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W. M. HOLMES.

GRAIN BINDER.

No. 422,414. Patented Mar. 4, 1890.

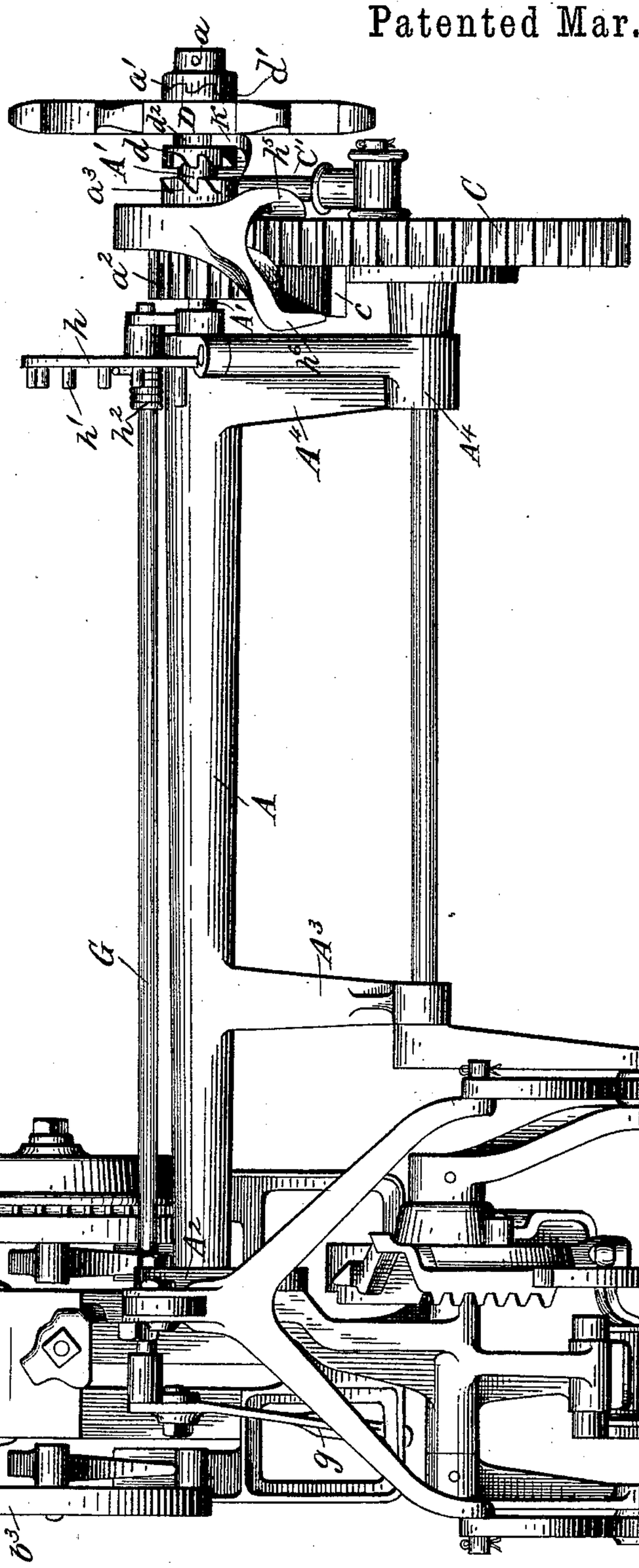

Fig. 1

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W. M. HOLMES.

GRAIN BINDER.

No. 422,414. Patented Mar. 4, 1890.

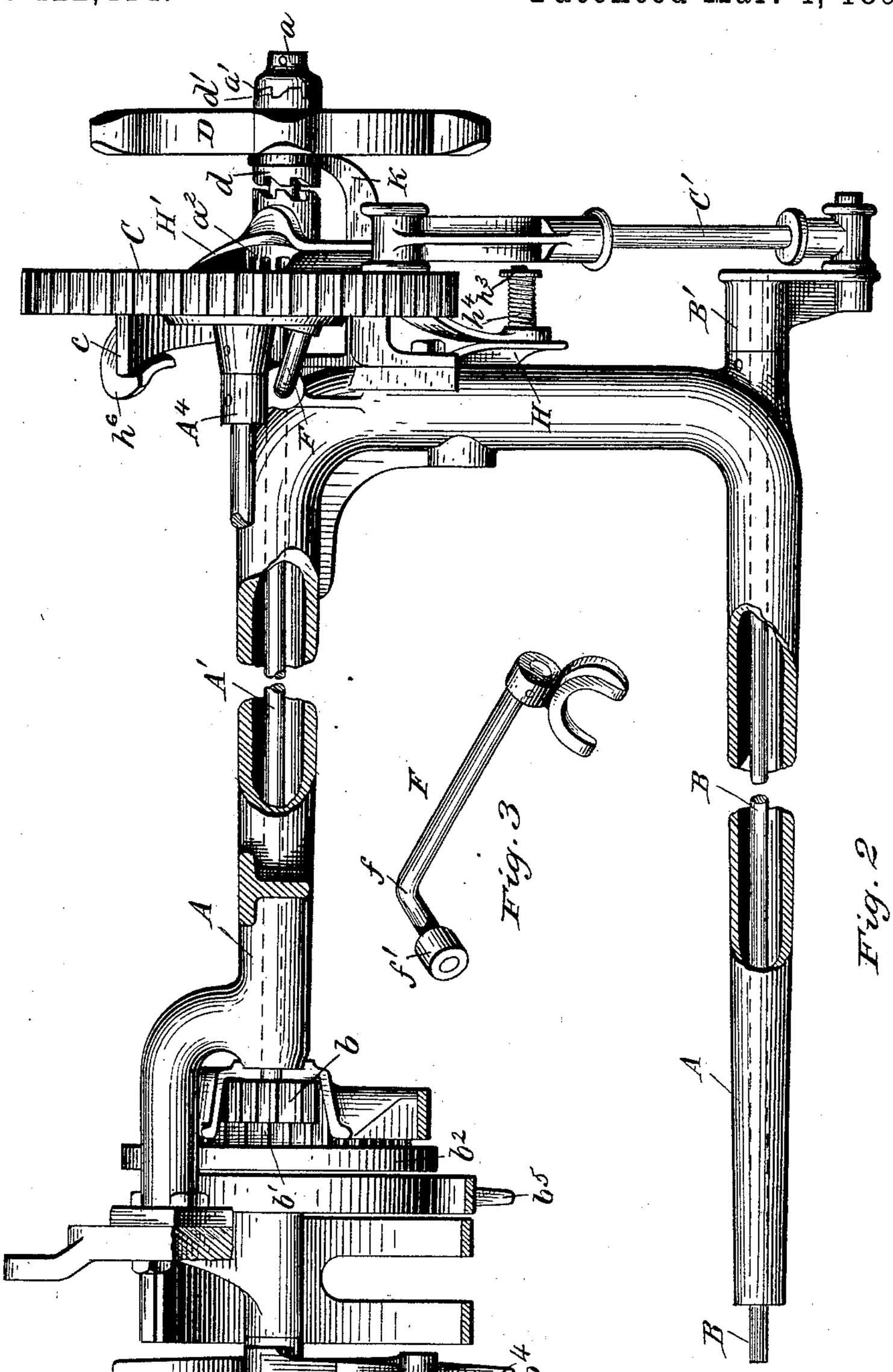

Fig. 3

Fig. 2

WITNESSES.

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W. M. HOLMES.

GRAIN BINDER.

No. 422,414. Patented Mar. 4, 1890.

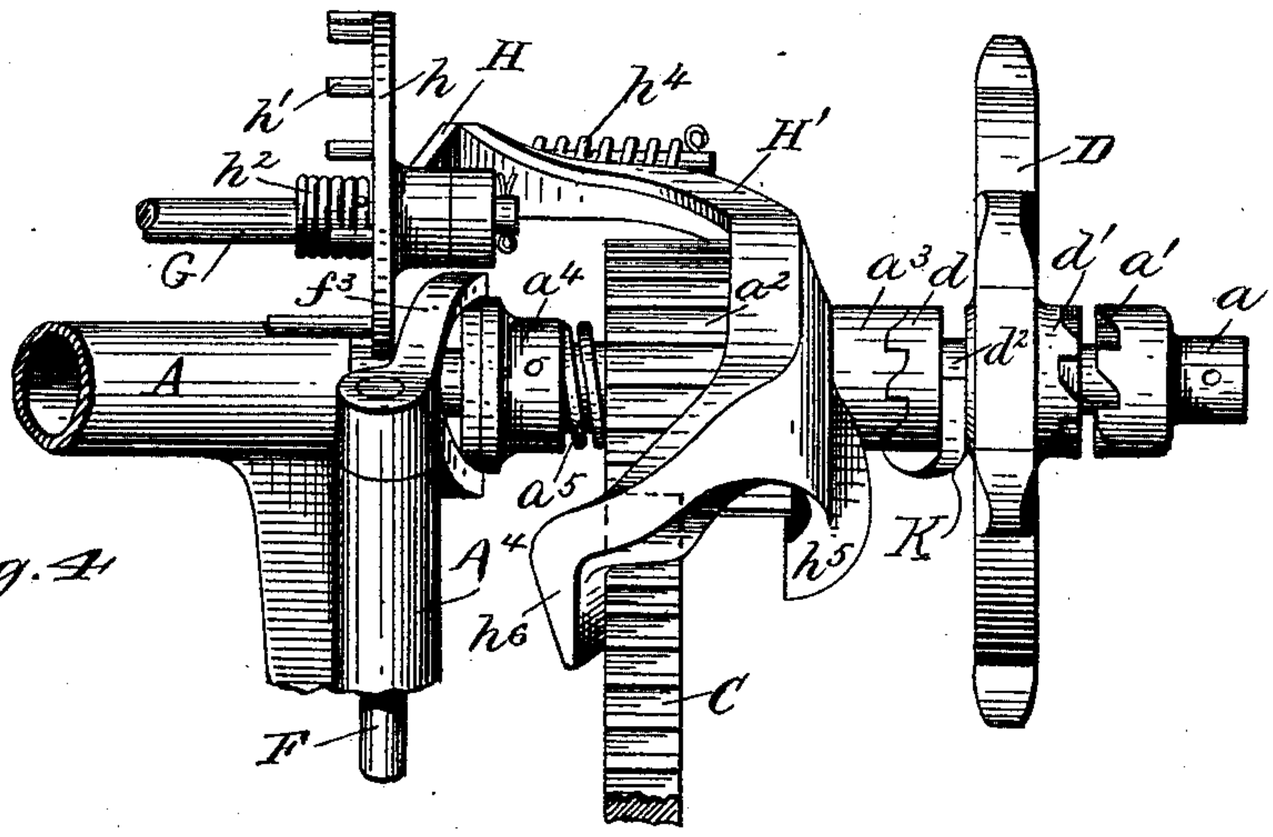

Fig. 4.

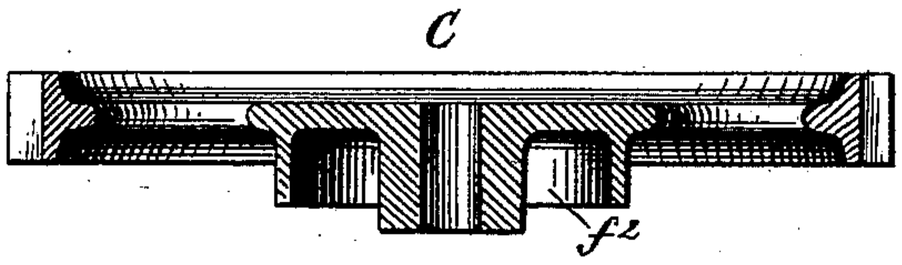

Fig. 5

Fig. 6

WITNESSES.

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W. M. HOLMES.

GRAIN BINDER.

No. 422,414. Patented Mar. 4, 1890.

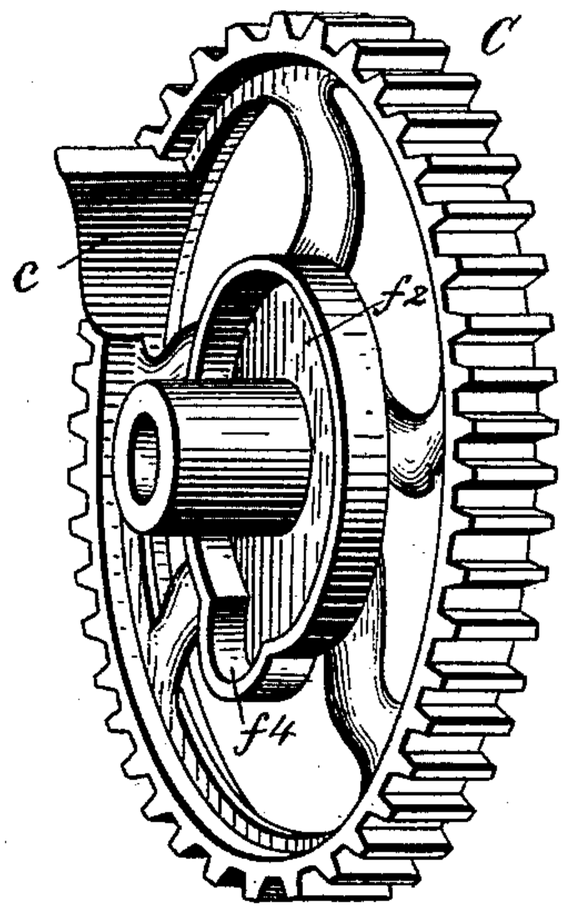

Fig. 7

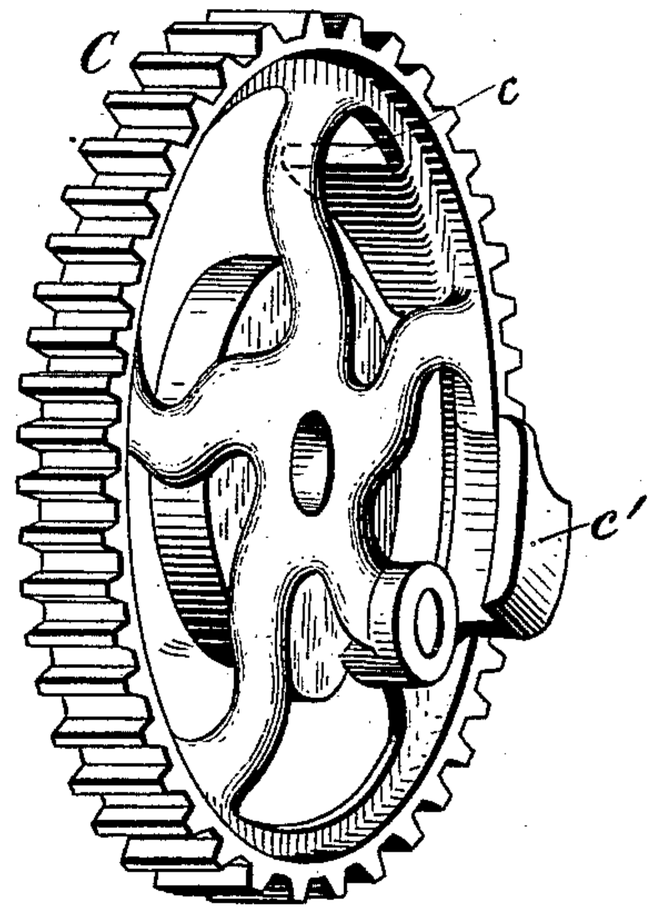

Fig. 8

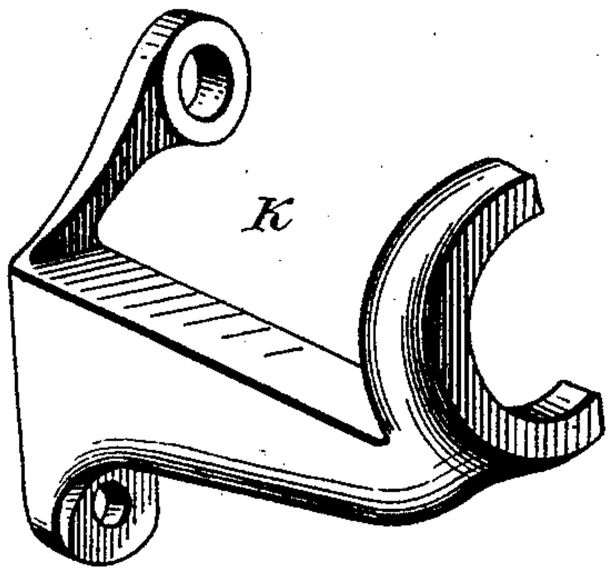

Fig. 9

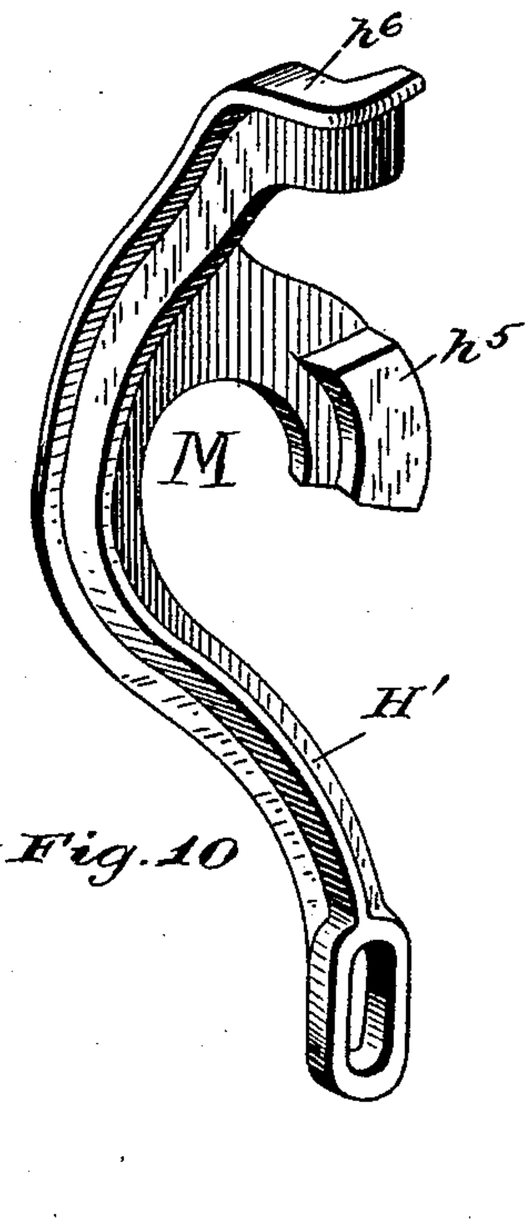

Fig. 10

WITNESSES.

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W. M. HOLMES.

GRAIN BINDER.

No. 422,414. Patented Mar. 4, 1890.

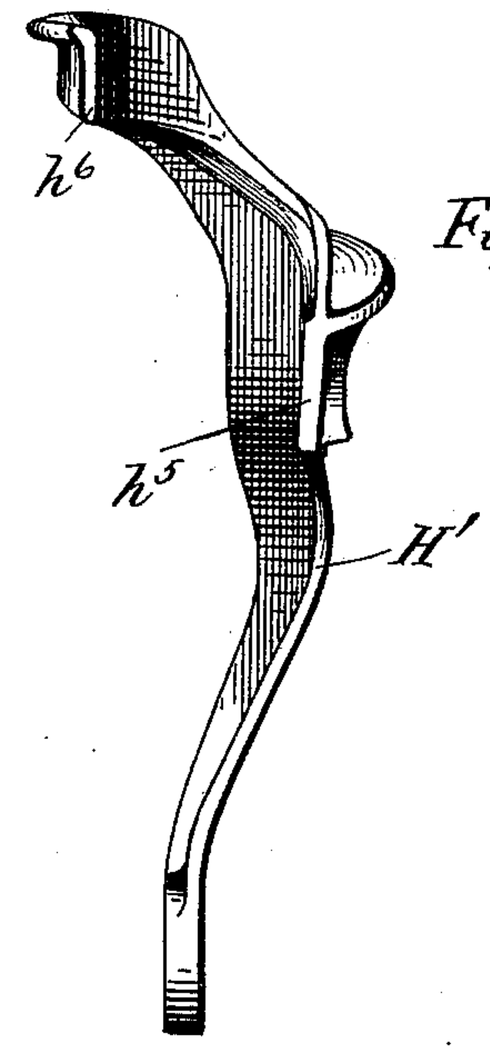

Fig. 11.

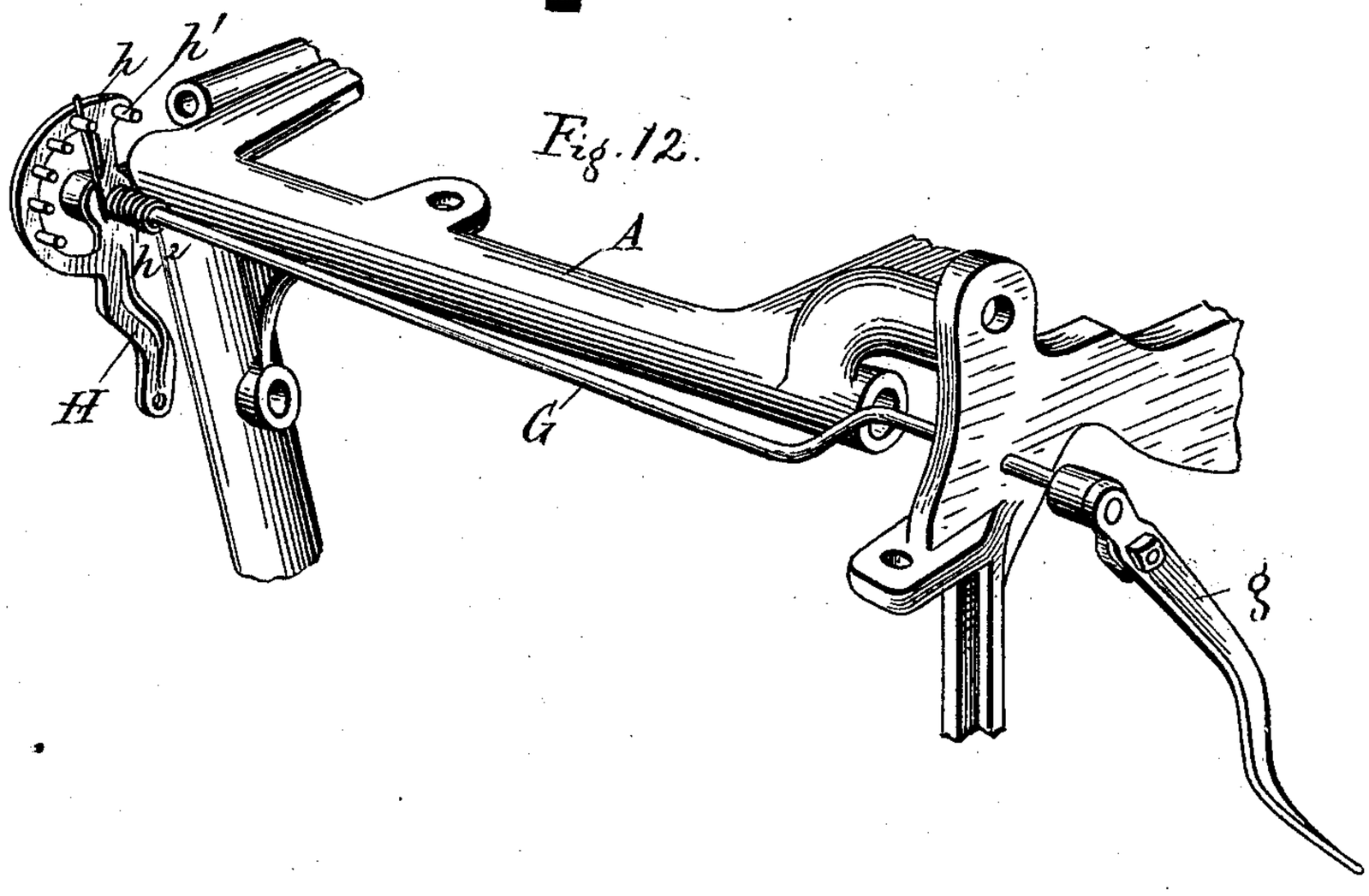

Fig. 12.

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UNITED STATES PATENT OFFICE.

WATSON M. HOLMES, OF HOOSICK FALLS, NEW YORK.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 422,414, dated March 4, 1890.

Application filed February 28, 1889. Serial No. 301,547. (No model.)

To all whom it may concern:

Be it known that I, WATSON M. HOLMES, a citizen of the United States, residing at Hoosick Falls, county of Rensselaer, and State of New York, have invented certain new and useful Improvements in Grain-Binders, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates more particularly to the mechanism by which the action of the packers is arrested and the binder started when a certain predetermined amount of straw has accumulated in the binder-receptacle, and by which the binder is stopped and the packers again started when the gavel has been bound.

My invention consists in the combination, with a constantly-revolving driver provided on either side with clutching mechanism and mounted loosely on its shaft, of a clutch fast on the shaft on one side of the driver and a spring-actuated clutch loose on the shaft, with means for causing, through the accumulation of grain in the binder-receptacle, the driver to engage one clutch to start the binder and to be disengaged by the starting of the binder from the other clutch, which operates the packers.

My invention furthermore consists in certain other details of arrangement and combinations of parts, as will be more fully hereinafter described, and pointed out in the claims.

Referring to the accompanying drawings, in which similar letters of reference indicate like parts, Figure 1 is a top plan view of a machine embodying my invention. Fig. 2 is a side elevation showing the packers, the tripping and actuating devices, and the needle-arm shaft. Fig. 3 is a perspective view showing the lever for sliding the packer-shaft to disengage the clutch secured thereto from the driver, and to consequently stop the packers. Fig. 4 is a side elevation of the clutches and the driver, also showing part of the tripping device. Fig. 5 is a vertical section through the driving-gear on the binder-shaft. Fig. 6 is a perspective view of the driving-pinion of the binder and of the shipping device for arresting the action of the packers. Figs. 7, 8, 9, and 10 are views of details of the tripping devices. Fig. 11 is a perspective view of the yoke which forms part of the tripping mechanism. Fig. 12 is a perspective view of the tripping-lever and its connections with the yoke shown in Fig. 11.

A is the binder-frame, of the usual form of construction. In the upper limb, which is formed hollow, the packer-shaft A′ has its bearings. Outwardly-extending offsets A^2 A^3 A^4 are also cast integral with or secured to the upper limb of the binder-frame. The binder and discharging-arm shaft is journaled in the offsets A^2 A^3 A^4.

The lower limb of the binder-frame forms a journal-bearing for the needle-arm shaft B, to the forward end of which is secured a crank-arm B′, on a stud in which and on a stud eccentrically secured to the gear-wheel C is pivoted a pitman C′, through which the necessary reciprocating movement is imparted to the needle by the revolution of the gear-wheel C to place the band around the center of the bundle. The packer-shaft A′ extends forwardly beyond the vertical binder-post and carries pinioned or otherwise rigidly secured thereto a clutch-collar *a*, provided with the clutch-teeth *a′*.

The sprocket-wheel D is loosely mounted on the packer-shaft next to the clutch-collar *a*. The hub of the sprocket-wheel is provided on either side with a clutch-face *d d′*, and the inner side of the hub of the sprocket-wheel is formed with a circumferential groove d^2, into which takes a nose-piece K, rigidly fastened to the binder-frame, so as to hold the sprocket-wheel always in the same vertical plane. The sprocket-wheel runs constantly, and is driven by a sprocket-chain running from some suitable constantly-running sprocket-wheel on the harvester.

Loosely mounted on the packer-shaft A′ is a pinion a^2, formed with the clutch-teeth a^3 to engage the clutch-teeth *d* of the sprocket-wheel or driver D. The gear-wheel C, which is secured to the binder-shaft, and through which shaft motion is communicated to the knotting devices and the discharge-arms, meshes with the pinion a^2, and when the clutch-teeth of the latter are in engagement with the clutch-teeth *d* of sprocket D the gear-wheel C is caused to revolve. The packer-

shaft A′ carries on its rear end a gear wheel or pinion b, which meshes with a gear-wheel b', secured to a shaft which carries the disks b^2 b^3, to which are pivoted the packer-fingers b^4 b^5, which, coming in contact with the grain delivered by the harvester, compact it against the tripping device. It is evident that when the clutch-collar a is in engagement with the clutch-teeth d' on the sprocket-wheel D the shaft A′ will be driven, thereby imparting motion to the packers.

Securely pinned to the shaft A′ is a collar a^4, between which and the clutch-pinion a^2 is interposed a spiral spring a^5. Journaled in the offset A^4 is a lever F, which is bent at f and carries a friction-roller f', which takes into a cam-groove f^2 on the wheel C. The other end of the lever F carries a yoke f^3, which fits over the shaft A′ and bears against the face of the collar a^4. The cam-groove f^2 is depressed at f^4, and into the depression f^4 the roller f' rests when the packers are in operation.

G is the trip-shaft, suitably journaled in the binder-frame and carrying the tripping-arm g, which overhangs the binding-receptacle, and against which the crop is forced to start the binding devices and stop the packers. The forward end of the tripping-shaft has secured thereto a downwardly-projecting arm H, which arm carries at its upper end the segmental piece h, provided with the adjusting-teeth h'. A spiral spring h^2 is coiled around the shaft, and one end abuts against the binder-frame and the other against one of the several adjusting-teeth h'. The lower end of the arm H carries a pin or stud h^3, on which is loosely mounted the lower end of the yoke H′, which, extending upwardly, is provided with a semicircular opening M, which fits over the hub of the gear-wheel a^2 and abuts against the collar a^6, turned or otherwise formed on the gear-wheel. The gear-wheel C is provided on either side with lugs c c', and as the gear-wheel C revolves these lugs c' c come, respectively, in contact with the portions h^5 h^6 of the yoke H′. A strong spiral spring h^4 is interposed between the lower end of the yoke H′ and a washer pinned on the end of the stud h^3.

The operation of my invention is as follows: Supposing the parts to be in the position shown in Fig. 1, the collar on the end of the shaft A′ having its clutch-teeth in contact or engagement with the clutch-teeth on the hub of the sprocket-wheel D, and the clutch-teeth on the pinion a^2 out of engagement with the clutch-teeth d, the packer-shaft A′, through the clutch-collar a, fast thereto, will be revolved, and the packers will thereby be driven. As soon, however, as sufficient grain has been forced by the packers underneath the tripping-arm g to depress the arm H, thereby forcing the arm h^6 of the yoke H′ from the lug c, the spring a^5 will be free to act and will move the pinion a^2 forwardly, so that its clutch-teeth will engage with the clutch-teeth d, and the pinion will commence to revolve, thereby imparting motion to the gear-wheel C. As soon as the gear-wheel C starts the cam f^2 will raise the friction-roller f' out of the depression f^4, and the yoke f^3, being thereby forced against the collar a^4, fast to the shaft A′, will slide the shaft forwardly, disengaging the clutch-collar a from the clutch-teeth d', and the packers will come to rest. The forward movement of the packer-driving shaft A is not sufficient to totally disengage the pinion b from the gear b'; but the teeth of the latter, and also of the pinion b, are sufficiently long to permit the sliding movement of the shaft A to disengage the clutch which operates the packer-driving shaft without disengaging b and b'. It will be noticed from the abruptness of the cam-groove at f^4 that the initial movement of the gear-wheel C brings the packers to rest, and a clear space is afforded the needle-arm in its ascent to bring the band around the bundle. As the gear-wheel C continues its revolution the knotter and the discharge-arms will be operated to bind the bundle and eject it from the machine. As the gear-wheel C is nearing the completion of the revolution the ledge or lug c' will come in contact with the portion h^5 and the lug c with the portion h^6. The lug c is wedge-shaped, as shown, and it tends to move the clutch-pinion a^2 out of engagement with the clutch-teeth d. Inasmuch, however, as the portion h^5 bears upon the lug c', the wedge-shaped lug c, as the wheel C revolves, will force the lower end of the yoke H′ outwardly or forwardly, thereby compressing the spiral spring h^4, the yoke H′ being pivoted sufficiently loosely upon the hub of the pinion to permit this lateral movement of the lower end of the yoke. As soon as the portion h^5 has been relieved from the lug c' the spring h^4 will be permitted to act suddenly, thereby overcoming the spring a^5, than which it is stronger, and the clutches a^3 and d will be totally disengaged. The shaft A′ will be also moved rearwardly and the clutch-collar a be brought into engagement with the sprocket-wheel clutch d', the roller f' again falling into the depression f^4 and the packers again started and the binder stopped, ready for the accumulation of the succeeding sheaf and the succeeding operation of the tripping device.

It will be noticed that the lug c' acts as a fulcrum for the yoke-lever H′ in compressing the spiral spring h^4. It will also be noticed that the compression of the spiral spring a^5 throws the packer-shaft backwardly, so that the clutch-collar a is again brought into engagement with the clutch-teeth d and the friction-roller f' again is caused to drop into the depression. The spiral spring which acts to throw the binder-driving clutch into engagement with the driver also acts to slide the packer-driving clutch into engagement with driver. The two clutches are thus thrown into engagement yieldingly, so that the points

of the clutch-teeth are prevented from jamming, and thereby becoming broken. This I consider a very essential feature of my invention, as it is well known to those skilled in the art that it is not practicable to positively force the sliding clutches into engagement. As the binder-driving clutch is being partially disengaged from the driver both the spring interposed between the binder-driving clutch and the collar fast on the shaft and the spring at the lower end of the yoke are compressed. The expansion of the latter spring when released serves to continue the separation of the spring-pressed binder-driving clutch from the driver, compressing its spring, which subsequently, partially expanding, acts against the collar fast on the shaft, sliding the latter to bring the packer-clutch into engagement with the driver, the binder-driving clutch being held against the action of the spring by the yoke and wedge-shaped lug on the binder-driving gear. The packer-driving shaft is kept from being moved longitudinally until the binder-driving clutch-pinion is freed from the driver by means of the roller on the lever journaled in the offset of the binder-frame, which roller traverses the cam on the binder-driving gear. When, however, the binder clutch-pinion is freed from the driver, the roller registers with the depression of the cam on the gear-wheel; but until this time the separation of the clutch-pinion from the driver compresses the spring between the pinion and the collar fast on the packer-driving shaft, which spring as the roller registers with the depression in the cam on the binder-driving gear is free to act to force the packer-clutch into engagement with the driver, as hereinbefore explained.

I am aware that I am not the first to use a continuously-revolving driver provided with clutching mechanism on either side in conjunction with clutches on either side of the driver, the one to operate the binder and the other the packers, together with mechanism for alternately shifting the clutches; but I believe that I am the first to use a driver provided on either side with clutching mechanism and mounted loosely on a driving-shaft in conjunction with a clutch fast on the same shaft and the clutch-pinion loose on the same shaft with mechanism to slide the shaft and clutch-pinion alternately. The advantages of this arrangement are its simplicity and its economy of construction. It will be noticed that when the binder is in motion its driving-pinion is clutched to the driver, which, together with the pinion, revolves loosely on the driving-shaft, and the binder coming to rest, the clutch-collar fast on the driving-shaft being clutched to the driver, the latter revolves with the shaft. It will also be noticed that by sliding the driving-shaft of the packers longitudinally the loosely-mounted driver is always kept in line with its corresponding sprocket-wheel from which it obtains its motion, and that the sprocket-chain which runs the driver is always kept in alignment. This arrangement also brings the various co-operative parts more closely together, making the machine more compact.

I claim—

1. The combination, with a longitudinally-sliding packer-driving shaft and a constantly-revolving driver mounted loosely thereon and a clutch-collar secured thereto, of a clutch on the driver, the gear-wheel on the binder-shaft, and a cam-groove formed on the face thereof, a lever journaled in the binder-frame and having a roller on one end taking into the cam-groove, and a yoke at the other end bearing against the packer-driving shaft, whereby the initial movement of the gear-wheel on the binder-shaft operates the lever to slide the packer-driving shaft through the driver, so that the clutch-collar on the packer-driving shaft will be disengaged from the clutch on the driver, substantially as and for the purpose specified.

2. The combination, with the longitudinally-sliding packer-driving shaft and a driver mounted loosely thereon and provided on either side with clutching mechanism, of a clutch-collar fast on the shaft, a spring-actuated clutch-pinion loose on the shaft, said collar and pinion being on opposite sides of the driver, the binder-driving gear-wheel, and mechanism connecting the binder-driving gear-wheel with the spring-actuated clutch-pinion to slide the latter, and a spring interposed between the loose clutch-pinion and a collar fast on the shaft, whereby the sliding of the clutch-pinion out of mesh with the driver moves the shaft longitudinally, substantially as and for the purpose specified.

3. The combination, with the tripping-shaft and its dependent arm, of a yoke pivoted at its lower end thereto and straddling the hub of a clutch-pinion, and having flanges taking over the periphery of the binder-driving gear, a spring-actuated clutch-pinion, a spring interposed between the lower end of the yoke and a projection on the lower end of the dependent arm of the trip-shaft, and lugs on the binder-driving gear to engage the flanges on the yoke, substantially as and for the purpose specified.

4. The combination, with a constantly-revolving driver and its clutch, of a clutch-pinion engaged thereby to drive the binder, the binder-driving gear, the tripping-shaft, its dependent arm, a yoke pivoted thereon at its lower end and at its upper end on the clutch-pinion, a spring interposed between the lower end of the yoke and dependent arm of the tripping-shaft, lugs on either side of the binder-driving gear, and the flanges on the yoke engaged by the lugs of the binder-driving gear, whereby the latter in disengaging the clutches compresses the spring to continue the separation of the clutches, substantially as and for the purpose specified.

5. In combination with the binder-driving gear-wheel and its wedge-shaped lug for par-

tially disengaging the clutches of a second lug on the opposite side of the binder-driving gear, a yoke pivoted on or straddling the loose clutch-pinion on the main driving-shaft, and a spring compressed by the partial disengagement of the clutches and then suddenly released to continue the separation of the clutches, substantially as and for the purpose specified.

6. The combination, with the constantly-revolving driver loose on its shaft and provided with clutches on either side of the driver, of a clutched collar fast on the shaft, a clutched pinion loose on the shaft, the clutched pinion and the clutched collar being on opposite sides of the driver, a spring interposed between the clutched pinion and a collar fast on the shaft, and means to slide the clutched pinion out of engagement with the driver, whereby the disengagement of the clutched pinion causes the engagement of the clutched collar and driver, substantially as and for the purpose specified.

7. The combination, with the continuously-revolving driver loose on the main driving-shaft and provided on either side with clutch-teeth, of a clutch-pinion meshing with the driving gear-wheel on the binder-shaft, a spring interposed between the pinion and a collar on the shaft, the longitudinally-sliding main driving-shaft, a clutch-collar secured thereto, and means, substantially as described, for alternately sliding the shaft and the clutch-pinion.

8. The combination, with gear-wheel C and arm H of the tripping-shaft, of the yoke H′, having the dependent flanges h^5 h^6, the lugs c c' on gear-wheel C, the spring h^4, and the spring-actuated clutch-pinion a^2, substantially as and for the purpose described.

9. The combination, with a constantly-revolving driver loose on its shaft and provided on either side with clutching mechanism, of a clutch on one side to operate the packer, a clutch on the opposite side to operate the binder, means to disengage the binder-clutch from the driver and hold it disengaged, and a spring compressed by the disengagement of the binder-clutch and then released to throw the packer-clutch into engagement with the driver, substantially as and for the purpose specified.

10. The combination, with a constantly-revolving driver loose on its shaft and having clutches on either side, of a clutch on one side of the driver to operate the packers and a clutch on the other side of the driver to operate the binder, a spring interposed between the packer and binder clutches to force the binder-clutch and packer-clutch into engagement with the driver, means to positively partially disengage and hold disengaged the binder-clutch from the driver, and a second spring positively compressed as the binder-clutch is partially disengaged and then suddenly released to continue the separation of the binder-clutch from its driver, substantially as and for the purpose specified.

11. The combination, with the constantly-revolving driver having clutch-faces on either side and loose on its shaft, of its longitudinally-sliding shaft provided with a clutch to drive the packers, a clutch-pinion loose on the shaft to drive the binder, a spring interposed between the clutch-pinion and a collar on the shaft, and means to positively disengage the clutches, whereby the spring is adapted to force both the clutches alternately into engagement with the driver, substantially as and for the purpose specified.

12. The combination, with the constantly-revolving driver loose on its shaft and provided on either side with clutches, of a clutch fast on the shaft to operate the packers, a clutch-pinion loose on its shaft to operate the binder-driving gear, a cam-groove on the binder-driving gear, a lever taking into the cam-groove and operated thereby to disengage and hold disengaged the packer-clutch from the driver, a depression in the cam on the binder-driving gear, a spring interposed between the binder clutch-pinion and a collar fast on the driving-shaft, and means to positively disengage and hold disengaged the binder clutch-pinion from the driver, whereby the spring is compressed until the lever registers with the depression in the cam, when it is free to act to slide the packer-clutch into engagement with the driver, substantially as and for the purpose specified.

In witness whereof I have hereunto set my hand this 6th day of November, 1888.

WATSON M. HOLMES.

Attest:

HINSDELL PARSONS,

P. M. STEARNS.