(No Model.) 4 Sheets—Sheet 1.

B. F. STEWART.

GRAIN BINDER.

No. 398,466. Patented Feb. 26, 1889.

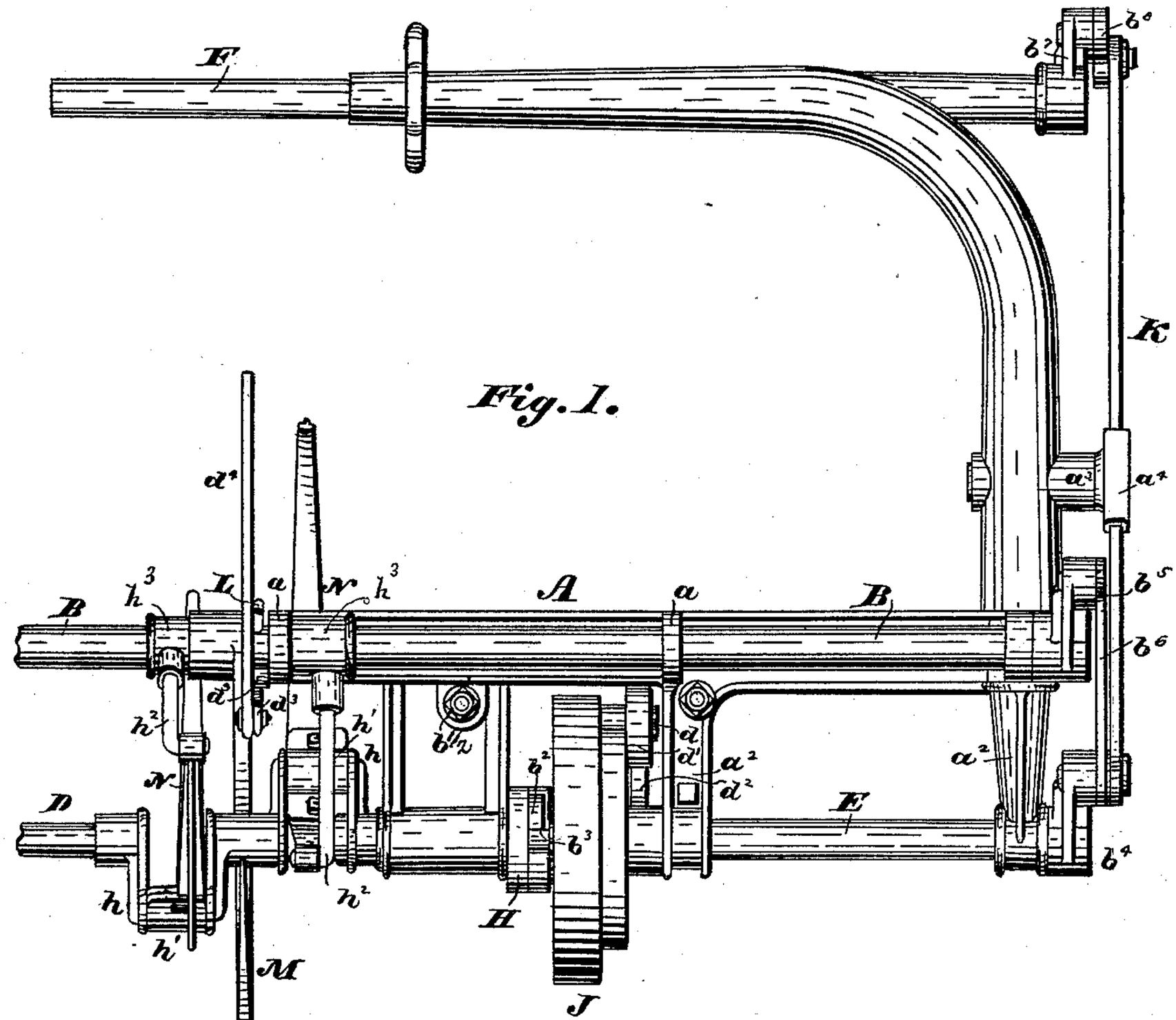


Fig. 1.

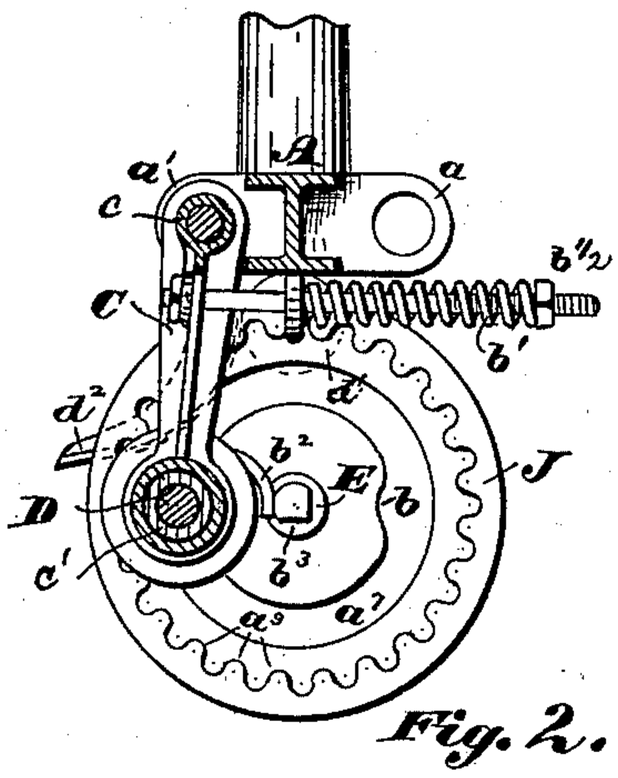
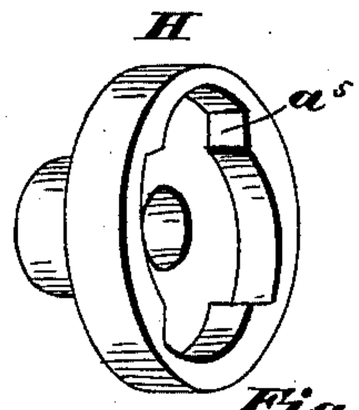


Fig. 2.



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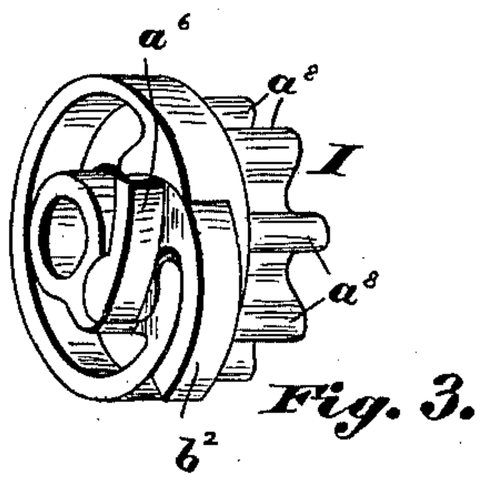

Fig. 3.

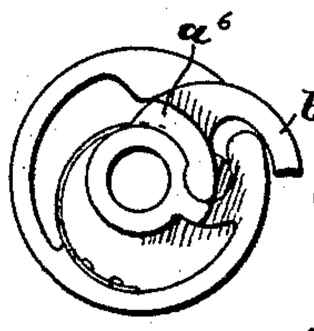

Fig. 5.

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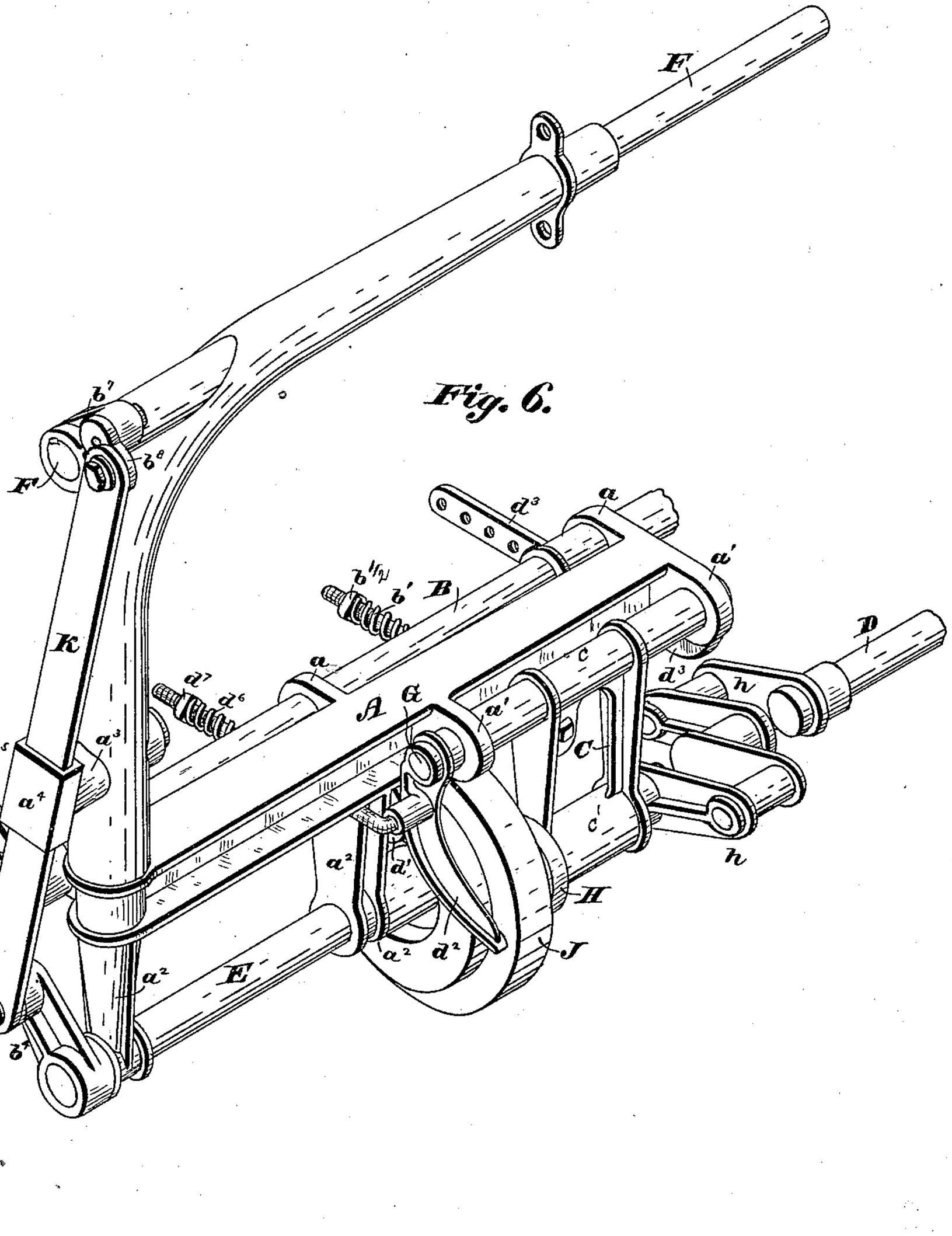

Fig. 6.

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Fig. 7.

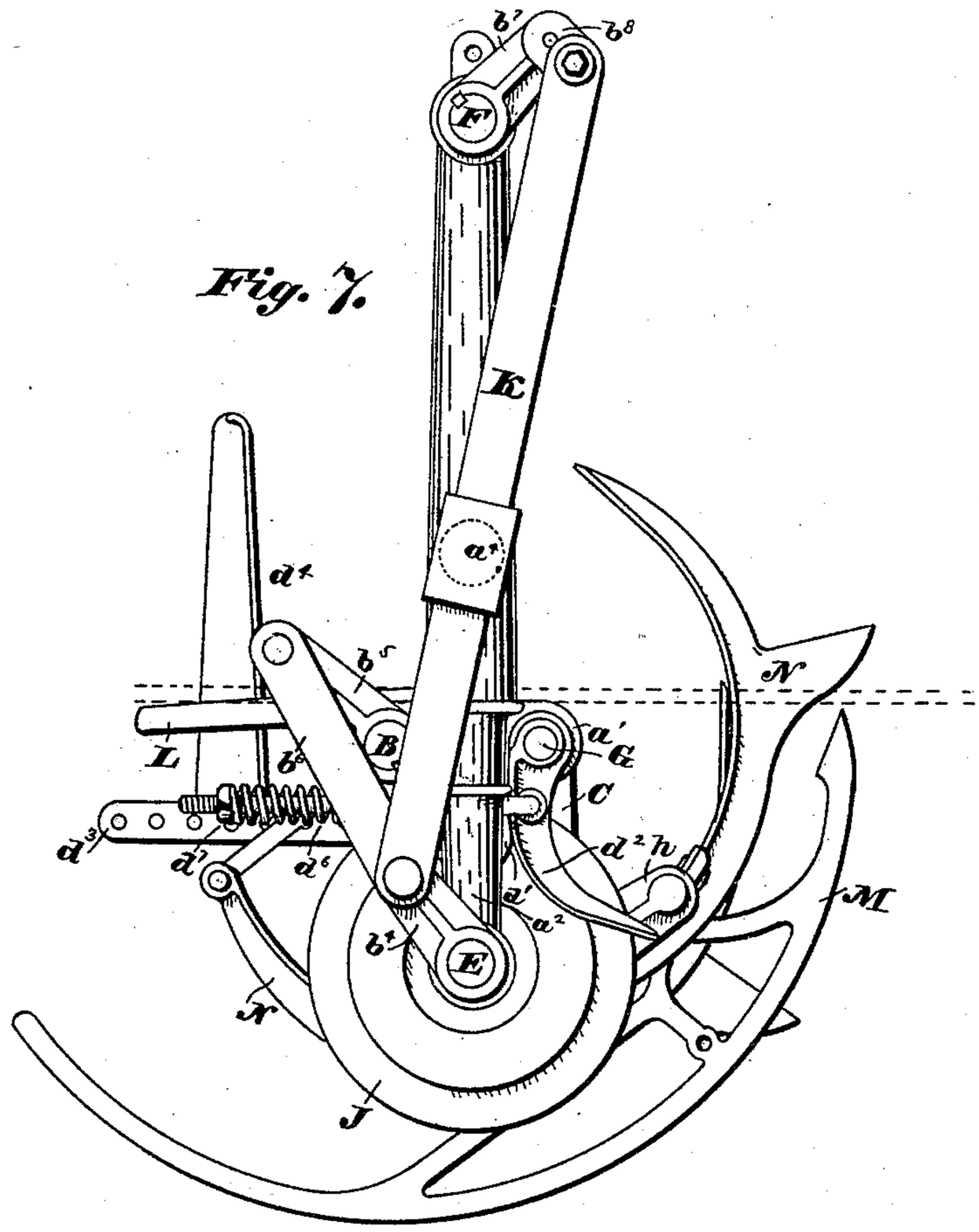
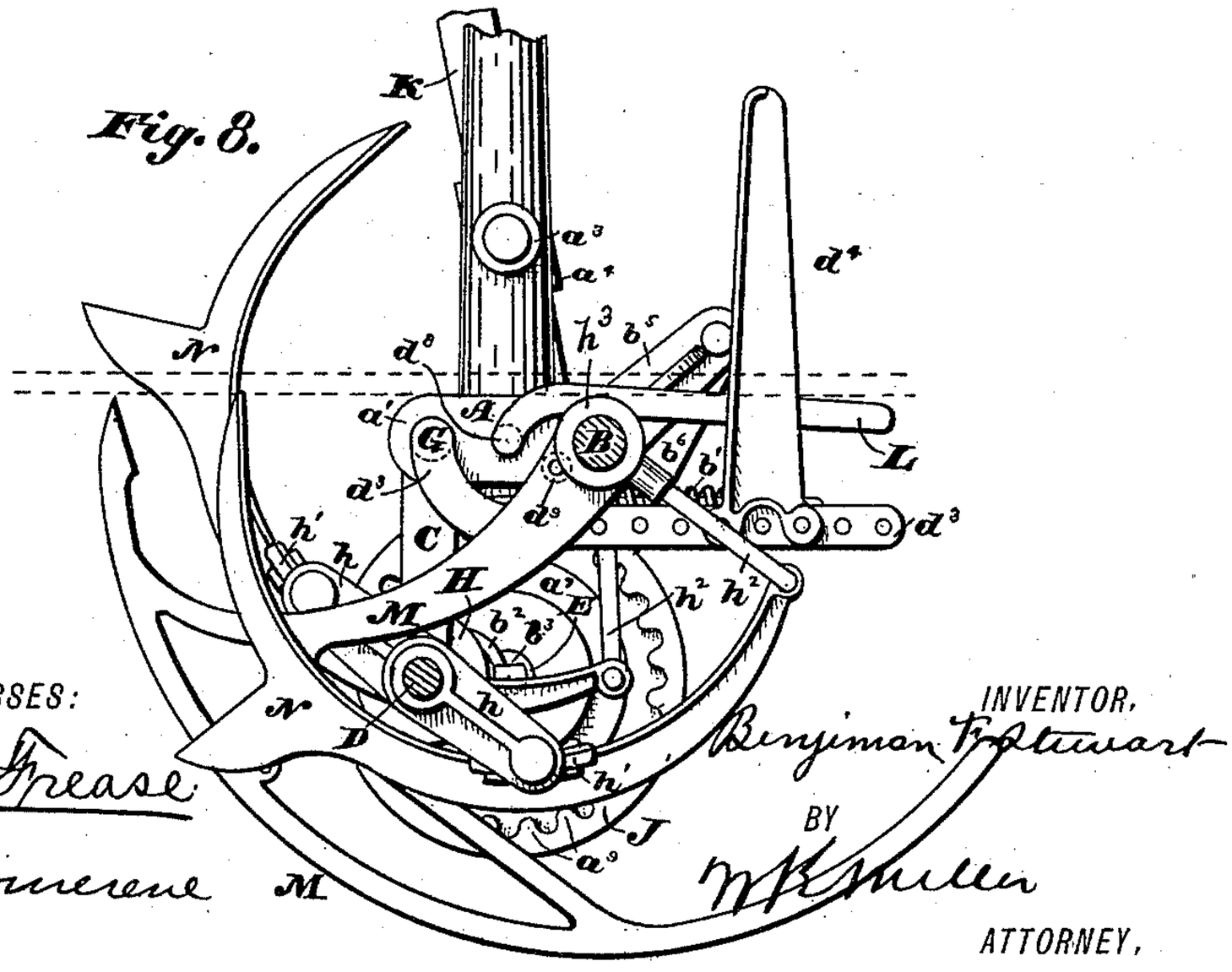


Fig. 8.



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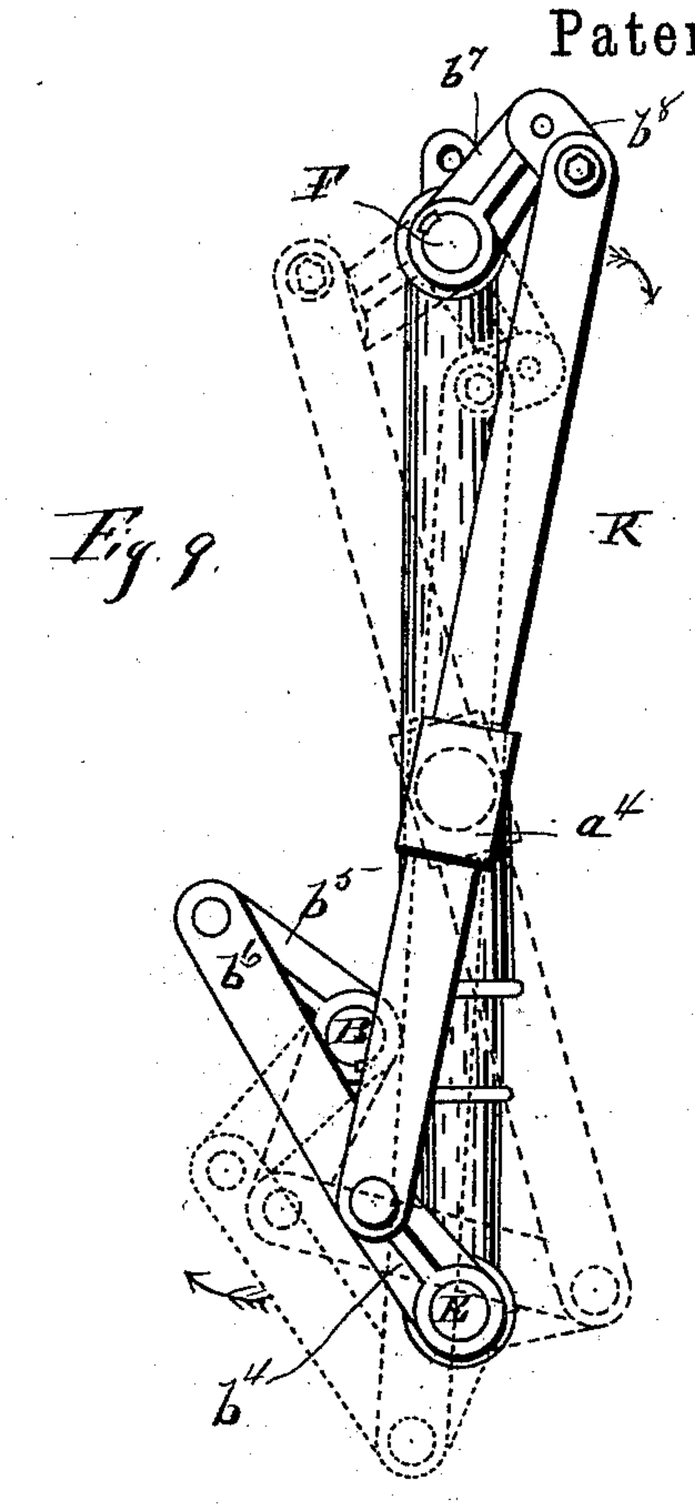

Fig. 9.

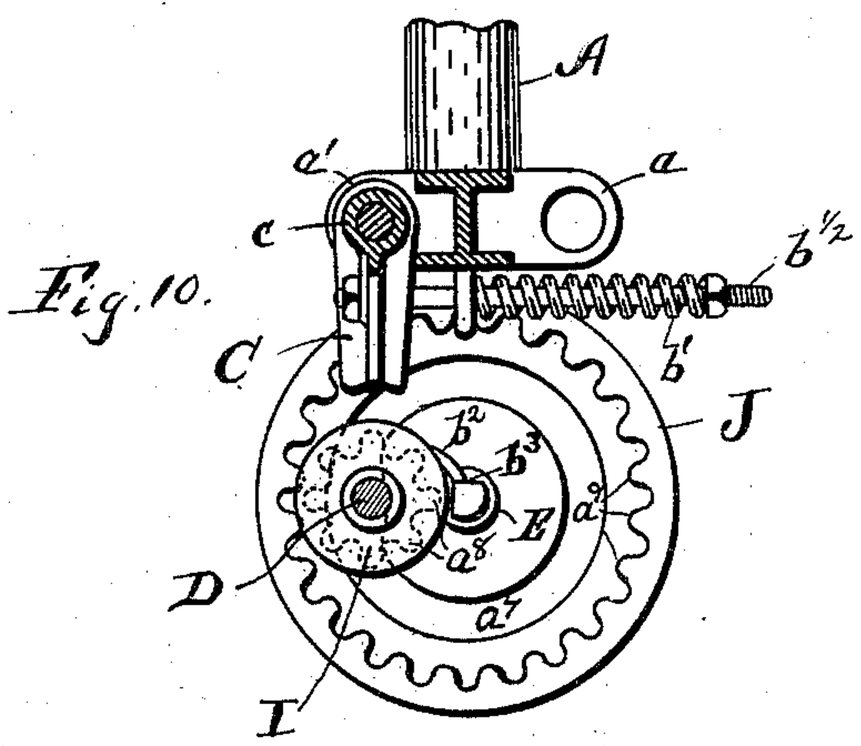

Fig. 10.

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UNITED STATES PATENT OFFICE.

BENJAMIN F. STEWART, OF NEW PHILADELPHIA, OHIO.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 398,466, dated February 26, 1889.

Application filed August 6, 1887. Serial No. 246,336. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. STEWART, a citizen of the United States, and a resident of New Philadelphia, county of Tuscarawas, State of Ohio, have invented a new and useful Improvement in Grain-Binders, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification.

My invention relates to improvements in grain-binders; and it consists of the parts and combination of parts, as hereinafter described, and set forth in the claims.

Figure 1 is a view of the binder-frame from the stubble side, showing the actuating mechanism attached thereto. Fig. 2 is an elevation of internal gear-wheel, showing position of driving-pinion. Fig. 3 is a view in perspective of the driving-pinion and pawl. Fig. 4 is a view in perspective of driving-ratchet. Fig. 5 is an elevation of the pawl-carrier, showing pawl and spring. Fig. 6 is an isometrical view of the binder-frame, showing the top and rear of frame and manner of connecting actuating mechanism. Fig. 7 is a front end elevation, and Fig. 8 is a rear end elevation. Fig. 9 is a detail view showing the lever K in several different positions. Fig. 10 is a detail view showing the parts I and J out of gear, the shaft D resting in the depression *b* of the groove a^7.

Similar letters of reference represent corresponding parts in all of the figures of the accompanying drawings.

Letter A represents the binder-frame, having on its horizontal branch laterally-projected lugs *a*, as a support for the needle-shaft B, and laterally-projected lugs *a'*, as a support for the swinging frame C, in which the packer-shaft D is journaled, and hangers a^2, by which the binder-actuating shaft E is supported. On the vertical portion of the said frame A there is provided a journal-box, a^3, for the support of the pivoted loop a^4. The upper horizontal portion is in pipe form, having journal-bearings at each of its ends for the knotter-shaft F. A shaft, G, is passed through the lugs *a'* and the pipe portion *c* of the frame C, by which said frame has a pivotal or swinging connection with the frame A. In the lower portion of the frame C there is provided a journal-support, *c'*, for the inner end of the packer-shaft D, on the end of which is mounted and rigidly secured thereto the ratchet-head H, having inclosed the ratchet a^5, and loosely mounted thereon the driving-pinion I, the inner pawl, a^6, adapted to engage the ratchet a^5, the extreme end of the shaft D resting in the groove a^7 in wheel J, the teeth a^8 of the pinion I engaging the teeth a^9 of the gear-wheel J, which is mounted on the inner end of shaft E. The driving-pinion I is formed separate from the ratchet-head H, in order that said driving-pinion may be allowed to lie idle while the packers are forming the bundle. As soon as the bundle is formed the pinion I will be thrown into gear with the ratchet-head H, as will hereinafter appear. On the inside of the groove a^7 there is provided a notch, *b*, of such depth as will disengage the teeth of the pinion I from the wheel J when the notch *b* is brought opposite the shaft D, the spring *b'* and bolt b^2, supported in a suitable hanger depending from the lower branch of the frame and connected with the swinging frame C, drawing the frame C toward the center of wheel J, the shaft D passing into the depression *b*, the pawl b^2 resting on a squared portion, b^3, of the end of shaft E, as shown in Fig. 8.

The pawls a^6 and b^2 are constructed as shown, and connected together or formed integral to operate simultaneously, so that when the pawl b^2 is pressed against the squared portion b^3 or stop it will force the pawl a^6 toward the center of the shaft out of engagement with the ratchet a^5; but when the pawl b^2 is disengaged from the squared portion or stop b^3 it will, through the action of a suitable spring, as shown, drop between the stop and the face of the wheel I, and at the same time throw the pawl a^6 into position to engage the ratchet a^5.

On the end of shaft E there is mounted a crank, b^4, and on the end of shaft B a similar crank, b^5. These cranks are connected by a link, b^6, substantially as shown, the length of the crank b^5 being regulated to determine the rotation of shaft B, and hence the desired throw of the cord-arm or needle, usually about one-third of a revolution.

On the outer end of the knotter-shaft F

there is mounted a crank, b^7, to the outer end of which there is pivotally secured a differential crank, b^8, by which the difference between the circle described by the end of driving-link K and the crank b^7 may be compensated, the said link passing through a pivoted loop, a^4, and connecting the cranks b^4 and b^7, the said loop a^4 having a supporting-spindle that is passed through and rotated in the journal-box a^3 provided therefor.

From the back of wheel J there is provided a spindle, d, having mounted loosely thereon a roller, d', and on the one end of shaft G there is securely mounted a cam, d^2, and on the other end a supporting-arm, d^3, for the bundle-supporting finger d^1. The arm d^3 is held in horizontal position and the cam vertically, as shown in Fig. 5, by the spring d^6 and bolt d^7, supported on suitable bearings depending from the lower branch of the frame A and connected with the arm d^3. The vertical finger d^4 may be adjusted on the arm d^3, as shown.

A compressor, L, is provided, having its inner end pivotally secured to the binder-frame, as shown at d^8, and to operate the said compressor a roller, d^9, is loosely mounted on a pin projected from the needle-arm M, as shown in Fig. 8, and when the needle is raised up to the knotter the roller d^9 will engage the compressor, and its free end will be raised up to compact the sheaf.

The double-cranked packer-shaft D is of the usual form, and may be rotated by any of the well-known and approved ways that will permit the inner end to swing with the frame C, as hereinbefore described.

The packers N are connected to the cranks h by journal-boxes h'. The tail of the packer is supported on links h^2, the upper end of which is supported by a collar or ring, h^3, embracing and vibrating about the needle-shaft B.

The operation is as follows: The cut grain is gathered and packed between the packers N and the vertical finger d^4 and compacted to a degree that will finally, when the sheaf reaches the desired size, produce sufficient pressure against the packers to move the shaft D over, disengaging the pawl b^2 from the stop b^3, and engaging the cogs a^8 of the driving-pinion I with the cogs a^9 of wheel J, and the pawl a^6 with the ratchet a^5, by which said wheel will be rotated. The pawl b^2, passing down between the stop b^3 and the pinion, will hold the pinion in engagement with the wheel while the end of the shaft D moves along in the groove a^7. Three revolutions of the pinion to one of the wheel bring the parts back to the position from which they started. The roller d^9 of the needle-arm will raise the compressor at the proper time to compact the sheaf, and the roller d', throwing up the cam d^2, will cause the arm d^3 and finger d^4 to drop and allow the sheaf to be discharged. The return of the needle-arm to its normal adjustment will allow the compressor-arm L to fall back into its position to receive another sheaf, and the action of the spring d^6 will return the arm d^3 and cam d^2 into their normal positions, as shown in Figs. 7 and 8. The same movement of the wheel J just described will rotate the shaft E, and with it the crank b^4, which, through the link-connection b^6 to crank b^5, will cause shaft B to make about one-third of a revolution, or so much as may be necessary to throw the needle to the proper place, while the revolution of the crank b^4, through the connecting-link K and fulcrum a^4, the link starting in the direction of the arrow, will revolve the knotter-head shaft F. The movement through the last quarter of the revolution will be accelerated by the position of the link K in the loop a^4, the forward and downward movement of the crank b^4 connected at that period of time to the short end of the link K, which during the same period of time acts as a lever as well as a link, the differential crank b^8 equalizing the movement of the parts, so as to provide a continuous rotary movement to the shaft F, and thereby to the knotting mechanism. The advantage gained by the increased speed of the shaft F, which carries the ejector, is that it accelerates the discharge of the sheaf, and to eject it with such force as to free it from entanglement with the machine or grain therein.

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

1. A binder-frame, A, consisting, essentially, of a lower horizontal portion and an upright portion projected therefrom, the lower horizontal portion being provided with shaft-supports projecting laterally therefrom in opposite directions, and with a hanger depending from said horizontal portion, and the upright portion being provided at a point above the horizontal portion with a journal projecting laterally therefrom, substantially as set forth.

2. The frame A, having the shaft-supports a a a' a' extending laterally from its lower horizontal portion, the hangers a^2 a^2, depending from said horizontal portion, and the journal a^3, projecting laterally from its upright portion, substantially as set forth.

3. In a grain-binder, the combination, with the yielding packer-shaft support and gear-wheels I and J, the former loosely mounted on the packer-shaft and the latter mounted on the shaft E, of the packer-shaft journaled in the yielding support and having a movement transverse to its axis to throw the said gear-wheels into and out of engagement, substantially as set forth.

4. The combination, with the binder-frame, of the yielding frame C, shaft D, driving-wheel I, loosely mounted on the shaft, spring-pawls a^6 b^2, mounted in wheel I, and ratchet a^5, gear-wheel J, having groove a^7, provided with notch, and the stop b^3, substantially as set forth.

5. The combination of the wheel J, carry-

ing a roller, d', shaft G, provided with a cam, d^2, and arm d^3, said roller d' being in position to engage the cam d^2 as the wheel J rotates, the bundle-supporting finger d^4, spring d^6, and bolt d^7, to hold the bundle-supporting finger in position to receive grain, the whole being constructed and arranged substantially as set forth.

6. The combination, with the binder-actuating shaft and the needle-shaft, of the knotter-head shaft, cranks secured to the binder-actuating shaft and knotter-head shaft, a differential link connected at one end with the crank on the knotter-head shaft, a link connecting the other end of the differential link with the crank on the binder-actuating shaft, a fulcrum for the link, on which the link bears at different distances from its ends during each revolution of the binder-actuating shaft, and a link connecting the needle and the binder-actuating shaft, substantially as set forth.

In testimony whereof I have hereunto set my hand this 4th day of August, A. D. 1887.

BENJAMIN F. STEWART.

Witnesses:

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ATLEE POMERENE.