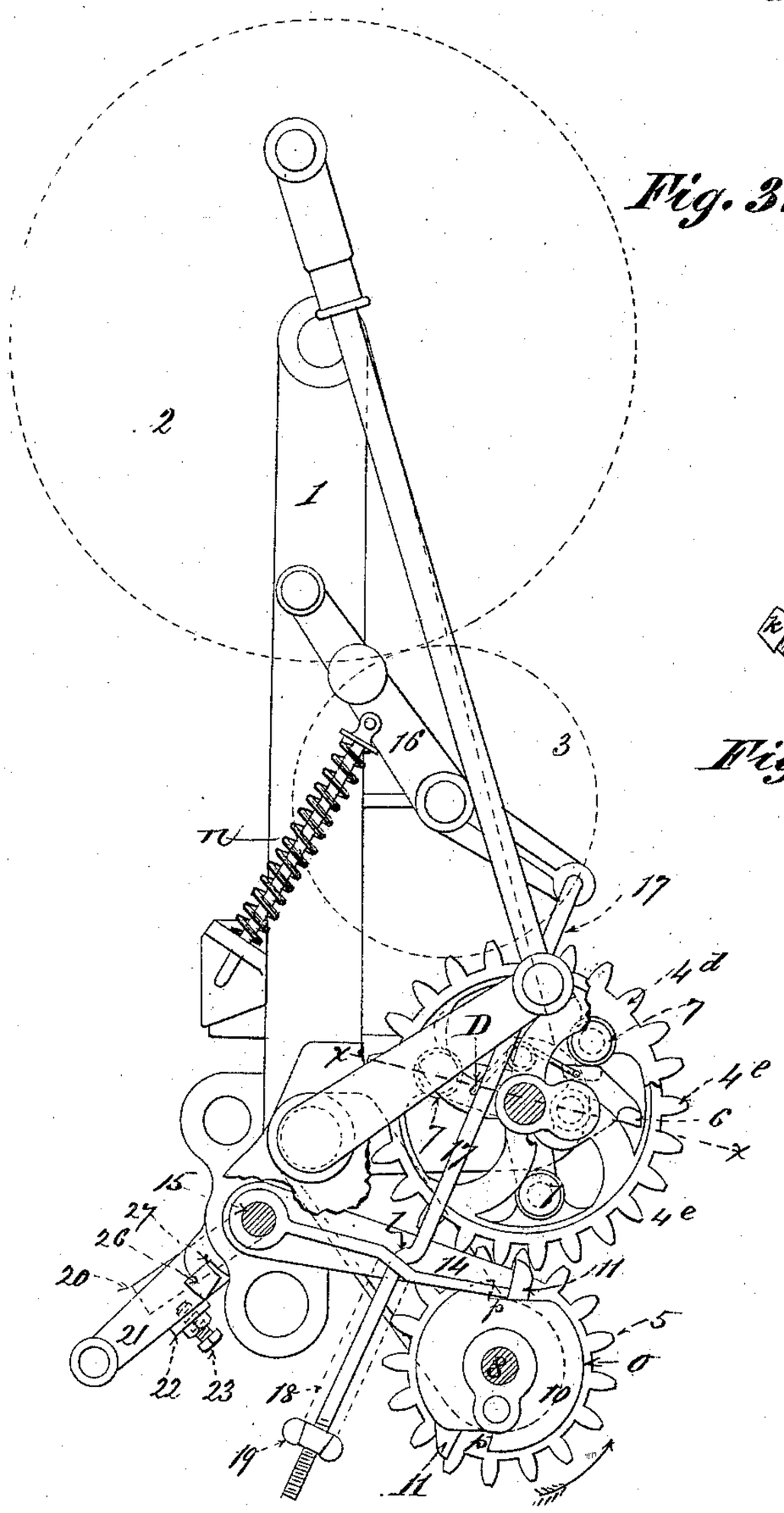

Fig. 3.

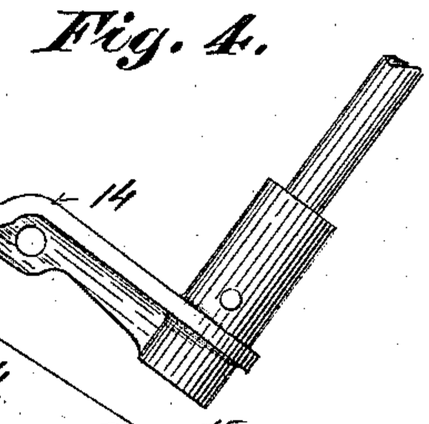

Fig. 4.

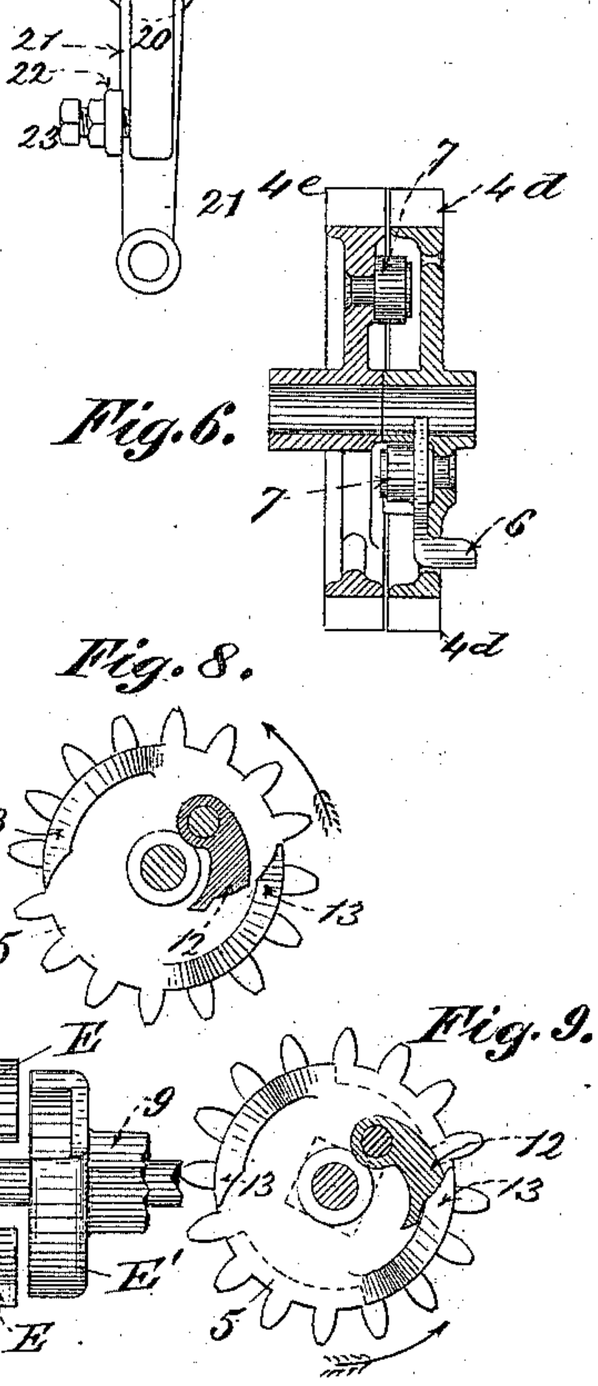

Fig. 5.

Fig. 6.

Fig. 8.

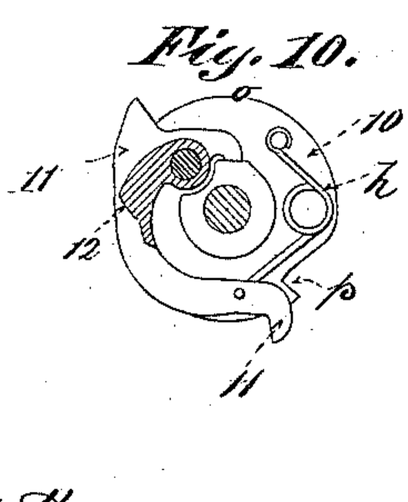

Fig. 10.

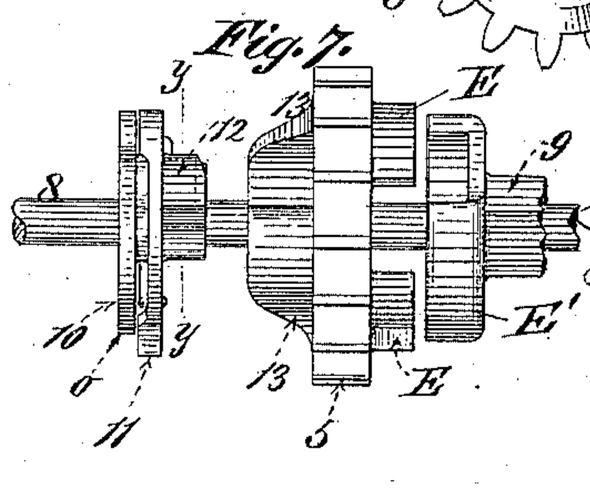

Fig. 7.

Fig. 9.

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UNITED STATES PATENT OFFICE.

SAMUEL V. KENNEDY AND CHARLES A. ANDERSON, OF MINNEAPOLIS, MINNESOTA, ASSIGNORS TO THE MINNEAPOLIS HARVESTER WORKS, OF SAME PLACE.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 385,059, dated June 26, 1888.

Application filed September 8, 1887. Serial No. 249,062. (No model.)

To all whom it may concern:

Be it known that we, SAMUEL V. KENNEDY and CHARLES A. ANDERSON, of Minneapolis, Minnesota, have invented certain Improvements in Grain-Binders, of which the following is a specification.

This invention relates to self-binding harvesters of the class in which the packers remain at rest during the binding operation and resume their labor at the completion thereof; and it consists of certain mechanism for producing this result in an especially simple and effective manner, the characteristic feature of which is a single stop-lever or stop-dog, which by its vibration in one direction releases the binder and stops the packer and then by its vibration in the opposite direction releases the packer and stops the binder.

The invention also embraces an improved construction of the binder-frame, whereby a more stable support is provided for the packer-shaft and the intermediate gearing, which communicates motion to the binder.

The accompanying drawings are as follows, viz: Figure 1 is an elevation of the binder, looking from the grain side; Fig. 2, an elevation from the front with the binder at rest and the packers in operation; Fig. 3, a similar view with the packers at rest and the binder in operation, the packers and some other parts being omitted to more clearly show the other devices; Figs. 4 and 5, different views of the stop-dog and trip-shaft; Fig. 6, a sectional view of the intermediate gears, 4^d and 4^e, on the line *x x* of Fig. 3. Fig. 7 shows the packer-shaft 8, the main driving hollow shaft 9, the binder-driving pinion 5, and packer-driving head 10. In this view the parts are separated from each other to more clearly show their construction, they being shown in proper relation in Fig. 1. Figs. 8, 9, and 10 are sectional views taken on the line *y y* of Fig. 7. Figs. 11 and 12 are details on a reduced scale, showing the binder-frame construction.

The binder-frame 1 is provided with the laterally-projecting flange *a*, in which are the usual seats, *b b*, for the studs, upon which the intermediate gears are journaled, and with another laterally-projecting flange, *c*, at a sufficient distance in advance of and parallel with the flange *a* to admit the intermediate gears, 4^d 4^e, between it and the flange *a*. The rear end of the stud *f* is seated in the flange *a*, and its front end is seated in the flange *c*, thus making the bearing for the gears 4^d and 4^e very firm and substantial. The flange *c'*, projecting downward from the lower horizontal member of the binder-frame, affords the rear bearing for the packer-shaft. The flange *c* also furnishes for the packer-shaft a bearing, *g*, outside of the gearing, &c., thus giving the packer-shaft and principal driving mechanism an especially stable support.

2 is the main binder-gear; 3, an intermediate gear for communicating motion to the main gear 2. 4^d and 4^e are intermediate gears mounted upon the same axle. The gear 4^d engages with the gear 3, to drive the same, and has pivoted to its inner side—*i.e.*, the side next to the gear 4^e—the binder-driving dog 6, which dog is provided, as shown, with a lateral arm projecting between the spokes of the gear to which the dog 6 is pivoted, and across the plane in which the stop-dog 14 vibrates. The collision of the driving-dog 6 with the stop-dog 14 serves to stop the binder. The gear 4^e engages with and receives motion from the main driving-pinion 5, and is provided, as shown, with the rollers 7 7 7, adapted to act against the dog 6, and thereby to impart rotation to the gear 4^d, and thus drive the binder. The driving-pinion 5 runs loosely upon the packer-shaft 8, and is driven by being clutched with the continuously-running hollow driving-shaft 9, as shown.

The clutching mechanism consists of the lips E E, projecting laterally from the side of the pinion 5, and embracing the sides of the cross-head E', formed upon the end of the hollow driving-shaft 9. The hollow driving-shaft 9 is itself driven by means of the usual sprocket-wheel, A, and chain A', the sprocket-wheel A being held in place during the adjusting movements of the binder by means of the ordinary yoke attached to the frame of the harvester. The bifurcated arms B B of the yoke bear respectively upon the opposite ends of the hub A^2 of the sprocket-wheel A.

To provide for the operation of the packers,

the packer-shaft 8 has affixed to its forward end a head, to which is pivoted a rocking dog, 11, having upon its rear side a projection which constitutes the pawl 12.

A spring, *h*, carried upon the head 10, and acting upon the longer end of the rocking-dog 11, as shown in Fig. 10, tends to swing the free end of the pawl 12 outward into the concentric path of movement of the pushers 13 13, affixed to the front side of the pinion 5. As will be seen on reference to Figs. 8 and 9, the pushers 13 13 are simply flanges in the form of concentric arcs projecting laterally from the face of the pinion 5. The ends of these flanges, which are at right angles with the face of the pinion 5, are slightly concave, in order that they may be concentric with the axis of the pawl 12. By the collision of one of the pushers 13 with the free end of the pawl 12, as shown in Fig. 9, the rotating motion of the pinion 5 is imparted to the head 10, and thus to the packer-shaft 8.

A stop-dog, 14, is rigidly secured to the forward end of the trip-shaft 15, and has at its free end a rearwardly-turned finger, *k*, as shown in Fig. 4. When the stop-dog 14 is swung downward, the finger *k* is carried into position to engage one or the other of the ends of the rocking dog 11, and to thereby swing the pawl 12 inward out of the path of movement of the pushers 13 13, as shown in Fig. 8, whereby rotatory motion ceases to be imparted to the packer-shaft 8.

During the latter part of the binding operation the cam on the main gear rocks downward the upper end of the lever 16, and by means of the rod 17, connecting the lower end of the lever 16 with the stop-dog 14, pulls the latter upward, carrying its finger *k* into position to engage the laterally-projecting arm of the dog 6, and thereby stop the imparting of motion to the binder. As in the well-known Appleby binder, the upper end of the lever 16, by acting upon the usual notch in the main-gear cam, serves to give a slight forward impulse to the main gear, and then to hold it positively in position during the time while the packers are operating.

The lower portion of the rod 17 is offset to form the shoulder *l*, and, having been loosely inserted through a hole in the stop-dog 14, is provided with the expanding spiral spring 18, which exerts its thrust in one direction against the under side of the stop-dog, and in the opposite direction against the adjusting-nut 19, screwed onto the threaded lower portion of the rod 17. The trip-shaft 15 has affixed to its rear end the crank-arm 20, and has loosely sleeved upon it, next adjoining the crank-arm 20, a yoke, 21, to which the lower ends of the packers are connected by the links 25 25, respectively. The yoke 21 is provided with a laterally-projecting lip, 22, through which there is inserted a set-screw, 23, in position to bear against the crank-arm 20. During the operation of packing the grain the yoke 21 is forced to swing outward in the direction of the arrow *m*, (shown in Fig. 2,) by reason of its connection, by means of the links 25, with the lower ends of the packers and the collision of the set-screw 23 with the crank-arm 20. The outward swing of the crank-arm 20 rocks the trip-shaft 15 in its bearings. The stop-dog 14, being rigidly attached to the trip-shaft 15, is thus swung downward a sufficient distance to disengage its free end from the driving-dog 6.

The yoke 21 is provided with a lateral projection or boss, 26, which plays within the notch 27, formed in the binder-frame. The width of this notch determines the range of swinging movement which the yoke 21 is permitted to have. This range of movement is a little more than sufficient to permit the free end of the stop-dog 14 to be swung downward out of engagement with the driving-dog 6, and to thus trip the binder into gear; but as this limited range of movement is not sufficient to carry the stop-dog downward within reach of the rocking-dog 11 of the packer-clutching mechanism, the crank-arm 20 is left free to rock away from the end of the set-screw 23, as shown in Fig. 3. The necessary additional movement of the stop-dog 14 is given to it the instant the binder-gear starts, by the expansion of the spring *n*, which rocks the lever 16 upward, and by means of the rod 17 pushes downward the stop-dog 14, and thereby rocks the shaft 15 and carries the crank-arm 20 away from the set-screw 23. During the latter portion of the binding operation the lever 16 is rocked downward by the cam on the main binder-gear, and the rod 17 being thus pulled upward the spring 18 is compressed until its thrust upon the under side of the stop-dog 14 is strong enough to disengage the stop-dog 14 from the packer-clutching mechanism and carry it upward into the position in which it engages the driving-dog 6. By this upward movement of the stop-dog 14 the arm 20 is carried into collision with the set-screw 23, and the yoke 21 is consequently rocked backward until the projection 26 brings up against the side of the notch 27, as shown in Fig. 2. It will therefore be seen that the set-screw 23 in the yoke 21 affords a means of varying the range of upward movement of the stop-dog 14. By screwing in the set-screw 23 the arm 20 will be sooner brought into collision with it during the upward movement of the stop-dog 14, and the upward movement of the stop-dog 14 will be therefore sooner arrested by the collision of the projection 26 with the side of the notch 27, and, on the other hand, by unscrewing or turning out the set-screw 23 the stop-dog 14 will be permitted to move farther upward before its motion is arrested by the collision of the arm 20 with the end of the set-screw 23 and the bringing up of the projection 26 on the side of the notch 27. There is thus afforded a means of varying the depth of engagement of the stop-dog 14 with the driving-dog 6, and hence of governing the extent of downward

movement which must be given to the stop-dog 14 to disengage it from the driving-dog 6, and to thus permit the driving-dog 6 to start the binder into operation. The downward movement of the stop-dog 14 is at this time resisted by the spring 18, and hence the disengagement of the stop-dog 14 from the driving-dog 6 will not be effected until there has been such an accumulation of grain in the gavel-receptacle that the resistance opposed to the stroke of the packers is great enough to overbalance the resistance which the spring 18 opposes to the downward movement of the stop-dog 14. It will therefore be seen that while the adjusting-nut 19 affords a means of regulating the tension of the spring 18 the provision of the set-screw 23 in the yoke 21 affords a means of increasing or decreasing the extent to which the spring 18 must be compressed in the act of tripping the binder into gear.

Just at the conclusion of the binding operation, as represented in Fig. 2, the laterally-projecting arm of the binder-driving dog 6 is carried against the lip *k* of the stop-dog 14, and the dog 6 is thereby rocked out of the path of the driving-rollers 7 on the gear 4^e, which thereafter revolves without imparting its rotation to the gear 4^d, and hence leaves the binder at rest. In the meantime the lip *k* of the stop-dog 14 has been swung upward out of engagement with the rocking-dog 11, and under the influence of the spring *h* the pawl 12 has been rocked outward into the path of the pushers 13 13, so that as soon as either of the pushers engages the pawl 12 the rotatory motion of the continuously-rotating pinion 5 will be imparted to the packer-shaft 8, as has been described, thus setting the packers at work. When sufficient grain has been accumulated for a bundle, the trip-shaft 15 will be rocked in its bearings by reason of its connection with the packers through the links 25 and the yoke 21. The set-screw 23 of the yoke 21, pushing against the crank-arm 20, rocks the trip-shaft and the arm 20 in the direction indicated by the arrow *m* in Fig. 2. The stop-dog 14, being secured to the trip-shaft, is thereby rocked downward, thus releasing the binder-driving dog 6, which is then thrown by its spring D, as shown in Fig. 3, into position to be engaged by some one of the rollers 7 7 7 on the gear 4^e. Such engagement imparts rotation to the gear 4^d, as has been described, and again starts the binder into operation. When the binder-gear 2 commences its movement, the upper end of the lever 16 is released from its notch in the binder-cam and thrust upward by the expanding spiral spring *n*, which actuates it. The lower end of the lever 16 is thus rocked downward, and, acting through the rod 17, rocks the stop-dog 14 still farther downward, until its lip *k* rides upon the periphery *o* of the packer-driving head 10, where it is in position to engage either end of the rocking-dog 11, and thereby to rock the pawl 12 out of the path of the pushers 13 13 on the pinion 5, as shown and described. The rocking-dog 11 in rocking back upon its pivot uncovers one of the notches *p p* in the periphery of the packer-driving head 10, into which the lip *k* of the stop-dog 14 is forced, as shown in Fig. 3, and thus locks the packers.

As has been explained, provision for permitting the stop-dog 14 the range of movement necessary to enable it to act both for the binders and for the packers is made by leaving the crank-arm 20 free to rock away from the set-screw 23, carried by the yoke 21, the range of movement of the yoke 21 being determined by the projection 26 playing in the notch 27. As has also been stated, the depth to which the lip *k* of the stop-dog 14 engages with the binder-driving dog 6 to hold the latter disengaged from either of the driving-rollers 7 7 7 is adjusted by the set-screw 23 bearing against the crank-arm 20 of the trip shaft 15, to which the stop-dog 14 is attached. It will thus be seen that the drive-dog 6, pivoted to the gear 4^d, and the rollers 7 7 7, carried upon the gear 4^e, constitute the clutching mechanism for driving the binder, and that the rocking-dog 11, carrying the pawl 12, pivoted to the packer-shaft head 10, and the pushers 13 13, affixed to the side of the continuously-rotating pinion 5, constitute the clutching mechanism for driving the packers, and that the arm of the binder-driving dog 6 and the ends of the rocking-dog 11, carrying the packer-driving pawl 12, are arranged in the vertical plane in which the stop-dog 14 vibrates, and that the organization is such that the stop-dog 14 arrives at the end of its upward excursion in time to intercept the arm of the binder-driving dog 6, and by its collision therewith rocks the dog 6 out of the path of the rollers 7 7 7, and thus disconnects the clutching mechanism for driving the binder, and similarly arrives at the end of its downward excursion in time to intercept one of the ends of the rocking-dog 11, by engaging which it rocks the pawl 12 out of the path of the pushers 13 13, and thus disconnects the clutching mechanism for driving the packers.

What is claimed as the invention is—

1. In a grain-binder wherein the binder proper and the packers work and rest alternately, clutching mechanism to drive the binder, and clutching mechanism to drive the packers, in combination with a single stop-dog in the form of an arm pivoted at one end and swinging in the plane in which the said clutching mechanisms are arranged for acting alternately with the clutching mechanisms of the binder and packers to stop and hold one at rest while the other is in operation, substantially as set forth.

2. In a grain-binder, the trip-shaft 15, having the stop-dog 14 secured to one end thereof, the crank-arm 20 at the other end thereof, the yoke 21 sleeved thereon near the crank-arm 20, and the set-screw 23 inserted through

a part of the yoke 21, whereby the stop-dog 14 may be adjusted, as described.

3. In a grain-binder, the trip-shaft 15, having the stop-dog 14 secured to one end thereof, the crank-arm 20 secured to the other end thereof, and the yoke 21 sleeved thereon near the crank-arm 20 and acting upon the crank-arm 20 in one direction to trip the binder, whereby the crank-arm 20, and hence the stop-dog 14, may have a movement independent of the movement of the yoke 21, as and for the purpose described.

4. In a grain-binder, the main frame 1, having formed upon it a flange, *a*, provided with seats or bearings for supporting the inner end or ends of an intermediate gear-wheel stud or studs, and an additional flange, *c*, provided with seats or bearings for supporting the outer end or ends of the intermediate gear-wheel stud or studs, and a seat or bearing for supporting the driving and packer shafts outside of the driving-gears thereof.

5. In a grain-binder wherein the stop-dog is actuated by a cam on the binder-gear, a lever, 16, actuated in one direction by the said cam, in combination with a spring, *n*, for actuating the said lever in the opposite direction, a stop-dog, 14, for controlling the movement of the binder, and a rod, 17, connecting the lever 16 with the said stop-dog, and provided with a shoulder, *l*, for transmitting to the said stop-dog the motion derived from the spring *n*, as and for the purpose described.

6. In a grain-binder wherein the stop-dog is actuated by a cam on the binder-gear, the combination, as herein set forth, of the lever 16, the spring *n*, the stop-dog 14 for controlling the movement of the binder, the rod 17, connecting the lever 16 with the stop-dog 14, and provided with the shoulder *l*, the adjusting-nut 19 upon the lower threaded portion of the rod 17, and the expanding-spring 18, bearing at its lower end against the nut 19 and at its upper end against the under side of the stop-dog 14.

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