(No Model.)

4 Sheets—Sheet 1.

J. F. STEWARD.

GRAIN BINDER.

No. 364,972. Patented June 14, 1887.

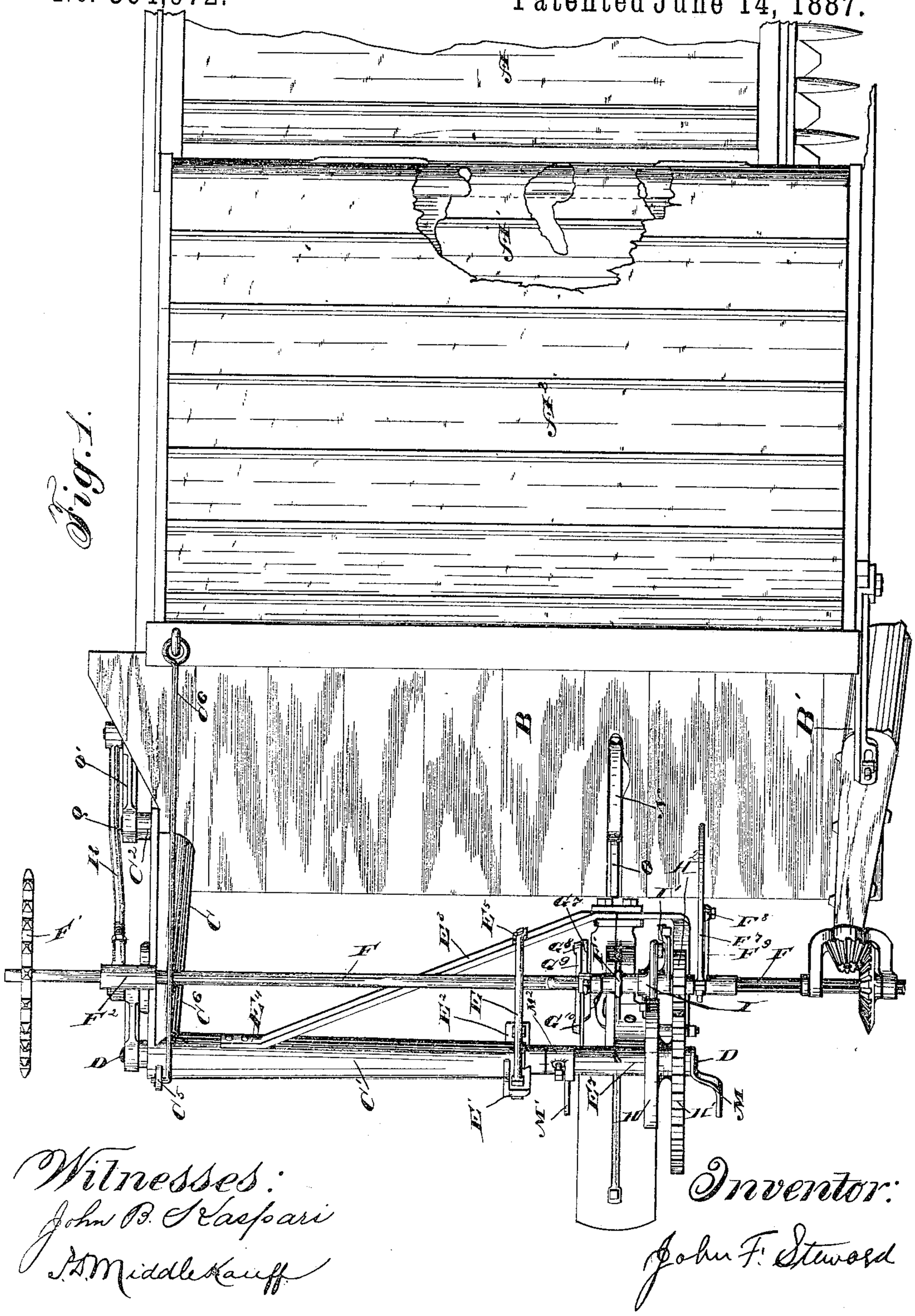

Fig. 1.

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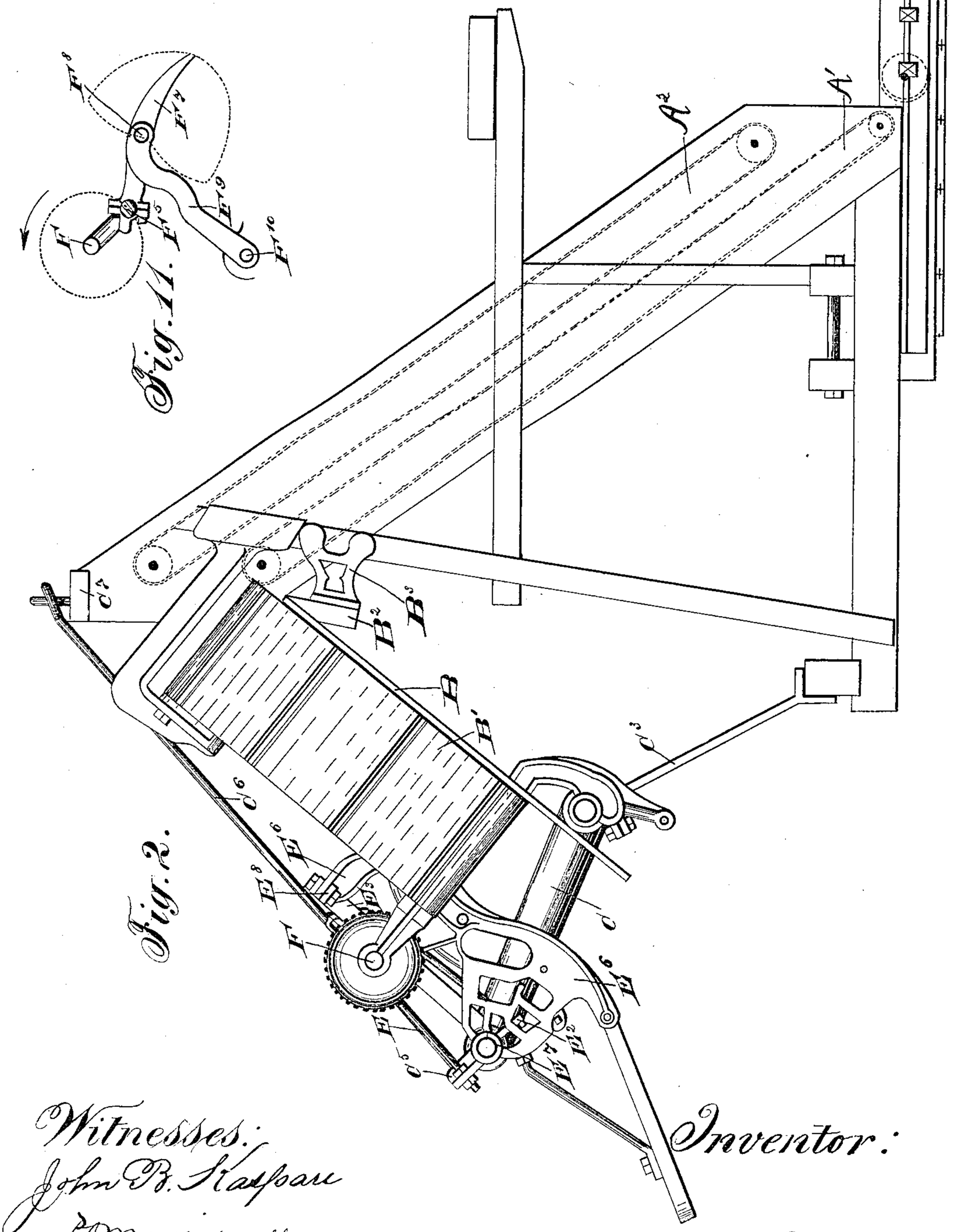

Fig. 2.

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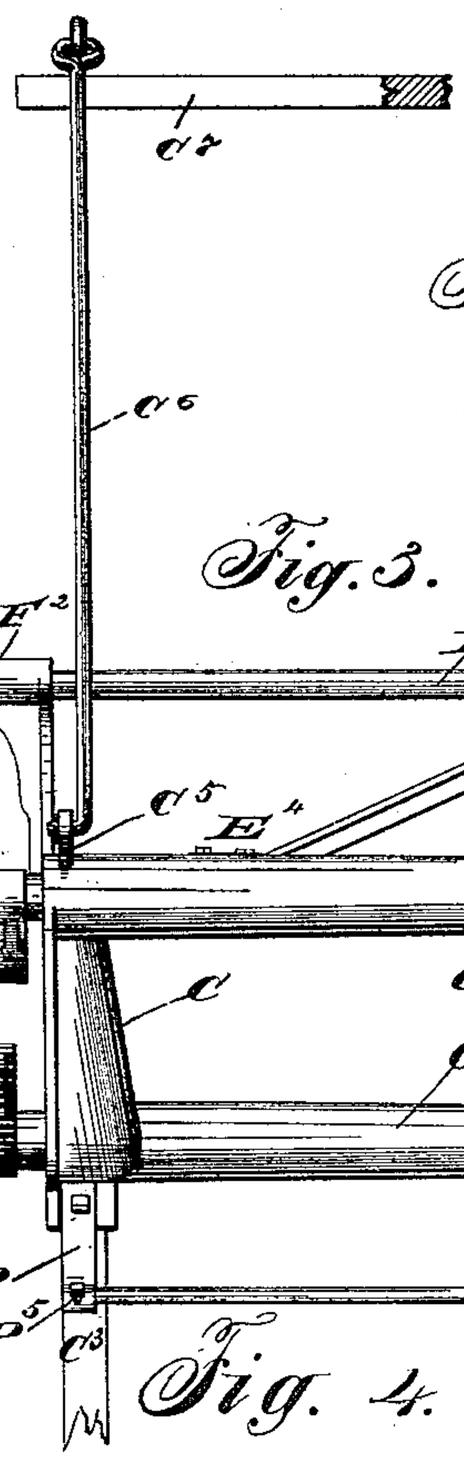

Fig. 9.

Fig. 3.

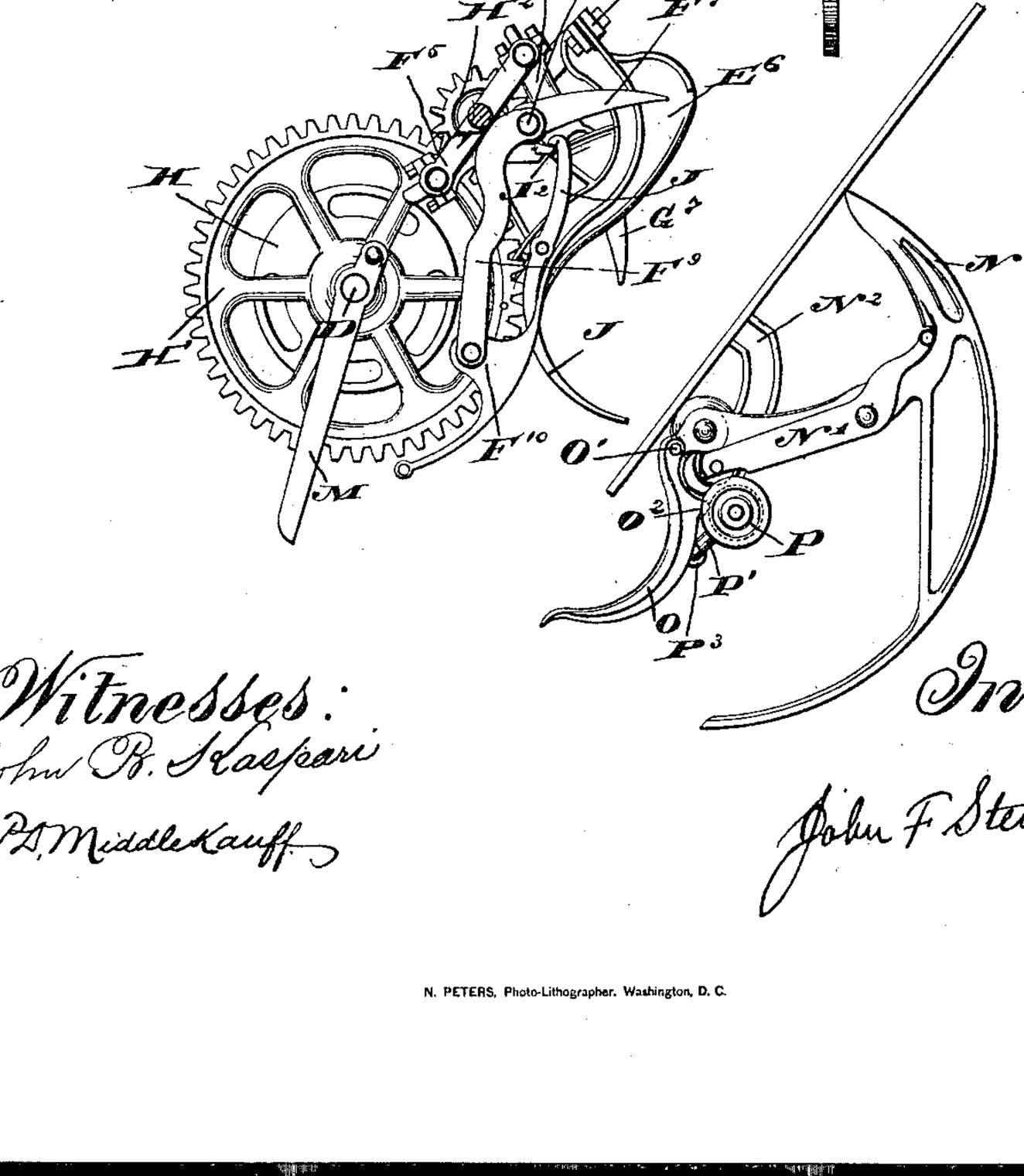

Fig. 4.

Fig. 10.

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(No Model.) 4 Sheets—Sheet 4.

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Fig. 5.

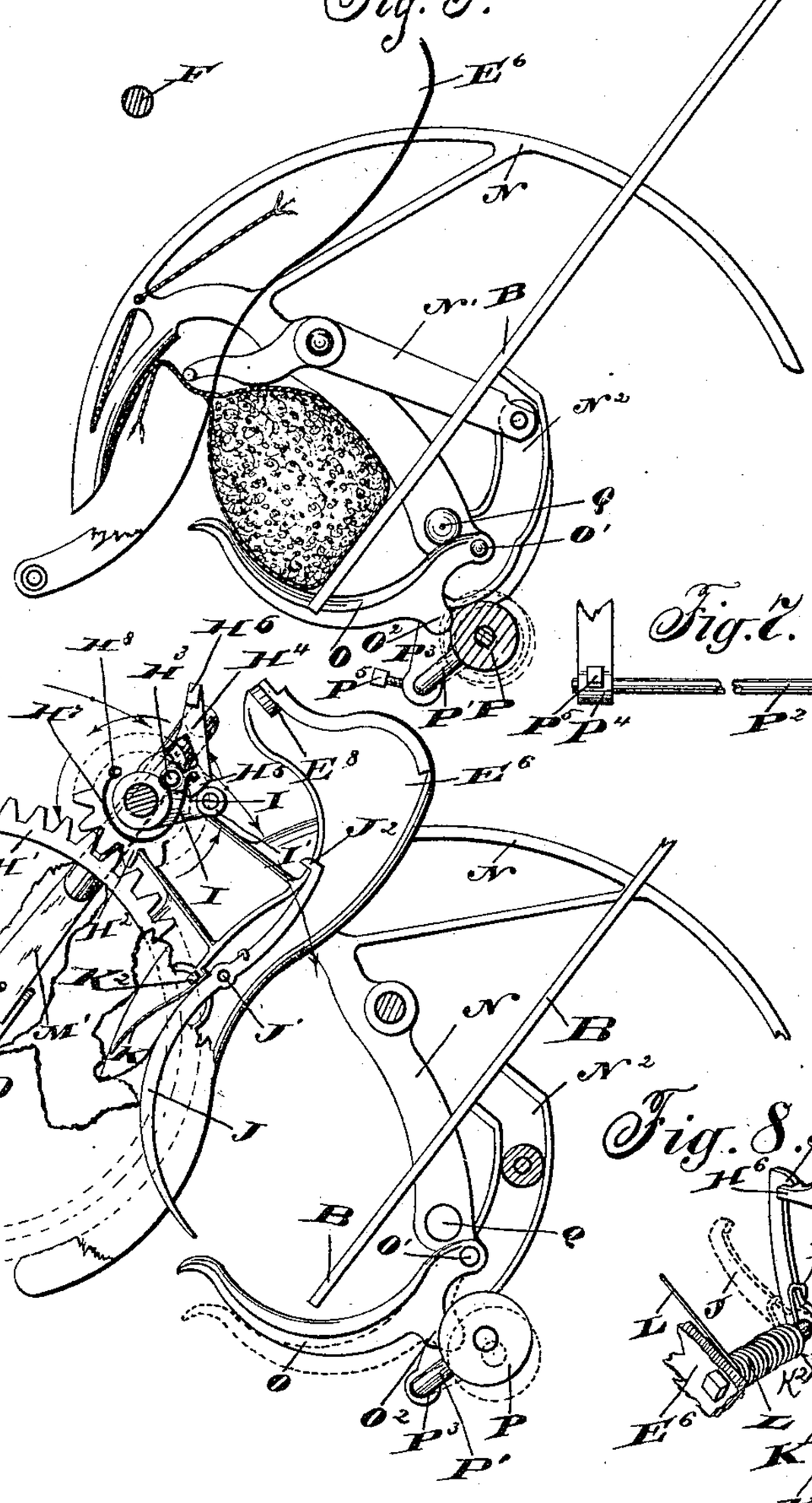


Fig. 12.

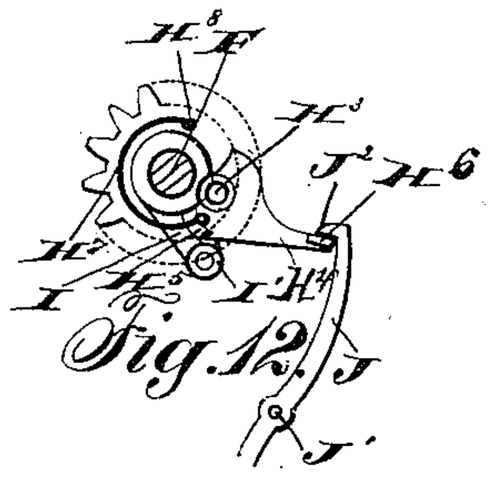
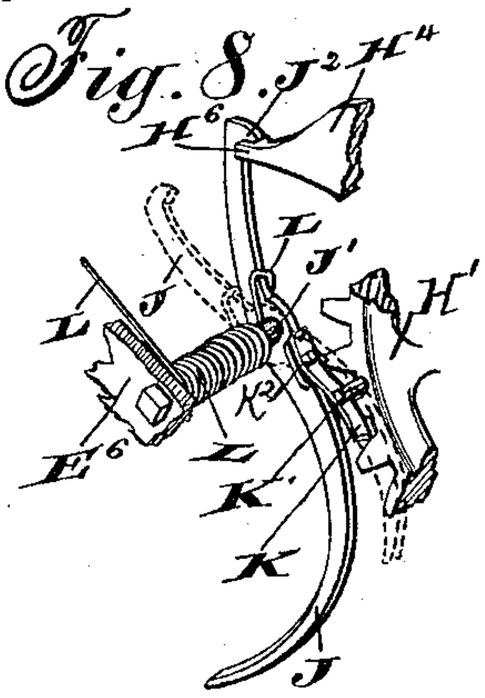


Fig. 7.

Fig. 6.

Fig. 8.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

JOHN F. STEWARD, OF CHICAGO, ILLINOIS.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 364,972, dated June 14, 1887.

Application filed January 2, 1885. Serial No. 151,889. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. STEWARD, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grain-Binders, of which the following is a full description, reference being had to the accompanying drawings.

Figure 1 is a plan view of my invention. Fig. 2 is a front elevation. Fig. 3 is an inner side elevation of the binder, and Fig. 4 a front elevation of the same. Fig. 5 is a front elevation of the compressing mechanism and the tucker. Fig. 6 is a front elevation of the tripping and compressing mechanism. Fig. 7 is a side view of the compressor-supporting spring. Fig. 8 is a perspective view of the tripping-arm and the mechanism for controlling it. Fig. 9 is a plan view of the packer-shaft. Fig. 10 is a side view of the knotter-frame. Fig. 11 is a diagram illustrating the construction and movement of the packing devices. Fig. 12 is a detailed view showing the construction and operation of the binder-driving clutch.

As my invention relates solely to the mechanism for controlling the cut grain delivered to the binder, no cord-holding, knotting, or cord-cutting mechanism is shown.

The harvester upon which the binder is mounted and with which it co-operates is provided with the platform-canvas A and the elevating-canvases A′ and A^2. By the latter the grain is delivered onto the binder-deck B.

B′ is the butting-canvas of the usual form, and driven in the ordinary manner.

C is the binder-frame having the sleeve C′, which forms a support and bearings for the knotter-shaft, and the sleeve C^2, which forms a like support and bearings for the needle-shaft. The lower edge of the deck rests upon this sleeve and is thus supported, while its upper edge is supported on the rail B^2, secured to the brackets B^3, mounted on the harvester-frame.

To the base of the binder-frame are bolted the legs C^3, which, being footed onto the harvester-sill C^4, serves as a support for the binder.

From a lug, C^5, at the upper rear corner of the binder-frame, to an eyebolt in the top rail of the harvester-frame, I connect the stay-rod C^6.

D is the knotter-driving shaft, its rearmost end provided with the crank D′, and its forward end extending some distance beyond the supporting-sleeve C′.

E is a crotched bracket projecting upward from the lugs E′ and E^2 at the forward end of the sleeve C′.

E^3 is a strong brace secured to the sleeve C′ at E^4 by means of a bolt. At E^5 it is secured to the bracket E.

E^6 is the knotter-frame, having the journal-bearing sleeve E^7 and the lugs E^8. The knotter-frame is supported by the sleeve E^7, resting on the forward-projecting end of the shaft D, and by being bolted through the lugs E^8 to the end of the brace E^3 at E^7. In the knotter-frame are the bearings for the knotter, the holder, and all parts pertaining to the knotting mechanism; but as they have no necessary connection with the present invention, they need not be described.

In addition to the usual functions of the knotter-frame, it here performs the office of a support and bearing for the packer-shaft.

F is the packer-shaft; F′, its bearing on the knotter-frame, and F^2 a bearing thrown upward from the part C of the binder-frame. The packer-shaft receives motion from the harvester-gearing by means of a chain thrown over the sprocket-wheel F^3. Two cranks are provided, on which the packers are hung and by which they are moved. These cranks F^4 and F^5 are located one before and one behind the knotter-frame, and the bearing for the shaft between them, as seen in Figs. 1 and 3. The packers are identical in construction and operation; but by the placing of the cranks F^4 and F^5 upon opposite sides of the shaft they are made to operate alternately upon the grain.

F^7, is the front packer, its upper end boxed on the crank F^5, its middle pivoted at F^8 to the link F^9, which in turn is pivoted to the knotter-frame at F^{10}.

The parts constituting the packing mechanism are shown in Fig. 11, and the motions of the point of the packer shown in dotted lines.

G^7 is the rear packer, its upper end boxed to the crank F^4, its middle pivoted at G^8 to the link G^9, which in turn is pivoted to the knotter-frame at G^{10}.

H is a mutilated cam-gear for driving the

knotter and for actuating all parts of the band-manipulating mechanism, of a form of construction much in use and well understood, and hence one that needs no description.

H′ is a gear, preferably made so as to be as one piece with the cam-gear H. These two gears are keyed to the knotter-driving shaft D.

Upon the packer-shaft, in proper position to engage with the gear H′, I place the pinion H^2. I provide this pinion with clutching mechanism adapted to so lock it as to compel the shaft to give it rotation, and thus impart motion to the gear H′, as required.

I is an arm keyed to the shaft F and having the anti-friction roller I′.

To the pinion H^2, at H^3, I pivot the dog H^4, having the lug H^5 in such a position that by the movement of the dog it may be thrown into and out of the circuit of the roller I′. A spring, H^7, is provided, having one end secured to the pinion at H^8 and at its other end entering a hole in the dog, or otherwise secured, and adapted to throw the dog into the position shown in Fig. 6. With the parts in this position the pinion would be driven constantly by the continuously-driven packer-shafts.

When it is wished to disengage the pinion from the shaft, the dog is thrown over to the position shown in Fig. 12, when the lug on the dog is moved out of contact with the anti-friction roller on the driver. This is done by the tripping-arm J, pivoted at J′ to the knotter-frame and provided with the hook J^2, adapted to engage the stem H^6 of the driving-dog.

K is a flat spring secured to the tripping-arm J by the screw K^2, and adapted to be pressed upon by the pin K′ in the periphery of the wheel H′ as it nears the completion of each revolution. The pressure of the pin on this spring throws the hook J^2 upward, so as to be in the path of the stem H^6. The dog is thus thrown over and the pinion permitted to stop. The binding mechanism is now permitted to rest until, by the action of the packers, the grain is compacted into the receptacle, so as to create sufficient pressure upon the arm J to move it upward and thus throw the hook J^2 away from the driving-dog and permit it to engage with the driver I.

L is a light spiral spring surrounding the stem which forms a support and pivot for the arm J, at one end adapted to engage the arm and throw its upper end downward, while its other end rests against the knotter-frame. The purpose of this spring is to throw the hook J^2 out of position to engage the driving-dog, so that when from any cause the binding mechanism is put in motion without a gavel in the receptacle, to hold the tripping-arm back, the hook J^2 will not disengage the clutching mechanism. The pinion H^2 makes four revolutions while carrying the wheel H′ through one. If the spring L were not provided, the hook J^2 might catch the dog at each revolution. It is necessary that the spring K should be sufficiently stiff to overcome the energy of the spring L when the pin K′ strikes it. Were this not the case the binding mechanism would not be stopped at the completion of each rotation.

M is an arm secured to the knotter-shaft D, forward of the gear H′, and adapted to eject the bundle at the completion of binding. The packer-shaft being so near to the knotter-shaft, if other provisions were not made to permit the discharge-arms to pass it, the latter would, from necessity, be required to be too short to do its work of discharging the bundle. In order that it may be sufficiently long to do its work and yet pass the shaft, I give the latter the bend F^6, so that the discharge-arm may pass through it, as shown by dotted lines in Fig. 3. The timing of the movement of the arm and the bend F^6 is such that they each pass their uppermost throw at so nearly the same instant that the bend swings over the arm, and they thus pass without clashing. The arm M′ is secured to the hub M^2, which is keyed to the knotter-shaft D at a point behind the knotting mechanism. In order that this discharge-arm may pass the packer-shaft, it is but necessary to make the wrist of the crank F^4 so long as to give space sufficient for it to pass by the side of the packer G^7.

N is the needle, of a form so well understood as to require no description.

N′ is the tucker, and N^2 the tucker-cam, both of well-known forms.

O is the compressor, pivoted at O′ to the needle eccentric to the needle-shaft.

P is an anti-friction roller, mounted on a crank formed on an arm, P′, reaching upward under the needle from the shaft P^2, which is supported loosely in the bearing P^3 and extends along under the binder-frame to the bearing P^4, where it is tightly held by the set-screw P^5. The shaft P^2, I make of steel or other elastic material, and it serves as an elastic support for the roller P, its torsional resistance making it suitable for the purpose. The compressor is provided with the heel O^2, which rests upon the roller P, the position of which, in relation to the roller and the point of attachment to the heel of the needle, is such that when the needle is withdrawn below the deck the compressor will also be retracted. When the needle is thrown forward, the pivot O′ is moved downward and backward and the compressor rocked upward at its point to the position shown in Fig. 6, the heel O^2 serving as a fulcrum. Because of the elasticity of the support of the roller P the compressor is held in its erected position elastically. The needle is keyed to the shaft Q, having the crank Q′, which is connected by the pitman R to the crank D′ on the knotter-shaft D. By this—a common form of mechanism—the needle is given its movements.

It will be observed that the breast-plate of my machine is extended downward and outward in such form that the extended portion serves as a stripper to force the bound bundles from the ejector or discharge-arms M.

What I claim is—

1. In combination with a rotary discharge-arm and its shaft, a packer-shaft located within the circuit described by the discharge-arm and provided with a bend or crank to permit the passage of the discharge-arm therethrough, and driving mechanism whereby said shafts are revolved in suitable times to present the crank of one in position to permit the arms of the other to pass therethrough.

2. In a grain-binder, the combination of a revolving arm to discharge the bundle with a shaft provided with a crank carrying a packer-arm, said crank widened, as described, to permit the end of the discharge-arm to pass therethrough.

3. In a grain-binder, the combination of the knotter-frame, the knotter-driving shaft journaled at one end in said frame, the driving-gear H′, secured to said shaft, the packer-shaft provided with the pinion H^2, engaging said gear, and with cranks F^5 and F^4, located on opposite sides of the driving-gear and knotter-frame, and the packers mounted upon said cranks, substantially as described.

4. A vibratory binding-needle with a heel-extension, in combination with a compressor-arm pivoted to said extension and provided on its under side with an abrupt shoulder or projection, and a stationary roller, on which said compressor rides, said parts constructed and arranged as described, whereby the projection of the compressor is caused to co-operate with the roller to effect a sudden rising and falling movement of the compressor.

5. The needle, the compressor O, pivoted to the heel of the needle at O′ and having the heel O^2, and the roller P, mounted on the arm of the torsional shaft P^2, all combined substantially as described.

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