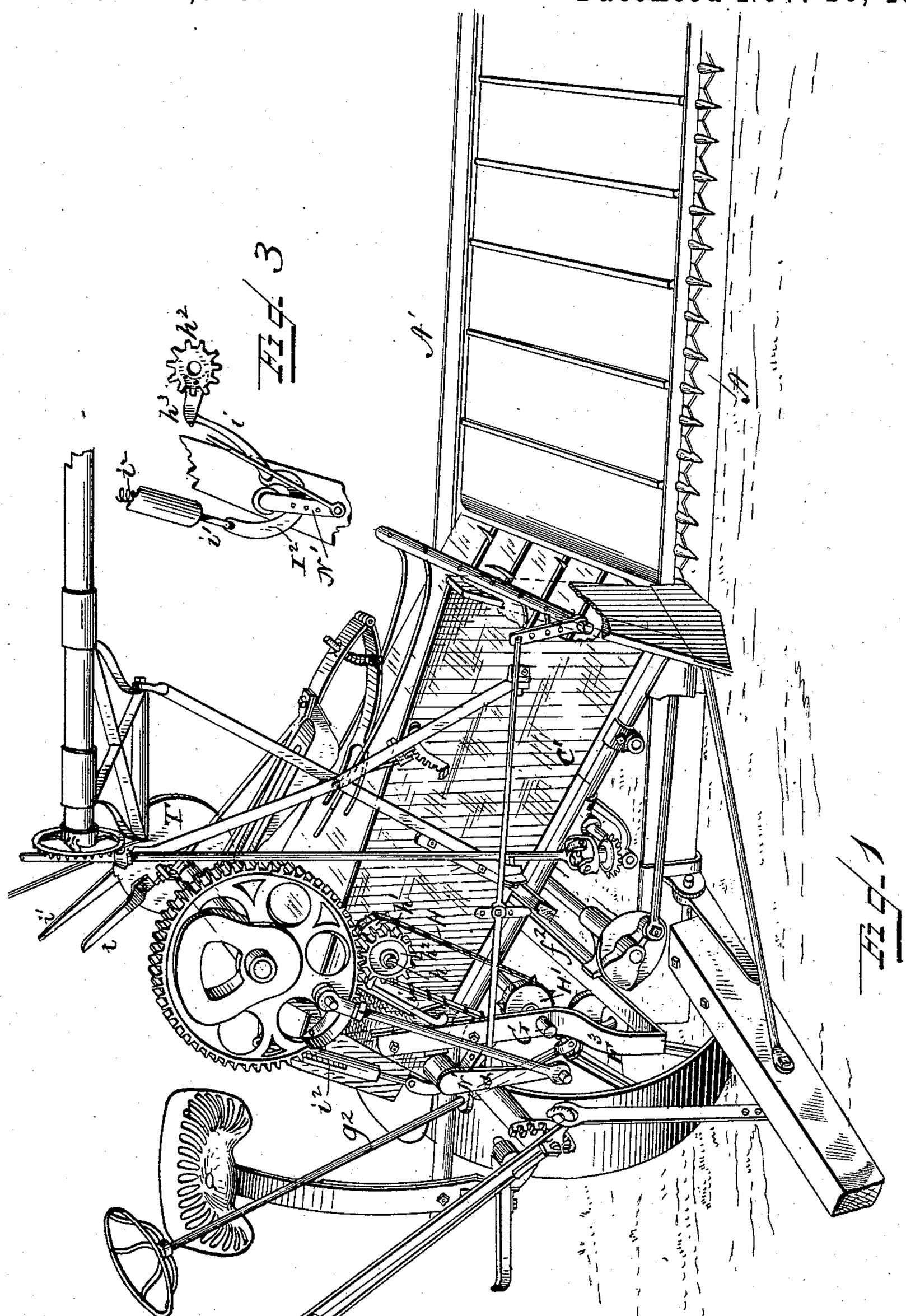
(No Model.) 2 Sheets—Sheet 1.

L. MILLER.

GRAIN BINDING HARVESTER.

No. 571,073. Patented Nov. 10, 1896.



Witnesses.
F. L. Ourand
Rey. Smith.

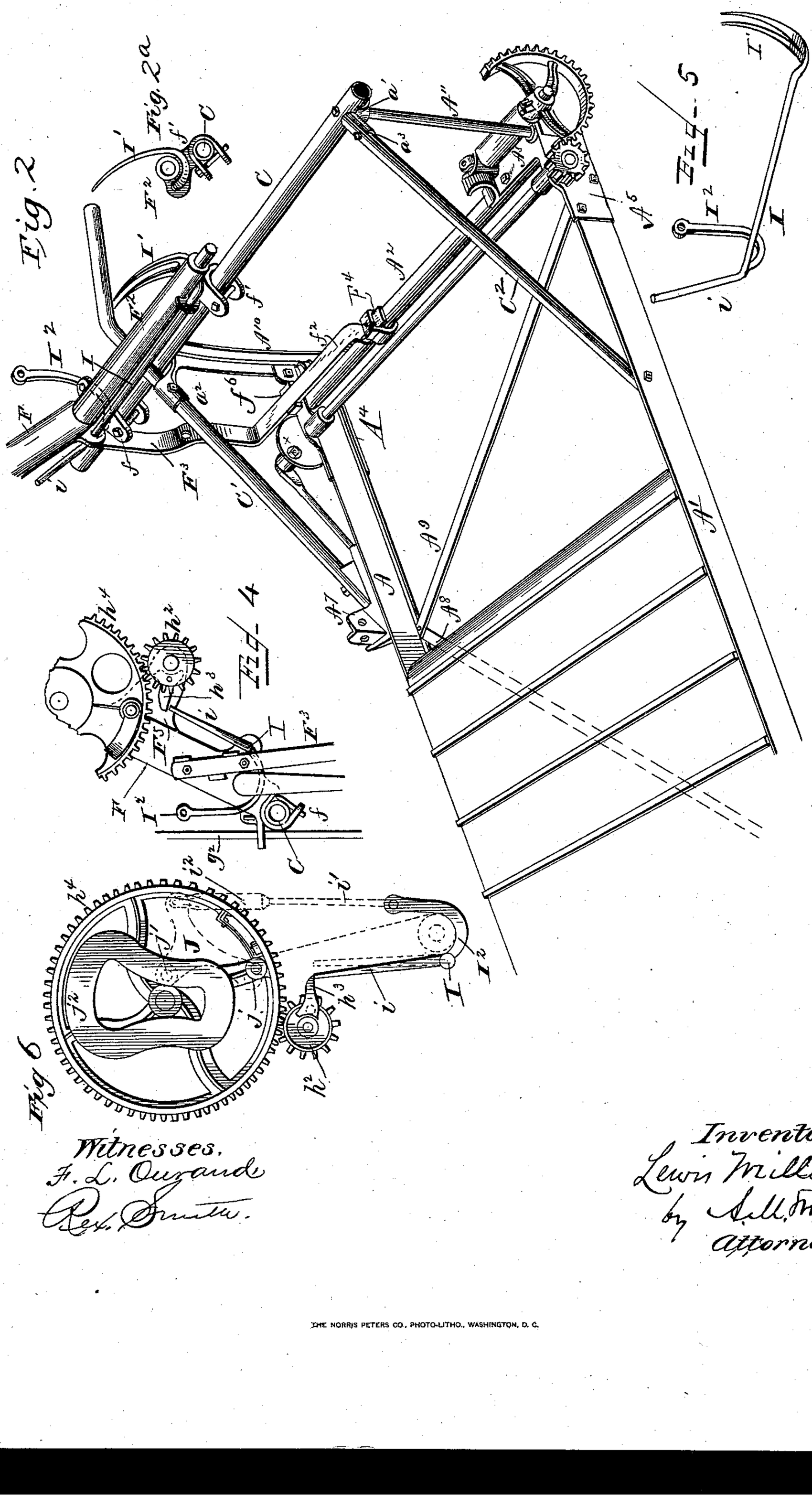
Inventor.
Lewis Miller
by A. D. Smith,
Attorney

(No Model.) 2 Sheets—Sheet 2.

L. MILLER.

GRAIN BINDING HARVESTER.

No. 571,073. Patented Nov. 10, 1896.



Witnesses.
F. L. Ourand
Rex. Smith.

Inventor
Lewis Miller
by A. H. Smith
Attorney

UNITED STATES PATENT OFFICE.

LEWIS MILLER, OF AKRON, OHIO.

GRAIN-BINDING HARVESTER.

SPECIFICATION forming part of Letters Patent No. 571,073, dated November 10, 1896.

Application filed April 30, 1886. Renewed August 18, 1892. Serial No. 443,432. (No model.) Patented in England December 22, 1888, No. 18,739.

To all whom it may concern:

Be it known that I, LEWIS MILLER, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented certain new and useful Improvements in Grain-Binding Harvesters, (for which I have received Letters Patent in Great Britain, No. 18,739, dated December 22, 1888,) of which the following is a specification.

The accompanying drawings represent so much of a low-down grain-binding harvester embodying all my present improvements as is necessary to illustrate the subject-matter claimed.

Unless otherwise specified the parts are of usual well-known construction.

Figure 1 represents a perspective view of the gearing or stubble end of the machine as seen from the front and grain side; Fig. 2, a similar view from the rear and grain side, showing some details of the frame and binding apparatus. Fig. 2^a shows in rear elevation a detail view of the compressor; Fig. 3, a detail view of the tripping mechanism; Fig. 4, a front elevation showing more of the same parts. Fig. 5 is a detail view of the compressor, and Fig. 6 a detail view of tripping mechanism.

The subject-matter herein claimed relating mainly, as before remarked, to the tripping mechanism, it is deemed unnecessary to describe in detail the construction of the parts of the machine not herein claimed, more especially as they are fully described and shown in other divisions of this application, respectively filed and numbered as follows, viz: Serial No. 304,945, filed March 27, 1889, and Serial Nos. 305,753, 305,754, 305,755, and 305,756, respectively filed April 2, 1889.

The front and rear transverse frame bars or sills A A′ are shown as made of angle-iron or of bars having horizontal flanges at the lower sides or edges turned inwardly toward each other. Longitudinal frame bars or tubes, at the grain and stubble ends, respectively, of the frame, are firmly secured to these sills at their points of intersection therewith by means of socketed angular braces or corner-pieces. The drawings only show the longitudinal frame-tube A^2 and the corresponding corner-brackets A^4 A^5 at the gearing end of the frame. The organization of these parts at the divider end is substantially similar. An angular box-bracket A^7, secured on the front sill near the stubble end of the cutting apparatus and platform-apron, serves as a support for the lower end of an inclined transverse tubular bar C′, extending upward and outward substantially in the same vertical plane as the front sill beyond the vertical plane of the driving-wheel, constituting an important part of what I term the "triangular" binder-frame, which supports the elevating-table and binding mechanism, as hereinafter explained.

Diagonal braces A^8 A^9 stiffen the platform-frame. The frame-bars, braces, and corner-pieces A A′ A^2 A^8 A^9 A^4 A^5 and their corresponding parts at the divider end constitute what I term, for the sake of distinction, the "main" frame or "platform-frame."

An inwardly and downwardly inclined transverse socket or sleeve a^2 on the upper end of a standard A^{10}, mounted on the inner front corner-piece, receives the upper portion of the front inclined transverse binder-frame bar C′, above mentioned. An upright post A^{11}, mounted on the inner rear corner-piece, supports a longitudinal binder-frame bar C, the forward end of which is supported by the standard A^{10}, above mentioned. The lower end of an inclined transverse tubular binder-frame bar C^2 is secured to the rear transverse sill A′ coincident or in line longitudinally with the corresponding point of attachment of the front bar C′, while its upper end is secured in a socket a^3 on a bracket a' on the upright A^{11}, secured to the longitudinal binder-frame bar C. The bars C C′ C^2 with the connected parts of the platform-frame constitute what I term for convenience the "binder-frame," which, as seen endwise from the front or rear, is triangular in outline. The gearing is supported upon the platform and binder frame, and I hereinafter sometimes speak of these parts as constituting a "combined main and binder" frame, in contradistinction to a binder-frame detachably connected with or adjustable upon the platform or gearing frame.

Brackets f f' on the lower arm F^2 of the binder-gear standard carry suitable bearings

for a rock-shaft I, supporting and actuating the binder-tripping devices hereinafter described. A vertically-perforated horizontal flange on the front bracket *f* receives a rod or shaft g^2, connected by a universal joint with an adjusting-screw which actuates the axle-support of the driving-wheel to raise or lower the machine. The upper portion of this shaft g^2 being thus free to vibrate on its joint without interference with the vertical adjustments above mentioned is utilized by as the means by which the binder-gear standard and the mechanism supported thereby are adjusted longitudinally to suit the length of straw, as well as to raise and lower the machine, its upper end being extended near the driver's seat and provided with suitable means for operating it.

The binder-gear standard is locked in position by suitable well-known means controlled by the driver to permit of its longitudinal adjustment when required.

A slotted elevating inclined binder-table is supported upon the binder-frame.

A binder-gear standard of well-known U shape, provided with rearwardly-projecting tubular arms, is connected with the frame by the U-shaped brackets *f f'*, pendent from the lower arm F^2, which embrace and slide upon the longitudinal binder-frame tube C, as above explained. This tube projects in advance of its front supporting-standard A^{10}, the front bracket *f* sliding upon this extended portion. The front inclined transverse binder-frame tube C' extends beyond its supporting-standard A^{10} and binder-frame tube C above, in front of, and beyond or across the longitudinal plane of the driving-wheel, forming a support for the driver's seat.

The lower sleeve F^2 of the binder-gear standard is provided with suitable bearings for the needle-shaft and the upper sleeve with bearings for the knotter-actuating shaft, or vice versa, one being above and the other below the binder-table and the path of the grain.

The upper end of the upright part of a pendent bent arm F^3 is secured to the binder-gear standard or its front bracket *f*. The horizontally-bent portion f^2 of the arm F^3 slides in a groove f^6 in the front corner-piece A^4, its rear end being provided with a pendent loop F^4, sliding on the inner longitudinal frame-bar A^2, thus upholding and bracing the binder-gear standard and connected parts either while working or while partaking of their adjustment.

The packer-shaft G, which also constitutes the first or main driving-shaft of the binder mechanism, is supported at its forward end in a bearing in the upright part of the bent arm F^3. Collars on the shaft in front and rear of the arm cause it to move backward and forward therewith, while leaving it free to turn coincidently with the adjustment of the binder-gear standard.

Packers of a well-known oscillating kind have their heel ends linked to the binder-gear standard in well-known ways, so as to be adjustable therewith.

A chain H, encircling a sprocket-wheel H' on the driving or packer shaft G, drives a corresponding sprocket-wheel *h'* on a stud-shaft *h* on a bracket F^5, projecting inwardly from the upright arm F of the binder-gear standard. A spur-pinion h^2 turns loosely on this stud-shaft in front of the sprocket-wheel *h'*. That face of this latter wheel adjacent to this pinion carries laterally-projecting pins or spurs engaging with a pawl on the corresponding face of the pinion, and which pawl is rocked by a suitable spring in one direction, as usual, to cause both the spur-pinion h^2 and sprocket-wheel *h'* to rotate simultaneously when locked together by the pawl. This pawl (shown in dotted lines in Fig. 3) has a radially-projecting arm or detent h^3, against which the end of a stop-arm *i* on the compressor-shaft I abuts at proper times to disengage the pawl from the sprocket-wheel *h'*, and thus allow the latter to rotate without driving the pinion h^2 and dependent devices in a manner well understood. This pinion drives a spur-gear h^4, fast on the forward end of the knotter-actuating shaft, and said gear-wheel h^4 carries a crank-pin which, through the usual connecting-rod and crank-arm N', vibrates the needle-shaft.

The stop or trip arm *i*, above mentioned, is mounted on the forward end of the rock-shaft I, above mentioned, journaled in lugs on the binder-gear standard. A compressor I', mounted on the rear end of this shaft, curves closely upwardly and outwardly around the lower arm of the needle-shaft.

In Fig. 6 I have shown the details of tripping mechanism. A crank-arm I^2 on the forward end of the compressor-shaft I, adjacent to the stop *i*, curves downward and outward under the needle-shaft, its outer end being connected by a jointed rod *i'* with one prong of a three-armed lever J, having its lower arm connected with the binder-gear standard by a pivot *j*, and its upper or third arm carries a friction-roller *j'*, traversing a cam-groove j^2 on the gear-wheel h^4, above mentioned, by which means the compressor I' is depressed at the proper period in each revolution of the gear-wheel to permit of the discharge of the bundles over it in a manner well understood. The spring i^2 and rod *i'* normally hold the stop-arm *i* constantly in position to abut against such arm h^3, and thus disengage the pinion h^2 from its driving-wheel *h'*. The spring i^2 being connected with the rock-shaft I through the arm I^2 and rod *i'*, as above described, normally holds the compressor in its advanced or working position until it yields to the pressure of the incoming grain. This movement, overcoming the resistance of the spring, releases the stop-arm *i* from contact with the detent h^3 and allows the wheel h^2 to engage with the sprocket-wheel *h'* and thus start the binding mechanism. The cam-

groove j^2 then holds the arm i out of the path of the pawl-arm h^3 until the spur-wheel h^4 completes its revolution, when it permits the arm i again to abut against the pawl-arm h^3, thus again disengaging the wheel h^2 and the binding mechanism.

The cam and gear wheel T on the knotter-actuating shaft carries the usual discharging-arms t t', the latter being made somewhat longer than the former, working in close proximity to the path of the needle and cut-off and being adapted to enter the space between them, while the cut-off is still holding back the incoming grain, and removes the bundle, thus completing its separation from the loose grain.

The compressor, as before explained, is mounted on a rock-shaft constituting part of the trip mechanism, and consequently coöperates with the discharge-arms by getting out of the way at the proper moment to allow the grain to pass over it. As the stop-arm i is mounted upon and vibrates with this shaft and abuts directly against the pawl or clutch-arm h^3 of the driving-piston h^2, which gears directly with the spur-gear h^4 on the knotter-actuating shaft, all intermediate mechanism is dispensed with and the construction of the apparatus simplified.

I do not broadly claim herein mounting a trip-arm on a compressor-shaft, as such a device has heretofore been used, but so far as I am aware I am the first to use a trip-arm on a compressor-shaft acting directly upon the clutch of a driving-pinion gearing directly with a pinion on the cam and gear wheel shaft, which organization greatly simplifies the mechanism.

Having thus described the organization and operation of my improved tripping mechanism, what I claim as new therein and as of my own invention is—

1. A compressor rock-shaft on one side of the grain-passage, provided with a radially-vibrating trip-arm, acting directly on the pawl of a clutch controlling a driving-pinion gearing directly with a gear-wheel on the cam and gear wheel shaft of the binder-actuating mechanism, on the opposite side of said passage, substantially as hereinbefore set forth.

2. The combination, substantially as hereinbefore set forth, of the binder-gear standard, the cam and gear wheel and knotter-actuating shaft mounted on the upper arm thereof; the driving-pinion gearing therewith, and carrying clutch mechanism; the binder-arm and compressor-shaft on the lower arm of the binder-gear standard; the pitman or driving connections between the binder-arm and compressor and cam and gear wheel, and the stop-arm on the compressor-shaft acting directly on the pawl of the clutch.

3. The combination, substantially as hereinbefore set forth, of the binder-gear standard; the cam and gear wheel mounted in bearings therein; the actuating-pinion meshing therewith; its clutch and pawl-arm; the rock-shaft carried by the lower member of the binder-gear standard; the compressor-arm on the inner end of said shaft, and the rigid, radially-moving locking and tripping arm on the other end of this shaft, acting directly on the pawl-arm.

4. The combination, substantially as hereinbefore set forth, of the binder-gear standard; the knotter-driving mechanism on the upper arm thereof; the compressor-shaft on its lower arm, actuated from the knotter-driving mechanism a driving-pinion gearing with a pinion on the cam and gear wheel shaft; a clutch controlling this mechanism, and a trip-arm on the compressor-shaft acting directly on the pawl of the clutch, normally to hold the driving mechanism out of gear.

5. The combination, substantially as hereinbefore set forth, of the binder-gear standard; the knotter-actuating shaft mounted in bearings therein; the cam and gear wheel carried thereby; the rocking arm actuated by the cam; the spring-arm connecting the rocking arm and crank on the rock-shaft I; the stop or trip arm on said shaft; the driving-clutch; its radial arm, and the driving-pinion, meshing directly with the cam and gear wheel.

6. The combination, substantially as hereinbefore set forth, of the binder-gear standard; the knotter-actuating shaft mounted in bearings in the upper member thereof; the discharge-arms on one end of this shaft; the cam and gear wheel on its other end; the compressor; its rock-shaft carried by the lower member of the binder-gear standard; the stop or trip arm carried by the rock-shaft; the rocking arms actuated by the cam; the spring-arm connecting them with the rock-shaft; the actuating-pinion, meshing with the cam and gear wheel; its clutch, and pawl-arm.

In testimony whereof I have hereunto set my hand this 20th day of April, A. D. 1896.

LEWIS MILLER.

Witnesses:
O. L. SADLER,
W. K. MEANS.