(No Model.) 2 Sheets—Sheet 1.

LA VERNE W. NOYES.

GRAIN BINDER.

No. 366,240. Patented July 12, 1887.

Fig. 7.

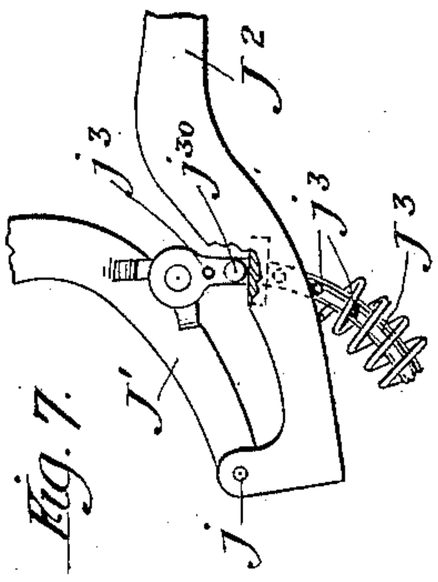


Fig. 6.

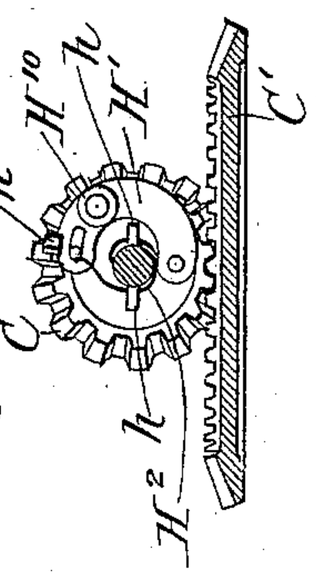
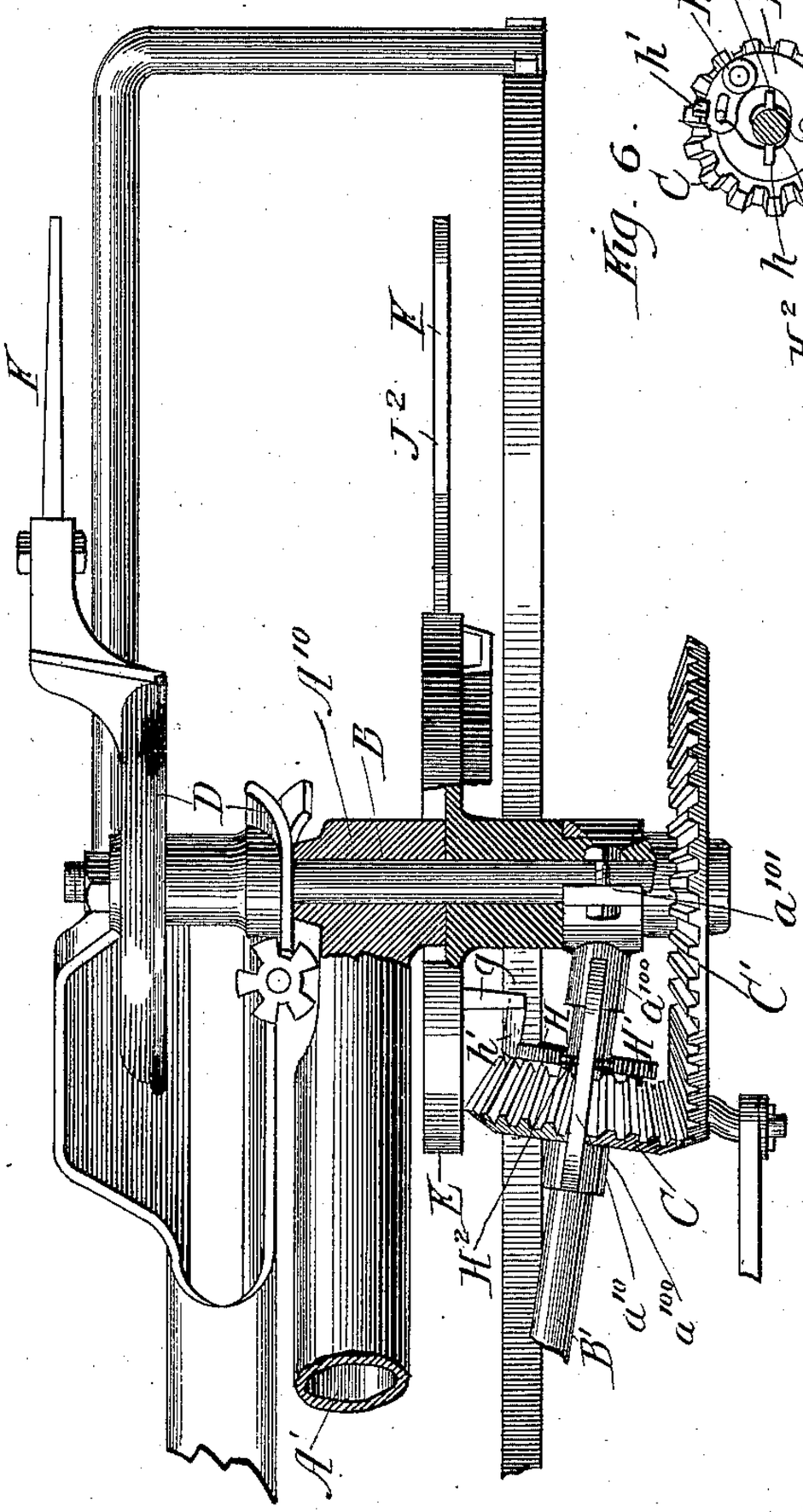


Fig. 1.



Witnesses:
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Chas. D. Burton

Inventor:
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(No Model.) 2 Sheets—Sheet 2.

LA VERNE W. NOYES.

GRAIN BINDER.

No. 366,240. Patented July 12, 1887.

Fig. 2.

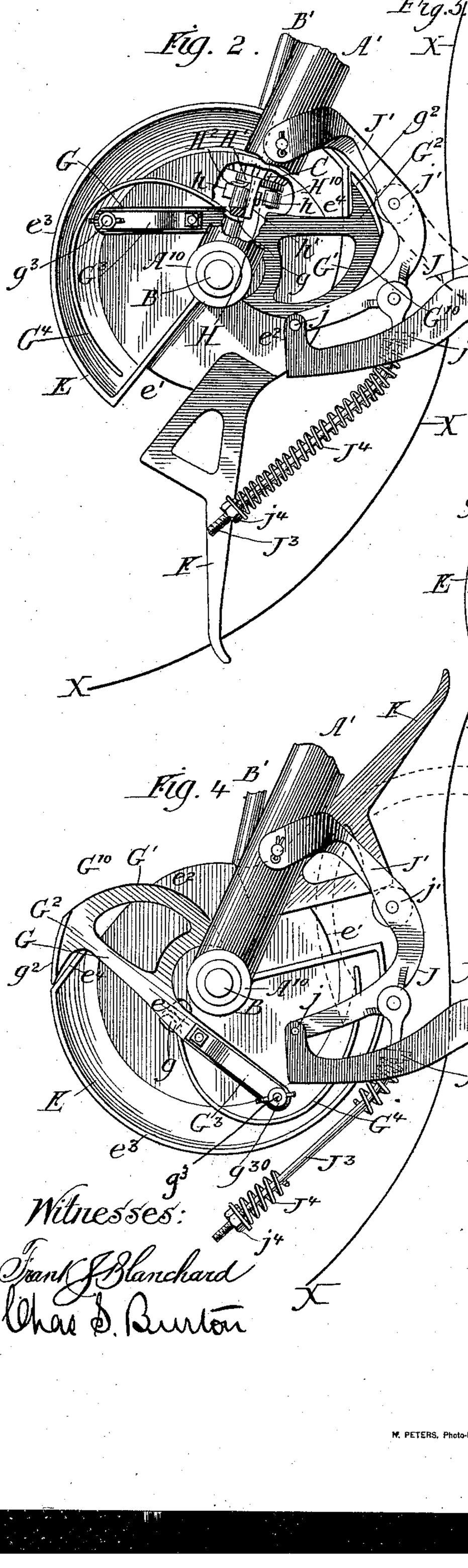

Fig. 5.

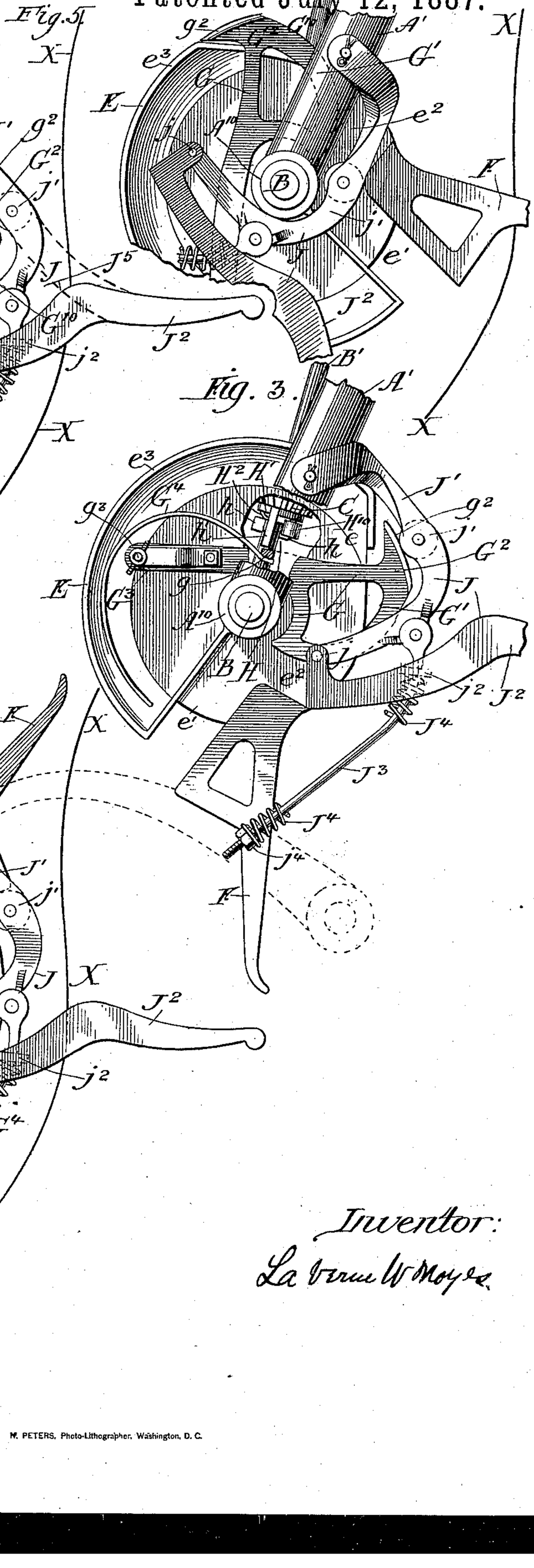

Fig. 3.

Fig. 4

Witnesses:

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UNITED STATES PATENT OFFICE.

LA VERNE W. NOYES, OF CHICAGO, ILLINOIS.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 366,240, dated July 12, 1887.

Application filed February 15, 1886. Serial No. 191,935. (No model.)

To all whom it may concern:

Be it known that I, LA VERNE W. NOYES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grain-Binders, which are fully set forth in the following specification.

This invention relates to the compressing and tripping mechanism of a grain-binder, and is shown as applied to a binder wherein the grain is bound standing on end, but is designed to be applicable to any binder.

In the drawings, Figure 1 is an elevation. Fig. 2 is a sectional plan of the knotter-actuating shaft and adjacent parts in the position of rest, the knotter-actuating wheel being removed to show the parts particularly pertaining to this invention, which lie behind or under said wheel, the compressor-actuating cam-wheel being broken to show the tripping and clutching devices underneath it. Fig. 3 is a similar plan showing same parts in the position just after the binder has been tripped into action. Fig. 4 is a similar plan, the binding-arm being shown in dotted line, the compressor-actuating cam-wheel being unbroken, showing the said wheel, binding-arm, compressor, and trip-lever in the position just preceding the retreat of the compressor and discharge of the bundle. Fig. 5 is a similar plan showing the compressor at the farthest outward position, just at the point of starting back after the discharge of the bundle. Fig. 6 is a detail elevation of the clutching device. Fig. 7 is a detail plan showing the manner of varying the size of the bundle by adjusting the compressor.

A is the binder-frame. (Not shown.) A′ is a horizontal stem thereof, which sustains the cross-arm A^{10} at the end of it, in which the knotter-actuating shaft B is journaled.

B′ is a shaft deriving power from the harvester-driving train, and communicating motion to the binder mechanism by means of the bevel-gear pinion C, which is clutched to it at the rear end and meshes with and drives the bevel gear-wheel C′, which is conveniently made integral with the compressor-actuating cam-wheel E, hereinafter described, and the said combined wheels fixed on the lower end of the knotter-actuating shaft B. To afford a bearing for the binder-actuating end of the shaft B′, there is provided the yoke a^{10}, having the journal-bearings a^{100} a^{100} for said shaft, and the fork or box a^{101}, embracing the neck or hub c' of the gear-wheel C′, (said neck being the connection between the said wheel C′ and the cam-wheel E.) The bevel-pinion C is placed on the shaft B′, between the two bearings a^{100} a^{100}, and there provided with means for clutching it to the shaft, hereinafter described. D is the knotter-actuating wheel. It is secured to the shaft B at the upper end of the cross-arm A^{10} of the frame, being therefore at the opposite end from the cam-wheel E.

To the cam-wheel E is secured one of the dischargers, F, the other being secured, as usual, to the knotter-actuating wheel. On the upper side of the cam-wheel E is pivoted the trip-lever G, whose tooth g protrudes down through the slot e in the cam-wheel, in position to engage the clutching device H, which effects connection between the shaft B′ and the bevel-pinion C.

J is the compressor. It is pivoted to the stem A′ of the binder-frame, and may be, as illustrated, composed of two pieces, J′ J^2, yieldingly united; and in that case the two parts may be pivoted together at j, and further connected by the rod J^3, secured to the arm J′ and passing through the eye j^2 on the arm J^2, and provided with the spring J^4, coiled about said rod J^3, outside the eye j^2, and stopped and regulated by the nut j^4 at the outer end of the rod J^3.

It will be seen that the making of the compressor thus in two parts, yieldingly connected, does not affect its movement in the least; but as the yielding piece is the one which directly receives the pressure of the bundle, this construction merely prevents the pressure and strain of compressing the bundle being too positive, and so allows for some variation in the compactness of the bundle without endangering the machinery, which might otherwise, in case of an unusually compact bundle, be subjected to too great strain in compressing. A further advantage of making the compressor in two pieces is that thereby opportunity is gained for adjusting the position of the pressure-arm J^2 to vary the bundle-space, and so the

size of the bundle, without change in the compactness. This may be done, as illustrated in Fig. 7, by piercing the rod J^3 with several holes, j^3, into any one of which the pin j^{30} may be inserted and form a stop for the arm J^2. By changing the pin from a hole nearer the arm J′ to one more distant the size of the bundle will be increased. The compressor, however, may be made in one piece, as shown by the dotted line J^5 in Fig. 2, indicating a rigid connection between the parts J′ and J^2. The compressor has a stud, j', on its rigid part, by which it is engaged and actuated by the cam-wheel E. The cam-track is on the upper face of said wheel and comprises the radial part e', the eccentric part e^2, and the exterior concentric part e^3.

A peculiarity of the structure consists in giving to the trip-lever G an extension, G′, whose rear convex curved edge, G^{10}, is adapted to form part of said cam-track, being in fact the whole of the eccentric portion or coinciding therewith when in one position. Said trip-lever has at the vibrating end the spur or hook G^2, shaped so that when standing in said position its outer edge, g^2, fills out or forms a portion of the concentric part e^3 of the cam-track, a corresponding portion of the cam-wheel being cut away, and a stop, as the flange e^4, being provided on the cam-wheel to stop the trip-lever in the position described. The trip-lever is stopped in the opposite direction by the hub of the said cam-wheel, as seen in Fig. 3. When the trip-lever is stopped in the first position (against the stop e^4) its tooth g is engaged with the clutch-dog of the clutching device H, and holds it and the pinion C out of engagement with the shaft B′, and when said lever is stopped in the second position (against the hub of the wheel E) its said tooth is out of engagement with said clutch-dog, and the latter is engaged and engages the pinion C with the shaft B′. When the pressure of the bundle is exerted against the compressor, the abutment j' on the latter, engaging the end of the trip-lever, tends to move it from the first to the second position, and so cause the engagement of the clutch-dog with the shaft B′ and the action of the binding mechanism.

In order to afford proper resistance to the movement of the trip-lever from one stop to the other, the spring G^3 is provided, located between said lever and the adjusting-nut which forms the head of the bolt g^3, which constitutes the pivot of said trip-lever. Such spring tends to press said lever down upon the face of the cam-wheel and increase the friction between the said lever and cam-wheel, and by means of an adjusting-nut, as g^{30}, on said pivot-bolt g^3 the pressure, and so the friction, may be regulated. The same thing may be effected by the spring G^4, secured at one end to the cam-wheel and having the other end bearing against any convenient projection, as the tooth g on the lever G, and tending to hold the lever against the stop e^4. The latter construction not only provides resistance against motion away from the stop e^4, but also means for returning the lever to said stop; but this latter purpose is positively effected by the engagement of the abutment j' with the curved edge G^{10} of the said lever G, so that the only effective function of said spring G^4 is the same as that of the spring G^3—viz., to resist movement of the lever G away from the stop e^4.

The clutching device H is not herein claimed, being shown in detail and claimed in my application filed June 29, 1885, Serial No. 170,143. For the purpose of making clear the action of the trip-lever G it may be briefly explained as follows: The shaft B′ is provided with two teeth or spurs, h h, formed by a flat bolt set through the shaft, and on the face of the pinion C, which is loose on the shaft, is pivoted the lever or clutch-dog H′, which has the projection h' from its free end protruding toward the shaft B and in the path of revolution of the tooth g when the lever G is against the stop e^4, but outside said path when the lever G is against the hub of the wheel E. The lever or clutch-dog H′ has the abutment (preferably a stud-bearing roll) H^{10}, and has a limited play over the face of the pinion C. At one of its limits (the limit to which it is forced when the tooth g engages its projection h') the abutment H^{10} is out of the track of the spurs h h; but at the other limit (to which it is forced by the spring H^2 when its projection h' is disengaged from the tooth g) it is in said track. In the latter position the pinion is engaged and driven by the shaft H, and in the former position it is disengaged and stands at rest.

The action of the compressor and trip will be readily understood from the above description of the sturucture; but it may be further briefly described as follows: X X X being the outline of the breast-plate and bundle-stripper, the position of rest being shown in Fig. 2 with the compressor protruding past the breast-plate into the path of the bundle, when the pressure of the bundle against said protruding compressor is sufficient to overcome the resistance, (whether frictional or other,) offered to the movement of the trip-lever, the latter, receding from the stop e^4, disengages the tooth g from the clutching device H, and the binder mechanism becomes engaged with the driving power. This position of the compressor, trip-lever needle, and compressor-actuating cam is shown in Fig. 3. As the cam-wheel E revolves with the knotter-actuating shaft B, the abutment j' travels over the concentric portion e^3 of the cam-track, holding the compressor in the position shown in Fig. 3 until the abutment is reached by the radial part e' of the cam-track. This position is shown in Fig. 4. Engaged by said radial part the abutment travels toward the shaft B, rocking the compressor about the pivot j^5 on the frame, so that when the abutment reaches the inner end of

said radial part of the cam-track, as seen in Fig. 5, its point has receded behind the line of the breast-plate, or so far in that direction that it does not impede the discharge of the bundle, which is by that time effected, and while the abutment travels in the eccentric part e^2 of the cam-track back toward the position of Fig. 1 said abutment engages the edge G^{10} of the trip-lever G and forces said lever ahead of it to the position of rest against the abutment e^4, and restores the compressor itself to the initial position, protruding across the path of the bundle.

I claim—

1. A binder-frame having an arm, as A′, located in a plane transverse to the length of the grain and between two planes passing transversely through the heads and butts, respectively, the knotter-actuating shaft journaled crosswise on and extending entirely across said arm and having its sole bearing thereon (as in the cross-arm A^{10}) and extending parallel with the grain, the knotter-actuating wheel and the binder-driving gear-wheel, both secured to said shaft, located at opposite ends of the shaft-bearings, and the compressor-actuating cam-wheel located on said shaft between the driving-gear wheel and the adjacent end of the shaft-bearing, substantially as described.

2. A binder-frame having an arm, as A′, located in a plane transverse to the length of the grain and between two planes passing transversely through the heads and butts, respectively, the knotter-actuating shaft journaled crosswise on and extending entirely across said arm and having its sole bearing thereon (as in the cross-arm A^{10}) and extending parallel with the grain, the knotter-actuating wheel and the driving-gear wheel both secured to said shaft, located at opposite ends of the shaft-bearings, the compressor-actuating cam-wheel located on said shaft between the driving gear wheel and the adjacent end of the shaft-bearing, and the compressor pivoted on the frame and adapted to oscillate approximately in the plane of its actuating cam-wheel, substantially as set forth.

3. A binder-frame having an arm, as A′, located in a plane transverse to the length of the grain and between two planes passing transversely through the heads and butts, respectively, the knotter-actuating shaft journaled crosswise and extending entirely across on said arm and having its sole bearing thereon (as in the cross-arm A^{10}) and extending parallel with the grain, the knotter-actuating wheel and the binder-driving gear-wheel both secured to said shaft located at opposite ends of the shaft-bearings, the compressor-actuating cam-wheel located on said shaft between the driving-gear wheel and the adjacent end of the shaft-bearing, and the compressor pivoted on the frame and actuated directly by the said cam-wheel, substantially as set forth.

4. In combination, the compressor-actuating cam-wheel, the trip-lever pivoted to it and having a limited range of motion about its pivot, and the compressor pivoted on the frame eccentric to the cam-wheel, the trip-lever being protruded into the path of an abutment on the compressor and having an edge forming part of the cam-track of said abutment, whereby the initial motion of the compressor on its pivot moves the trip-lever to the limit of its own motion in the same direction, and the revolution of the cam-wheel causes said abutment to move said lever to its limit in the other direction.

5. In combination with the compressor pivoted on the frame, the compressor-actuating cam-wheel revolved about the axis of the knotter-actuating shaft, and the trip-lever pivoted to and revolving with said cam-wheel, substantially as set forth.

6. In combination, substantially as set forth, the compressor-actuating cam-wheel and the trip-lever pivoted thereto and forming part of the cam-track to actuate the compressor.

7. In combination, substantially as set forth, the knotter-actuating shaft, an arm of the binder-frame located in a plane transverse to the length of the grain and having said shaft journaled upon and extending entirely across it, the driving-gear wheel on said shaft on one side of said arm and the knotter-actuating wheel fixed on the shaft on the other side of the arm, the compressor-actuating cam-wheel on the shaft between the said arm and the driving-wheel, the compressor pivoted on the frame and located approximately in the plane of the cam-wheel and protruding into the path of the bundle and actuated thereby, and the trip-lever located approximately in the plane of the cam-wheel and adapted to move in a plane parallel to the plane of the compressor and engaged and actuated thereby when the latter is moved by the bundle.

8. In combination, substantially as set forth, the compressor pivoted to the frame and protruding into the path of the bundle, a wheel on and revolved by the knotter-actuating shaft, the trip lever pivoted on said wheel and revolved therewith, and the clutching devices of the binder operated by the trip-lever, the compressor having an abutment which engages the trip-lever on one side when the compressor is moved by the bundle and on the other side when the trip-lever is revolved with the cam-wheel, whereby the compressor causes both the engagement and the disengagement of the trip-lever with the clutching devices.

9. In combination, substantially as set forth, the compressor pivoted to the frame and protruding into the path of the bundle, a wheel on and revolved by the knotter-actuating shaft, and the trip-lever pivoted on said wheel eccentrically thereto and revolved therewith, its range of oscillatory motion about its pivot being limited by stops on said wheel, the compressor having an abutment protruding into the plane

of movement of the trip-lever and engaging the same to give it oscillatory movement, and engaged by the trip-lever during the rotary movement of the latter, substantially as set forth.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 9th day of February, 1886.

LA VERNE W. NOYES.

Attest:
I. K. WEST,
CHAS. S. BURTON.