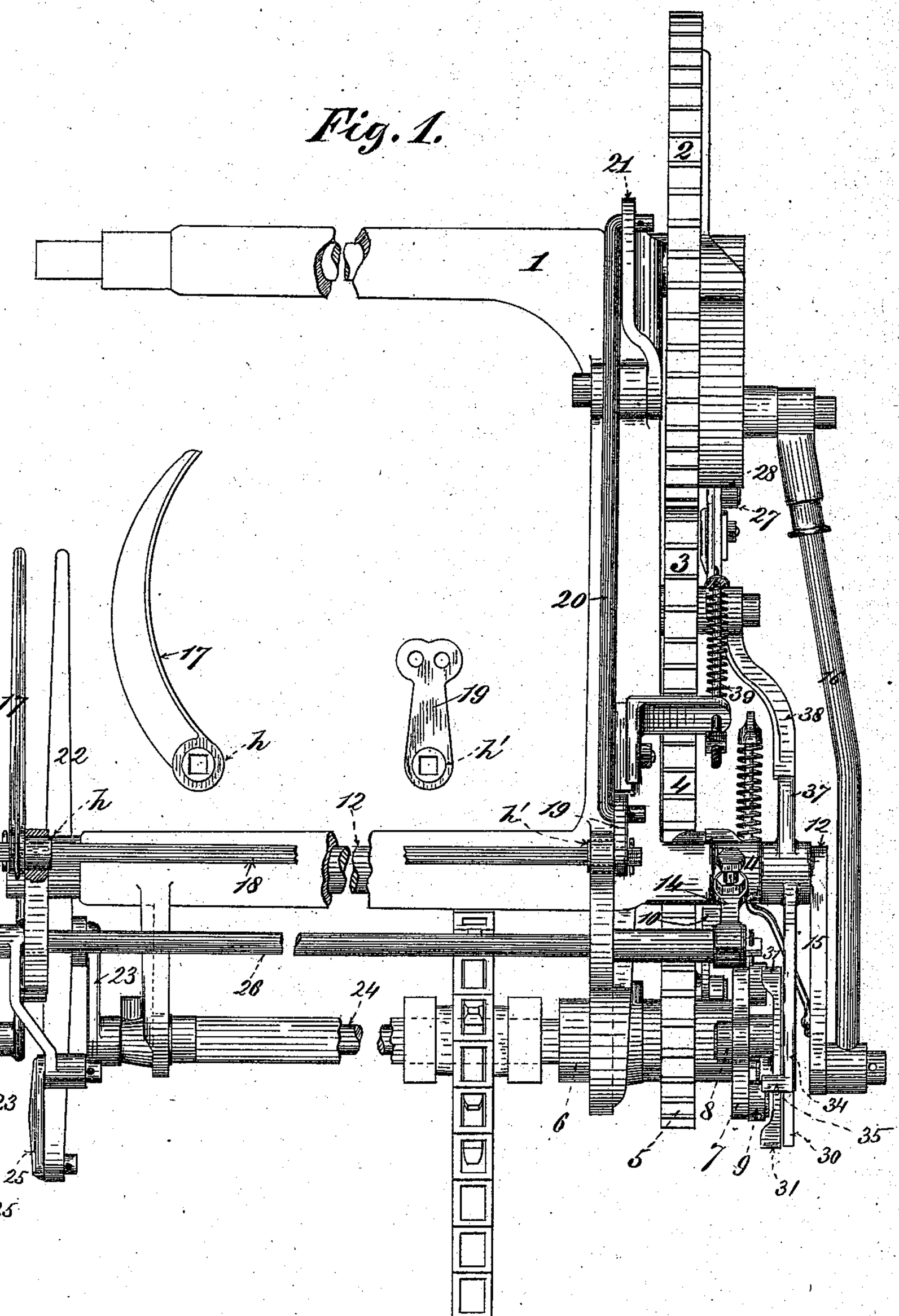
(No Model.) 3 Sheets—Sheet 1.

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

GRAIN BINDER.

No. 380,119. Patented Mar. 27, 1888.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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GRAIN BINDER.

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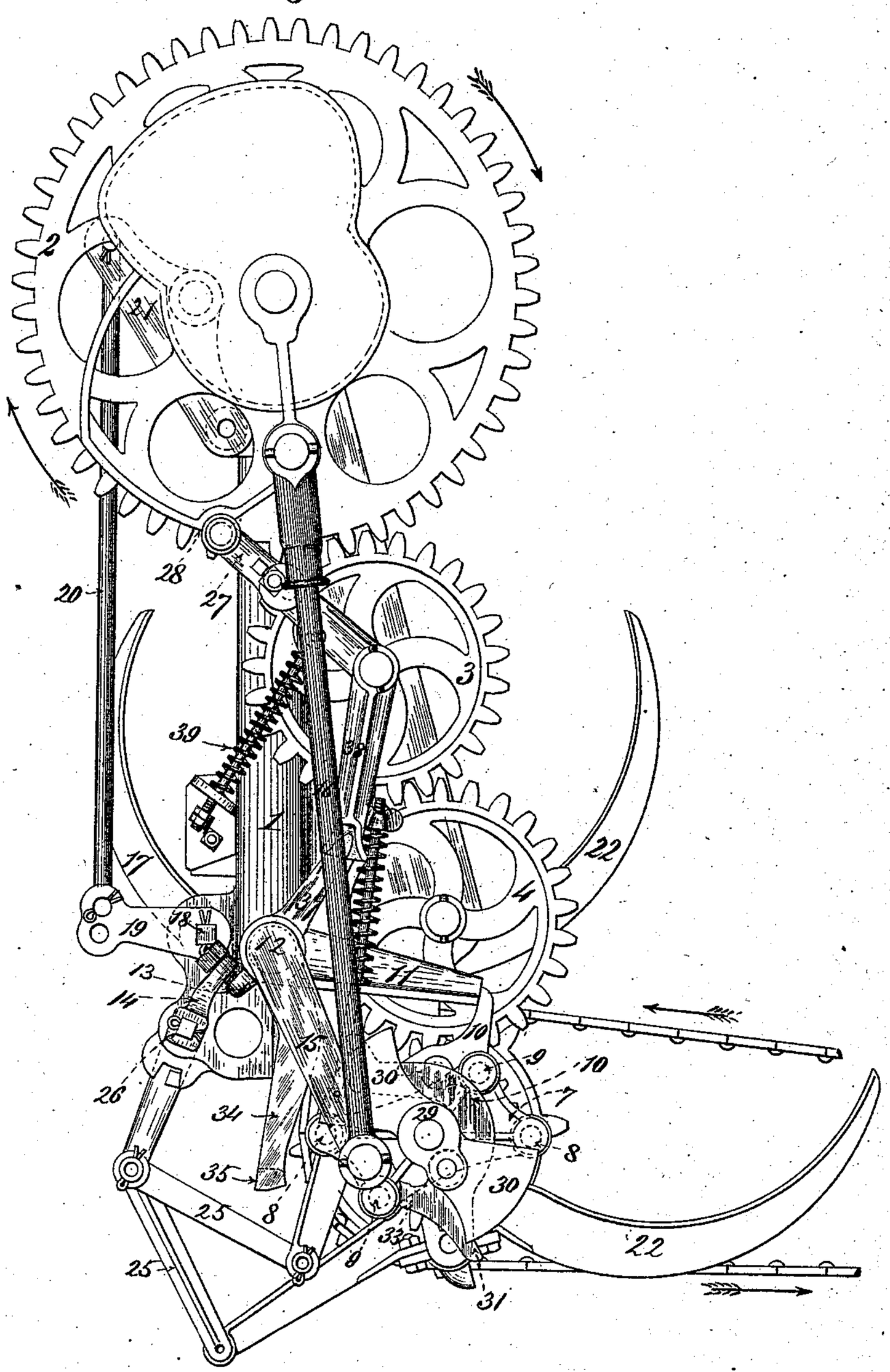
Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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

GRAIN BINDER.

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Fig. 4.

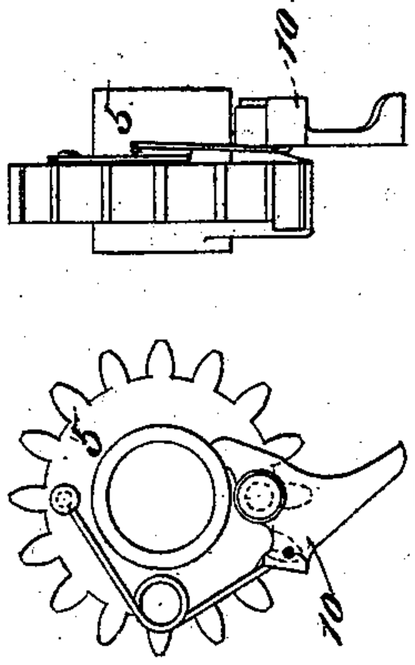


Fig. 5.

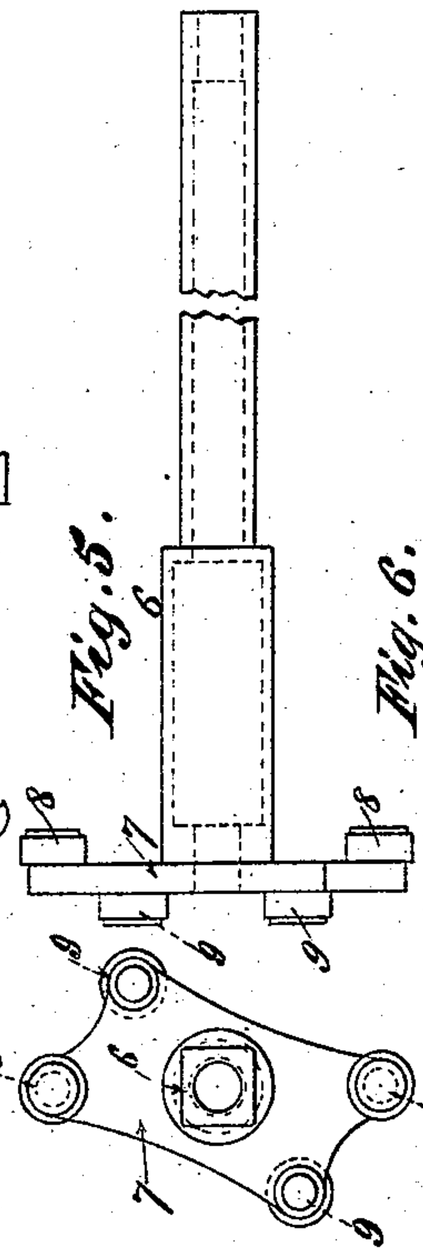


Fig. 6.

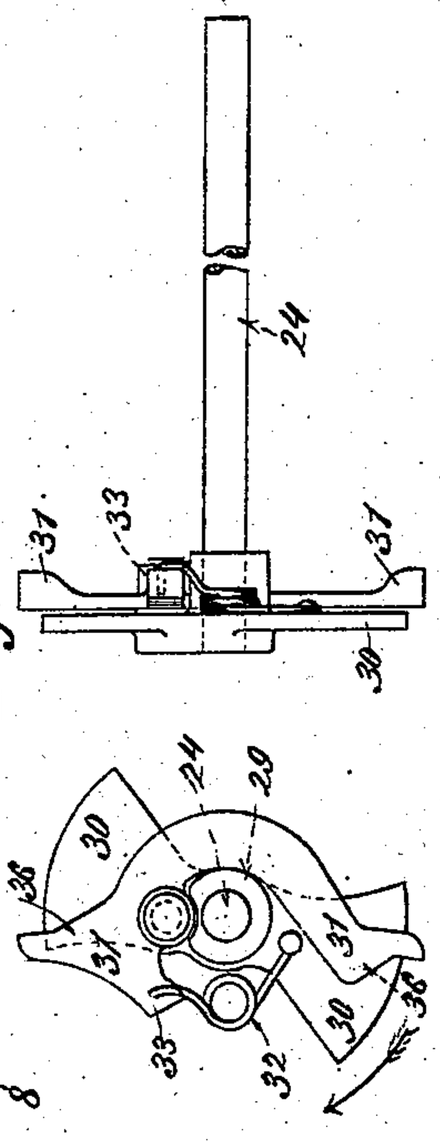
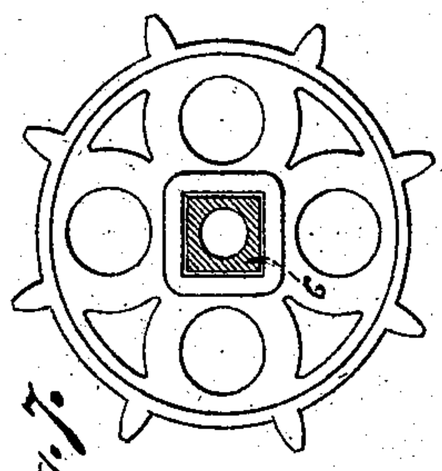


Fig. 3.

Fig. 7.



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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. 380,119, dated March 27, 1888.

Application filed September 29, 1887. Serial No. 251,014. (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 that class of binders in which the packers remain at rest during the binding operation and resume their labor at the completion thereof. It embraces the hereinafter-described devices for accomplishing this result in a simple, positive, and effective manner; also the hereinafter-described construction of the compressor-shaft and its accessories, whereby the said shaft and its accessories are appropriately associated and the shaft provided with bearings in the framework of the binder with a small amount of labor, and also the employment of the compressor-shaft as a torsion-spring, by which the ordinary compressor-spring is dispensed with.

Figure 1 is an elevation of a binder embodying this invention, looking from the stubble side. Fig. 2 is an elevation of the same looking toward the rear of the machine, with the parts shown in their proper position when the binder is at rest and the packers in operation; Fig. 3, the same view with the binder in operation and the packers at rest, the packers and some other parts being omitted to more clearly show the other features; Fig. 4, details of the pinion which drives the binder; Fig. 5, a continuously-running sleeve or shaft from which the binder and packers take their motion; Fig. 6, the packer-shaft with the packer-cranks omitted; Fig. 7, a sprocket-wheel which communicates motion to the sleeve 6.

In the drawings the several parts of the apparatus are numbered consecutively. Thus 1 is the main frame of the binder; 2, the main binder-gear; 3 and 4, intermediate gears for transmitting motion from the binder-driving pinion 5 to the main binder-gear. A continuously-running hollow shaft, 6, is mounted in suitable bearings in the binder-frame and provided with a driving-head, 7, upon the opposite sides of which are mounted two sets of driving-rollers, 8 and 9. The pinion 5, mounted loosely upon the shaft 6, has pivoted to it the driving-dog 10, and is rotated by the engagement of the driving-dog 10 with either one of the rollers 8. The portion of the shaft 6 between its bearings is square and is loosely inserted through the hub of the driving sprocket-wheel, which, during the adjusting movement of the binder, slides upon the square part of the shaft 6.

11 is a stop-dog for the binder. It is loosely hung upon the needle-shaft 12 next to the bearing of the latter in the main frame. The stop-dog 11 is provided with a heel, 13, against which a set-screw in the trip-arm 14 bears to actuate the same.

15 is a crank-arm on the needle-shaft 12, which, by means of the pitman 16, is connected to a wrist-pin on the main gear 2.

17 is the compressor, and 18 the compressor-shaft, connected and operated in the usual manner by the crank 19, connecting-rod 20, quadrant 21, and main binder-gear 2.

22 are packers mounted upon cranks 23 on the packer-shaft 24 and having their lower ends or extensions, below the cranks 23, connected by the links 25 to a rock-shaft, 26, which serves to trip the binder through the medium of the set-screw and trip-arm 14, as shown. A locking-dog, 27, acting upon the cam 28 on the main gear 2, serves to give the said gear 2 a slight impulse forward and hold the same positively in position after the dog 10 of the pinion 5 has been disengaged from the drive-roller 8.

The parts thus far described are in many respects substantially the same in construction and mode of operation as the similar parts in the well-known Appleby binder, and further explanation thereof in detail is therefore unnecessary; but it will be observed that the binder-driving shaft 6, as before explained, is hollow and contains the packer-shaft 24, which is provided with bearings, as shown, at each end thereof. The packer-shaft 24 has affixed to its forward end the head 29, provided with the two quadrantal flanges 30, whose peripheries are concentric with the shaft 24. To the head 29 is pivoted a double-end driving-dog, 31, which is thrown into working position by the spring 32, so that one of the rollers 9 on the continuously-running shaft 6 will engage with the heel 33 thereof, and thereby drive the

packer-shaft 24. The drive-dog 31 has two cam-faces, 36, the functions of which will be hereinafter referred to.

34 is a stop-dog for the packers. It is sleeved or pivoted upon the needle-shaft between the crank 15 and the binder stop-dog 11 and has at its lower end a rearward bend, 35, which, by collision with the packer-driving dog 31, at the appropriate time disengages the driving-roller 9 from the heel 33 of the dog 31, and thus stops the packers. To the hub of the packer stop-dog 34 is affixed an upwardly-projecting arm, 37, the free end of which is adapted to engage with the recessed lower end of the arm 38, extending downwardly from the hub of the locking-dog 27, as shown. A spiral spring, 39, serves to actuate the locking-dog 27 in the usual manner.

In operation, when the packers are at work and while the binders are at rest, as shown in Fig. 2, the binder drive-dog 10 bears against the binder stop-dog 11, which depresses the heel of the drive-dog 10, so that the drive-roller 8 may pass outside thereof, the binder being locked in position by the locking-dog 27 and cam 28, all in the usual manner. While the driving-head 7 is being continuously driven in the direction shown by the chain and sprocket-wheel, the bearing of one of the rollers 9 against the heel 33 of the packer-driving dog 31 drives the packers. When the gavel is collected, the binder is tripped into gear by the action of the packers through the links 25, rock-shaft 26, trip-arm 14, and heel 13 on the stop-dog 11, whereby the stop-dog 11 is raised from contact with the long arm of the drive-dog 10 on the driving-pinion 5. The dog, being thus released, is thrown by its spring into position to be engaged and rotated by one of the drive-rollers 8, whereby the binder is set into operation in the usual manner. When the main binder-gear 2 has moved a short distance in the direction indicated, the upper end of the locking-dog 27 is released from the cam 28 and is thrust upward by the recoil of its spring 39. This swings the arms 38 and 37 outwardly and carrries the packer stop-dog 34 inward toward the packer-shaft until the lower end of the dog comes in contact with and rides upon the periphery of one of the quadrantal flanges 30. Before this arm passes off the said flange, the end of the packer-driving dog 31, by acquiring contact with the rearward projection, 35, of the stop-dog 34, is rocked upon its pivot, which depresses the heel or shorter arm, 33, thereof and disengages the same from the driving-roller 9, thus stopping the packers in substantially the same manner as that in which the binder is stopped. When the drive-dog 31 has been arrested in its movement by contact with the stop-dog 34, and the flange 30, with the roller 9, has moved forward, so that by the rocking upon its pivot of the drive-dog 31 its heel 33 has been depressed sufficiently to allow the drive-roller 9 to pass outside of it, an opening is presented between the cam-face 36, Fig. 3, and the rear surface of the flange 30. Into this opening the bend 35 of the stop-dog 34 is carried by the force derived from the spring 39, and as the bend 35 moves down the inclined cam-face 36 it further depresses the heel 33 of the dog 31, so that the heel 33 is carried out of the path of the drive-roller 9, thus preventing any contact between the said roller 9 and the dog 31 until the latter shall have been released by the action of the cam 28 on the locking-dog 27 at the completion of the binding operation, when the binder comes to rest and the packers resume their work, the parts being then in the position in which they are represented in Fig. 3. The dropping of the bend 35 of the dog 34 in the opening behind the flange 30, as described, locks the packer-shaft against any backward movement after the driving devices have been disengaged, which backward movement might otherwise ensue from the pressure of grain which has been packed into the gavel-receptacle, the packers being purposely so arranged and timed that they will stop and hold the accumulated gavel at a point in advance of the needle's path, and thus relieve the needle from the labor of penetrating the mass of grain.

It results from the inclusion in this organization of stopping and locking devices of the cam-faces 36 for engagement by the bend 35 of the stop-dog 34 that the organization is not prevented from being practically effective by the ordinary wear of the connections in continued use, for if in the course of time there is any looseness or lost motion from this cause the bend 35 is simply forced to move farther down upon the cam-face 36 and to thus rock the dog 31 to its proper position in all cases. Adjustment to compensate for wear is thus rendered unnecessary by making this stopping and locking organization practically self-adjusting.

Another important feature of the organization is its quickness of action. The stop-dog 34 is actuated the instant the main binder-gear begins to move, and hence the packers are stopped promptly before the needle can be projected above the deck to interfere with their action.

The drive-dog 31 is made double, so that either of its opposite ends may be acted upon by the bend 35 of the stop-dog 34, in order that either of the two packers may be stopped and made to hold the accumulated gavel forward of the needle accordingly as either packer may be nearer the gavel when the binder is tripped into gear.

It is of course not new to stop the packers by means of a cam on the main binder-gear. The novelty herein consists in the described combination of devices whereby either one of the two packers may be stopped and locked rigidly to hold the accumulated gavel in such position that the needle makes its movement behind rather than through the mass of grain composing the gavel.

The compressor-shaft 18 is made of a square

bar of spring-steel. The hub *h* of the compressor 17 and the hub *h'* of the crank-arm are each made with a square central opening to fit the shaft 18, and are seated in bearings in the binder-frame, as shown in Fig. 1, in which figure a portion of the binder-frame near the compressor is represented as broken away to show the construction. The compressor-shaft 18 is made of such size that its torsional elasticity will provide all the elasticity required for the compressor, so that the cumbersome coiled-spring device heretofore used for the compressor is dispensed with. By this construction all machine-work is avoided, excepting the drilling of a cotter-hole in each end of the shaft 18. The latter is simply cut from commercial steel bar, drilled as above, put in its place in the binder-frame, the compressor and bell-crank put on, as shown in Fig. 1, and the cotters put in to hold the compressor and crank-arm in place.

What is claimed as the invention is—

1. In a grain-binder, the continuously-running hollow shaft 6, the drive-head 7, the rollers 8 and 9 on opposite sides thereof, the stop-dog 11 and the locking-dog 10, a driving sprocket-wheel adjustably mounted upon a square part of the shaft 6 to drive the same, the packer-shaft 24, mounted within the hollow shaft 6, the driving-head 29 and driving-dog 31 thereon, the stop-dog 34, the arms 37 and 38, locking-dog 27, the spring 39, and cam 28, whereby the binder when stopped is locked in position and the packers started, and whereby the packers are stopped and locked in position by the starting of the binder, in the manner set forth.

2. In a grain-binder, a clutching and locking device for the packers thereof, consisting of a packer-shaft, a driving-head thereon provided with quadrantal flanges, a driving-dog pivoted to the driving-head, and a stop-dog coacting therewith, combined and operating in the manner set forth, whereby when the driving-dog by collision with the stop-dog is rocked upon its pivot and disengaged from its driving member the stop-dog will enter the space opened between the driving-dog and the quadrantal flange to still further rock the driving-dog upon the pivot and securely lock the packer-shaft in position, as described.

3. In a grain-binder in which the binder proper and the packers work and rest alternately, the packer-shaft 24, quadrantal flanges 30, the driving-head 29, and the double driving-dog 31, having the cam-faces 36, in combination with the packer stop-dog 34, as and for the purposes described.

4. In a grain-binder in which the binder proper and the packers work and rest alternately, the packer-shaft 24, the driving-head 29, quadrantal flanges 30, and the double driving-dog 31, having the cam-faces 36, in combination with the packer stop-dog 34, having the upwardly-extending arm 37, the locking-dog 27, having the downwardly-extending arm 38, and the cam 28 on the main gear, as described.

5. In a grain-binder wherein the binder proper and the packers thereof act and rest alternately, a double-crank packer-shaft, with packers thereon, a driving-head upon the packer-shaft, a double driving-dog pivoted to the driving-head, and suitable stopping mechanism coacting with the double dog, whereby either one of the two packers may be stopped in position to hold the accumulated gavel in advance of the path of the needles, substantially as described.

6. In a grain-binder, a torsionally-elastic compressor-shaft, in combination with a compressor at one end and a crank-arm at the other end, said compressor and crank-arm having hubs provided with angular openings adapted to fit on the ends of the compressor-shaft, and the said hubs being themselves seated in circular bearings formed in the binder-frame, substantially as described.

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