

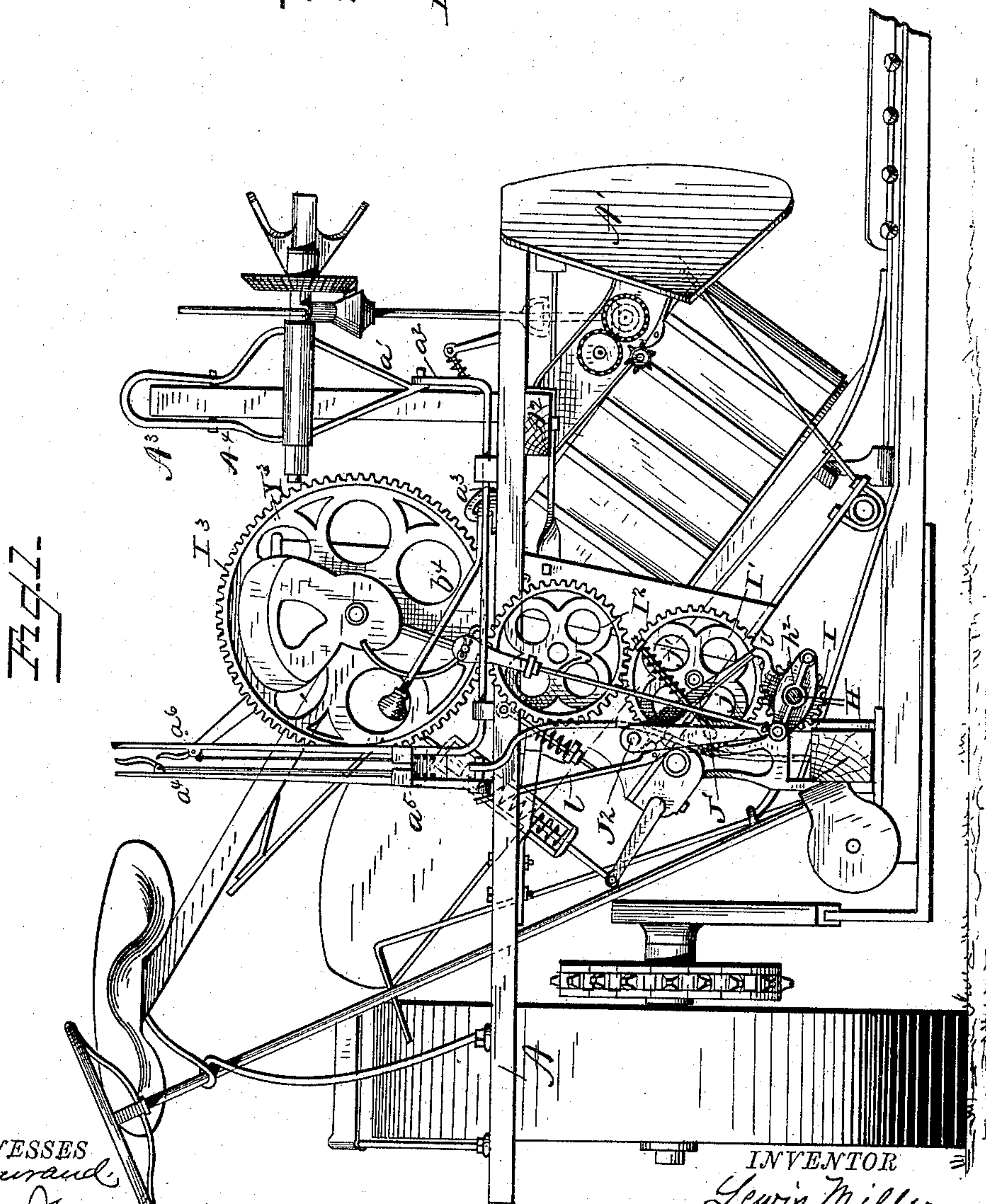
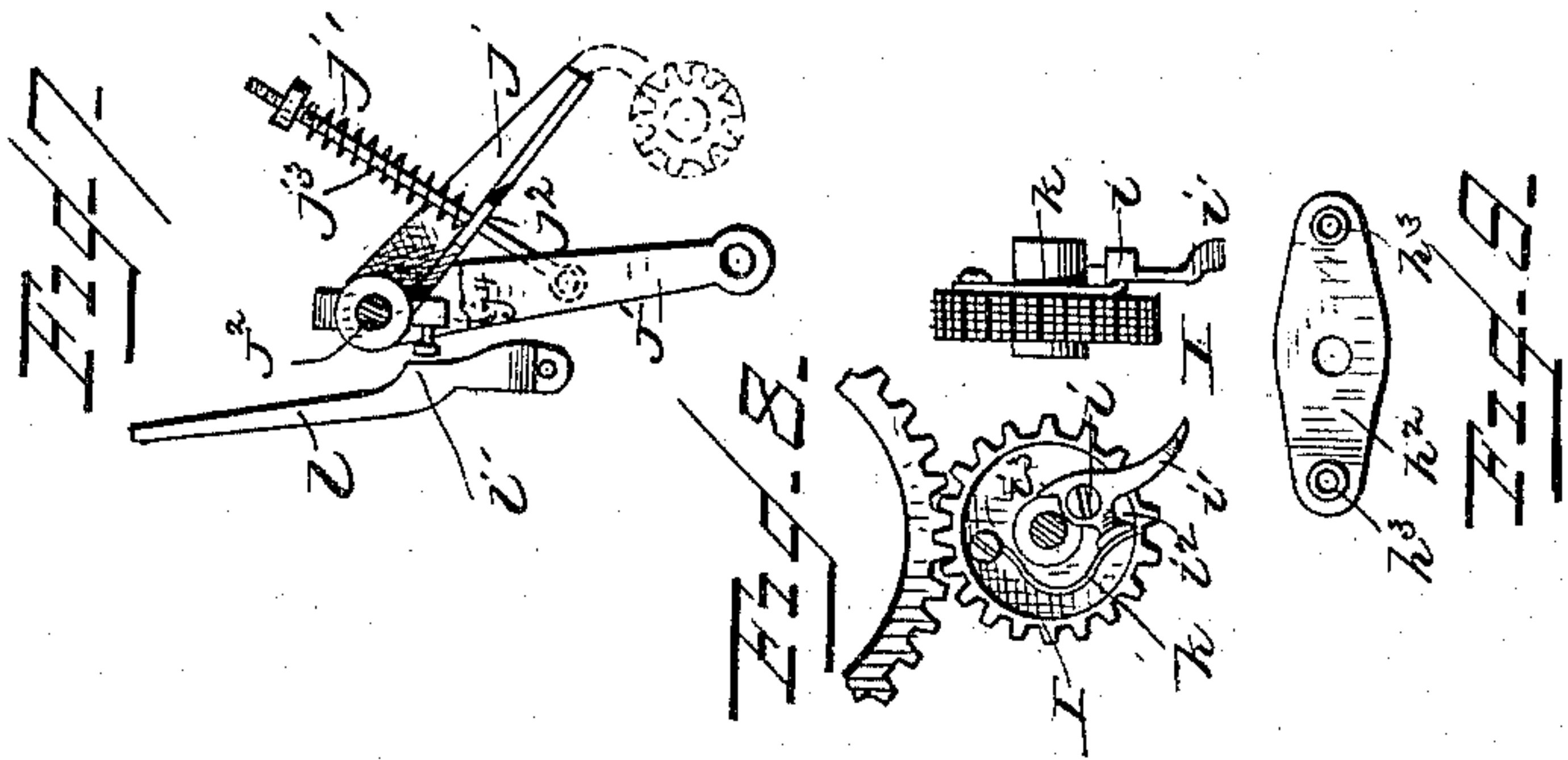
(No Model.)

3 Sheets—Sheet 1.

L. MILLER.  
GRAIN BINDING HARVESTER.

No. 335,610.

Patented Feb. 9, 1886.



WITNESSES  
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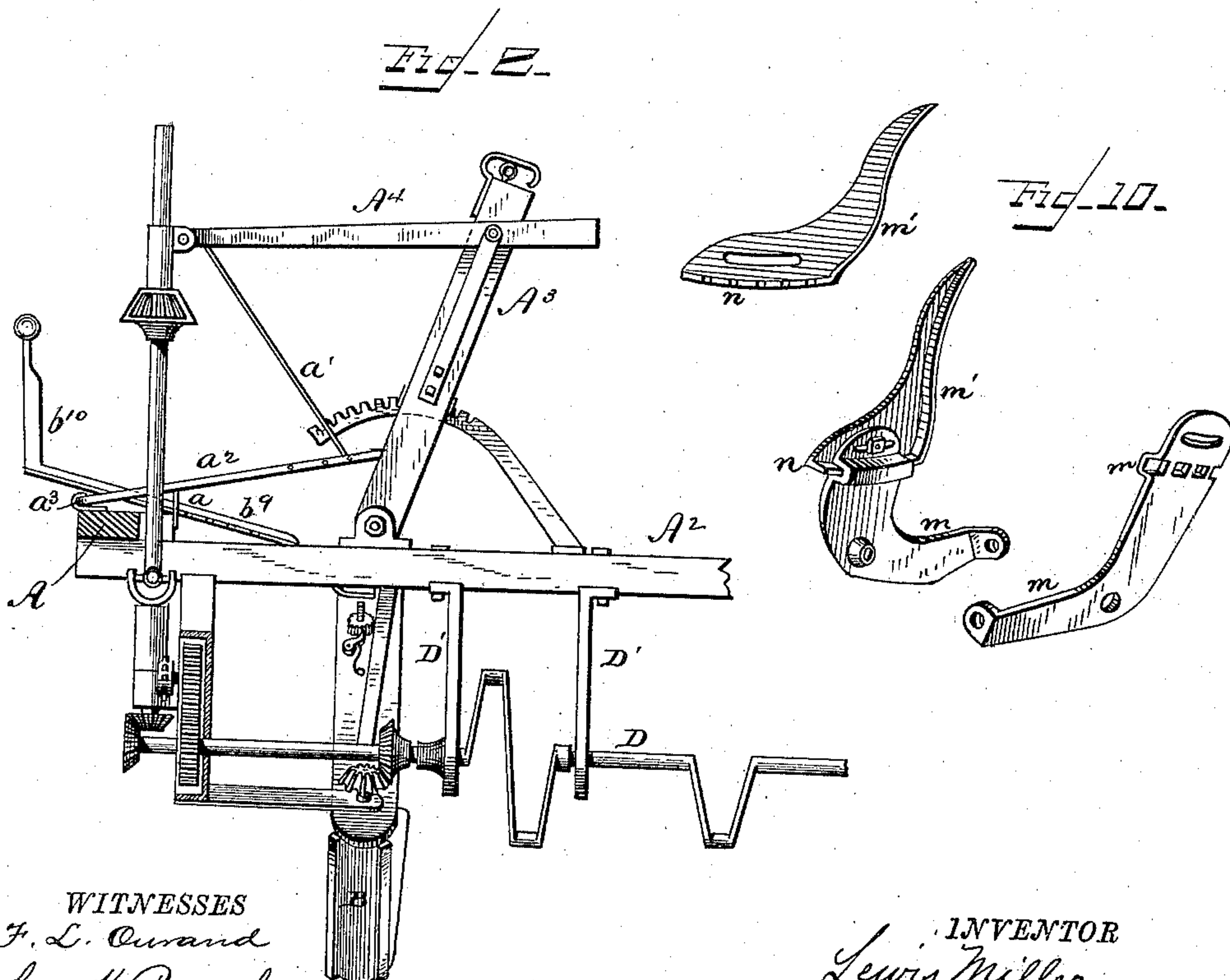
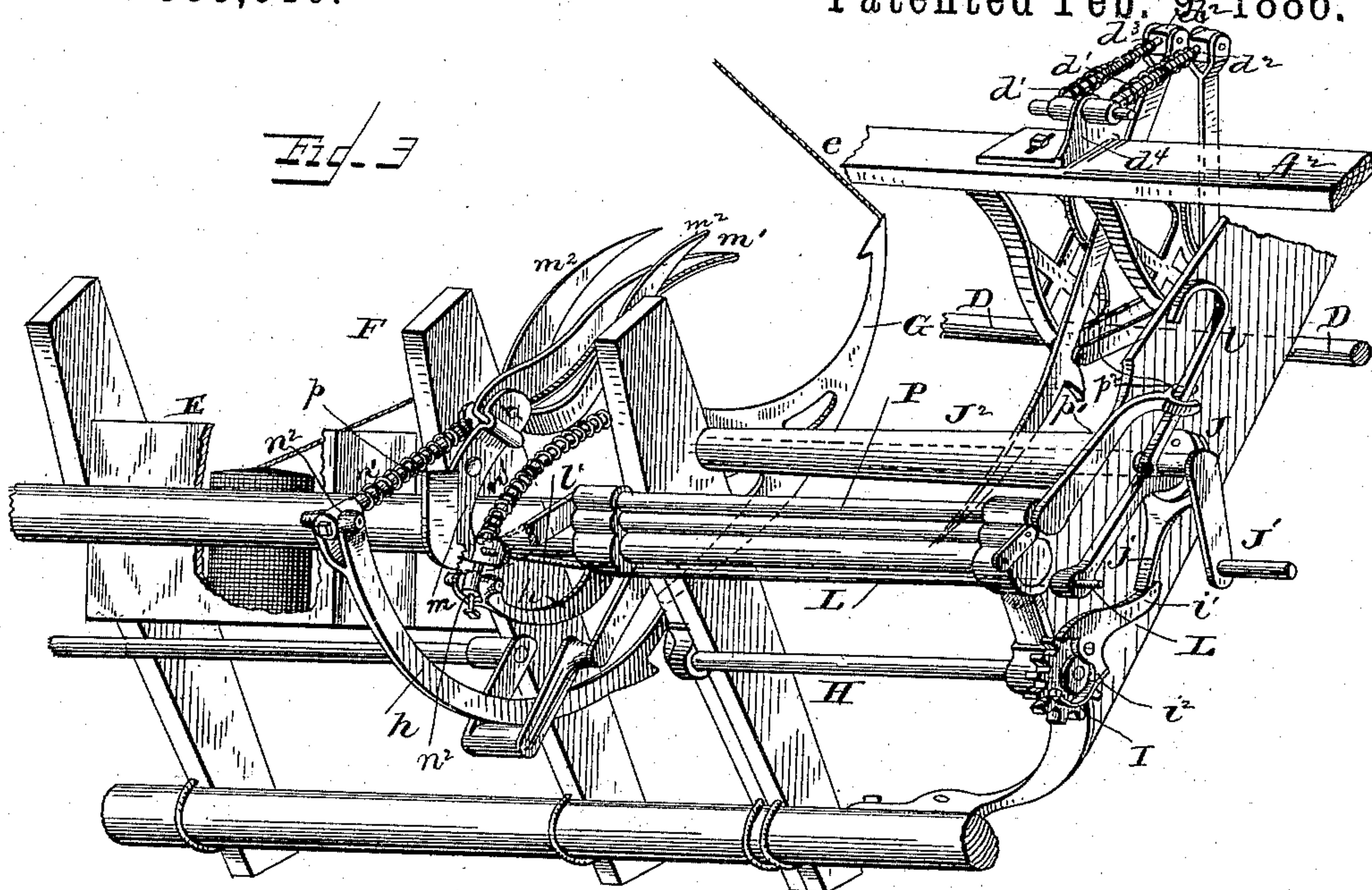
(No Model.)

3 Sheets—Sheet 2.

L. MILLER.  
GRAIN BINDING HARVESTER.

No. 335,610.

Patented Feb. 9, 1886.



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(No Model.)

3 Sheets—Sheet 3.

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Fig. 5.

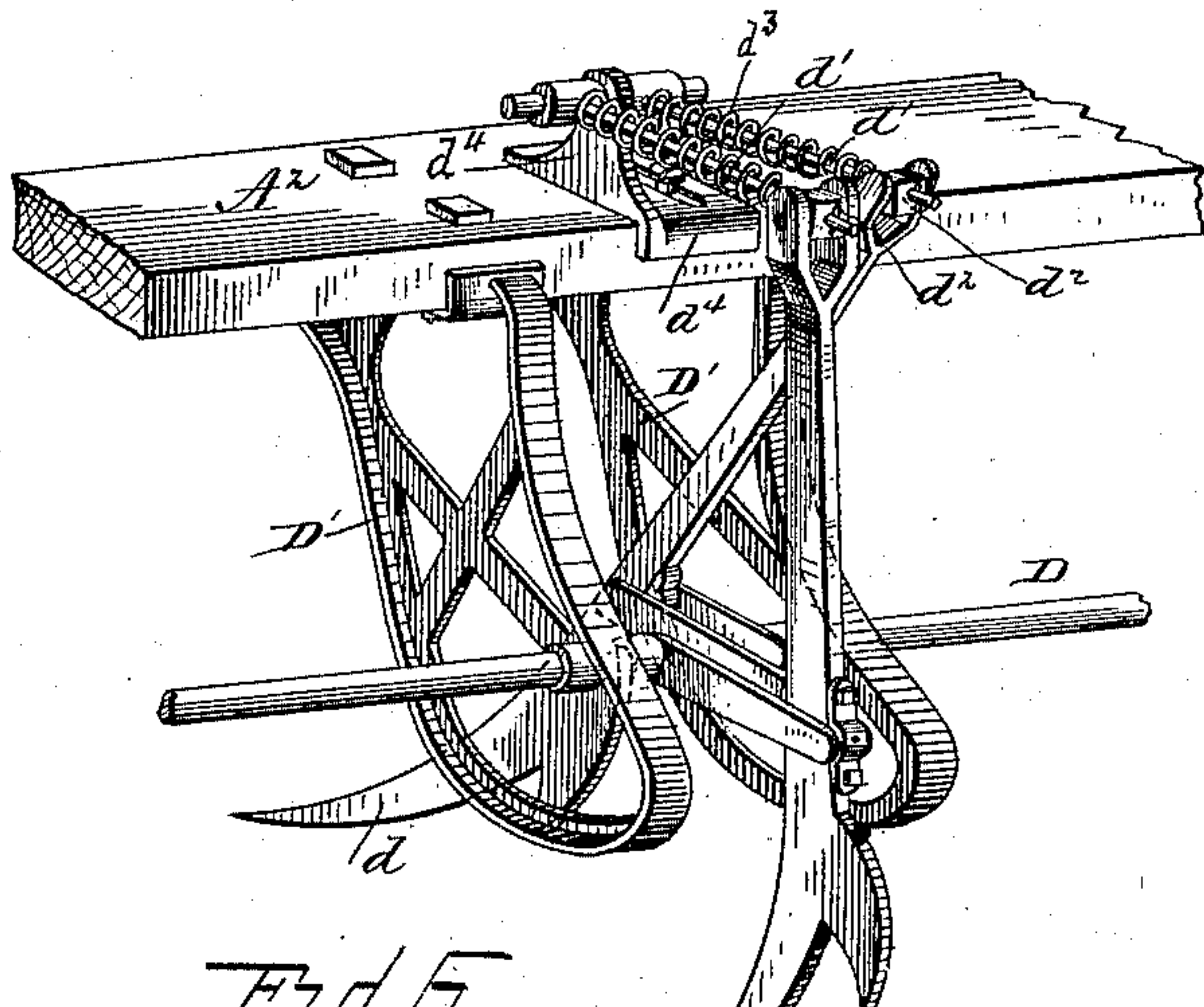


Fig. 6.

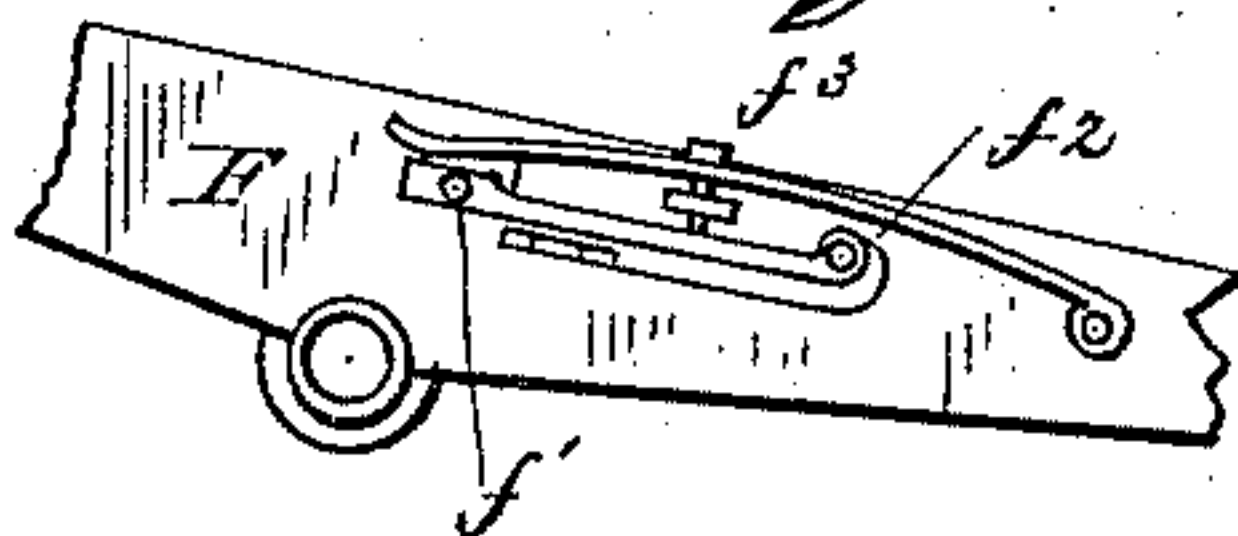
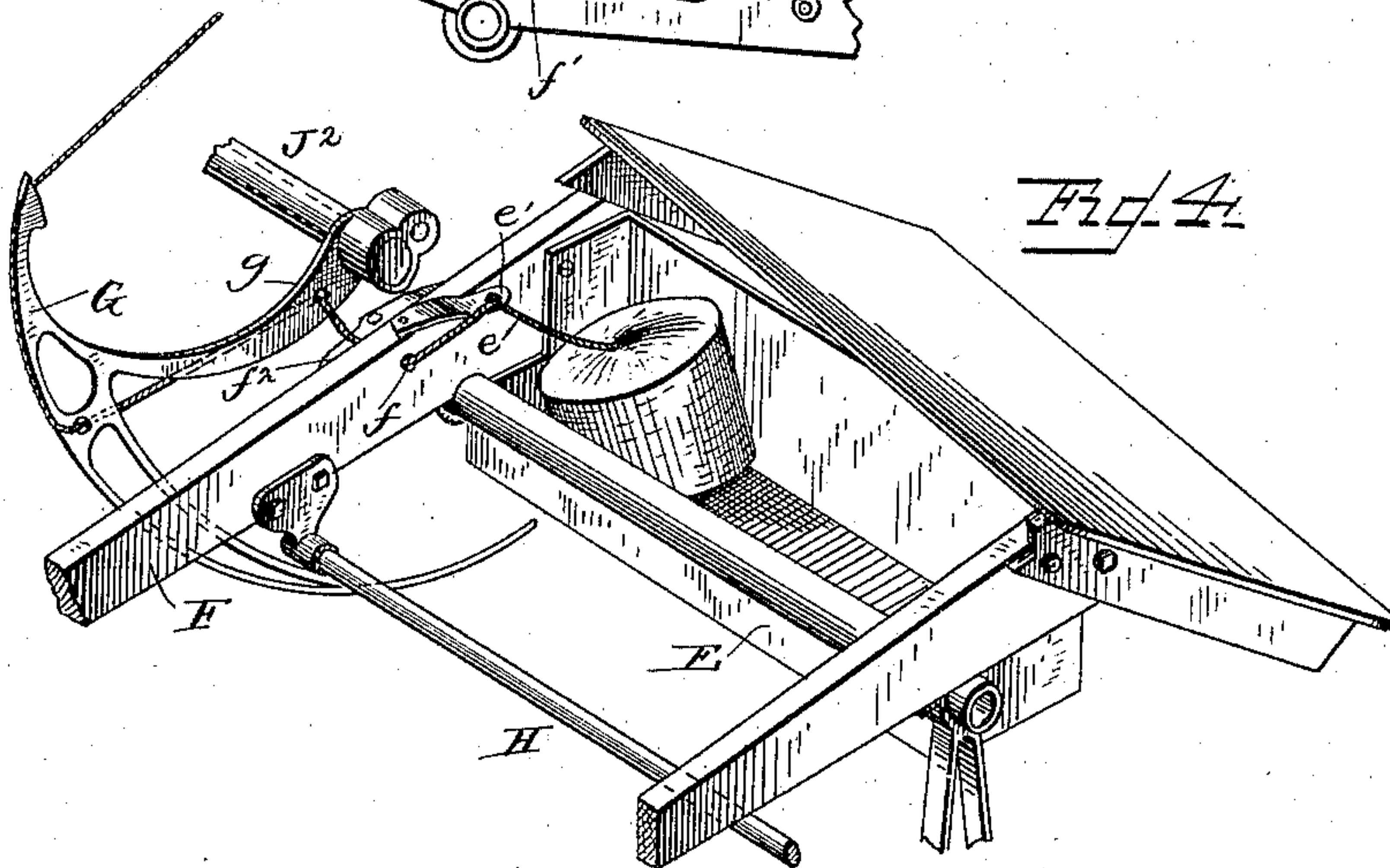


Fig. 4.



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# UNITED STATES PATENT OFFICE.

LEWIS MILLER, OF AKRON, OHIO.

## GRAIN-BINDING HARVESTER.

SPECIFICATION forming part of Letters Patent No. 335,610, dated February 9, 1886.

Application filed June 2, 1883. Serial No. 96,911. (No model.)

*To all whom it may concern:*

Be it known that I, LEWIS MILLER, of Akron, county of Summit, and State of Ohio, have invented a new and useful Improvement in Grain-Binding Harvesters, 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, mainly, to the improvement of that class of machines in which the grain is bound upon an inclined platform interposed between the grain platform or carrier and the driving-wheel; but it will be apparent from the following description that some of the devices hereinafter described may be applied to other constructions of machine.

The invention consists in certain details of construction and arrangement of parts, hereinafter described.

In the accompanying drawings, Figure 1 is a front elevation of a machine embracing my improvements. Fig. 2 is an elevation taken from the grain side, showing the arrangement of the reel-supports and butt-board and the means for actuating and adjusting the same. Fig. 3 is a perspective view of the packers and the binder mechanism trip connected therewith. Fig. 4 is a perspective view of the needle-arm and a portion of the binder-frame, showing the arrangement of the cord-box relatively thereto. Fig. 5 is a perspective view of the pickers and their supports and actuating-shaft; and Figs. 6, 7, 8, 9, and 10 are detail views of parts hereinafter described.

A represents the driver's foot-board, which is supported by the binder gear-standard above and in advance of the cutting apparatus. From the inner end of this board is suspended the inner grain guard or deflector, A', with its lower edge sufficiently depressed to insure its action on very short grain, but raised above and clear of the cutting apparatus and platform, to adapt the butts of the grain lying on the latter to pass freely under it to the butting and binding devices.

The reel-post A<sup>3</sup> is pivoted at its lower end to the longitudinal bar A<sup>2</sup> in a vertical longitudinal plane intermediate the planes of the reel-actuating gear and the binder-gear standard and gearing, and has a horizontal arm or yoke, A<sup>4</sup>, pivoted to its upper end, the forward

ward swinging end of which is provided with bearings for the reel-shaft. To said swinging end of the yoke A<sup>4</sup> is connected the upper bifurcated end of a pendent V-shaped rod, a', the lower end of which is attached to a rearwardly-projecting crank-arm, a<sup>2</sup>, on a transverse rocking-shaft, a<sup>3</sup>, mounted in suitable bearings on the foot-board A. The shaft a<sup>3</sup> passes through and has one of its bearings in a quadrant rack-standard, a<sup>5</sup>, and has a lever-arm, a<sup>4</sup>, on its outer end, extending up within reach of the driver, who, by vibrating said lever-arm forward or backward, can raise or lower the reel as desired. The rack a<sup>5</sup> is a double one, or it is of sufficient thickness on its upper rack-face to accommodate two holding-pawls, one attached to the lever a<sup>4</sup>, and the other connected with an elbow-lever, a<sup>6</sup>, journaled on the shaft a<sup>3</sup> on the opposite side of the quadrant rack a<sup>5</sup> from lever a<sup>4</sup>, and connected by a rod, a<sup>7</sup>, with the pivoted tongue, for adjusting the latter and rocking the machine on its carrying-wheels.

The pickers d, one pair of which is shown in Fig. 7, are connected with and operated from the shaft D, which is mounted in bearings in pendent brackets D', attached to the longitudinal bar A<sup>2</sup>, and arranged one on each side of each pair of picker-arms. The bearings for the shaft D are at or near the outer face or edge of the brackets D', which project below and inward from said bearings, and form on their inner lower sides or edges guards or clearers for freeing the pickers or removing the grain from their points as the latter rise to start on their outward or return movement, said points rising above the lower edges of the guards, and being thus prevented from carrying the grain or straw back with them. The upper ends of the picker-arms d are forked, and have the two arms perforated to form bearings for a block, d<sup>2</sup>, pivoted therein. Said block d<sup>2</sup> is perforated to receive and adapt it to slide upon one end of link or rod d', pivoted at its opposite end to a bracket, d<sup>4</sup>, on the bar A<sup>2</sup>. A pin passed through the link d', outside of the block d<sup>2</sup>, prevents the escape of the latter therefrom, and a spring, d<sup>3</sup>, surrounding the link, and extending between its pivot and its pivotal block, holds the latter out against its retaining-pin, but



permits it to yield to undue pressure on the points of the pickers, and thereby to relieve the latter from any unusual strain due to an obstruction or other cause. The brackets  $d^4$  are made adjustable in and out on the bar  $A^2$  by being slotted and secured to said bar by set-screws passing through such slots, for the purpose of changing the path of the points of the pickers.

The packers operating from beneath the platform, and hereinafter referred to, are connected with their pivoted links in the same manner as the pickers above described, for adapting them also to yield for a purpose which will be explained.

The operation of the pickers is well understood and need not be here explained.

The cord-box E is arranged underneath the inclined binder-table in rear of the needle-arm and packers, and is supported between the central and rear transverse bars of the binder-frame by said bars and the upper longitudinal tubular frame-bar in any suitable manner. The cord  $e$  extends from the ball in said box through a guiding-eye in an arm,  $e'$ , thence forward through a perforation at  $f$  in the transverse frame-bar F, and an eye or guide arranged in line or nearly in line with the needle-shaft or with an eye in the heel of the needle, said guide being formed in the free end of a bar,  $f'$ , pivoted at one end to the bar F.

$f^2$  is a spring, secured at one end to the bar F, with its free end overhanging the pivoted bar  $f'$ , and the latter is suspended from said spring by a bolt or screw,  $f^3$ , by the adjustment of which the eye in the bar  $f'$  can be thrown more or less out of line with the perforation  $f$  through which the cord passes to said eye, for increasing or diminishing the tension upon or frictional resistance to the passage of the cord to the needle-arm G. The cord passes from the eye in the bar  $f'$  through an eye or perforation,  $g$ , in the needle-arm near its heel end or shaft, and thence through suitable guiding-eyes to its point, as shown. The needle-arm is secured to the end of its shaft in rear or outside of its sleeve-bearing, and the cord in the arrangement described comes to it from a box arranged in rear of and below the needle-shaft and through a guide arranged in rear of and in line with said shaft extended, or nearly so, or with the eye in the heel of the needle, with sufficient space between the two for free passage of the cord, which is thus held clear of the needle in the vibrations of the latter and prevented from being caught and entangled with the needle or its shaft or with other operative parts of the machine.

The packers  $h$   $h'$  are connected with and operated by cranks formed in the first and main shaft H of the binder gearing, which extends longitudinally under the binder-frame mounted in suitable bearings thereon. The forward end of this shaft has a sprocket-wheel (not

shown) fast on it for driving the picker and reel shafts, and in rear of said sprocket-wheel is secured a cross head or arm,  $h^2$ , (the sprocket-wheel being removed to show said arms,) also fast on the shaft H and provided on its rear face at the ends of the arms or cross-head with short pins or studs  $h^3$ , on which small friction-rollers are mounted. In rear of the cross-head  $h^2$  is a pinion, I, mounted loosely on the shaft H, and provided on its forward face with a pin,  $i$ , upon which is pivoted an elbow-lever,  $i'$ , which is rounded at its angle or elbow and let into a recess of corresponding shape formed in one side of the hub of the pinion. A stop or spur at  $i^3$  on the lever strikes the hub of the pinion on one side of the recess and limits the movement of the lever in one direction on its pivot, and a spring,  $k$ , serves when its tension is not overcome to hold the lever against movement in the opposite direction. The short arm  $i^2$ , when the lever is in the position described, projects within the path of the pins  $h^3$ , and one of the latter acting thereon causes the pinion I to be rotated with the shaft H, and the pinion I, acting through the gears  $I'$  and  $I^2$  upon the gear  $I^3$ , sets in motion the binding mechanism. The gear  $I^3$  is fast on a shaft passing through the upper tubular arm of the binder-gear standard and actuating the knotting mechanism, and is provided on its forward face with a crank-pin, from which a connecting-rod, J, extends to a crank arm,  $J'$ , on the forward end of the needle-arm shaft  $J^2$ , which is mounted in the lower tubular arm of the gear-standard for imparting a rocking movement to said shaft. Upon the shaft  $J^2$ , just behind the arm  $J'$ , is secured a second arm,  $j$ , by a sleeve loose on the shaft, and to the arm  $J'$  is pivoted a short rod,  $j'$ , which passes through an eye in a forwardly-projecting lug,  $j^2$ , on the arm  $j$ , at or near the center of the length of the latter, and a spring,  $j^3$ , surrounding the rod  $j'$ , between an adjustable nut on the threaded outer end of the latter and the lug  $j^2$ , serves to hold the arm  $j$  with the lug  $j^2$  resting upon the arm  $J'$  with any required force. In each revolution of the gear  $I^3$  with its crank-pin, through which the crank-arm  $J'$  of the needle-shaft is vibrated, just after the needle has been retracted to receive the grain, the end of the arm  $j$  is brought within the path of the arm  $i'$  of the elbow-lever on the pinion I, and, acting on said arm, throws the arm  $i^2$  inward toward the center of shaft H of said pinion, and out of the path of the pins on the cross head or arms  $h^2$ , thereby allowing the cross-head and its shaft to continue to rotate and to actuate the picking and packing mechanisms, platform carrier, and reel, while the pinion I and the binding mechanism actuated therefrom remain at rest.

For tripping the arm  $j$  and again throwing the binding mechanism into action, a foot-trip (seen most clearly in Fig. 7) is employed, consisting of an arm or lever,  $l$ , pivoted at its



lower end in the gear-standard, and extending up within convenient reach of the driver's foot, and provided with a shoulder at  $l'$ , adapted to act on a short arm,  $j'$ , on the sleeve of arm  $j$  in such manner that the driver, by pressing outward on the upper end of said lever, can lift the arm  $j$  out of engagement with the arm  $i'$  of the lever  $i' i^2$ , thereby allowing the latter to be thrown out by its spring for engaging the arm  $i^2$  with the cross head or arms  $h^2$  on the shaft H. The pivot of lever  $l$  may be and by preference is made in the form of a rock-shaft, L, provided at its rear end with a crank-arm,  $l'$ , which passes through an eye in the heel end of a curved and angular arm or lever,  $m m'$ . The lever  $m$  is pivoted in an arm or heel extension of the compressor  $m^2$ . The arm  $m'$  extends up by the side of or between the arms of the compressor, and slightly in front thereof, in such manner as to receive the pressure of the grain brought up to the compressor by the packer-arms. By this arrangement, when the pressure on the arm  $m'$  becomes great enough to crowd it back into the plane of the arms  $m^2$ , its angular heel-extension, acting through arm  $l'$  and shaft L on the lever  $l$ , serves through said lever to trip the arm  $j$  and set in motion the binding mechanism. The size of the bundle may be regulated by making the arm  $m'$  of the elbow-lever  $m m'$  adjustable. This can be done by attaching the arm  $m'$ , through a feather,  $n$ , on the one matching a slot or groove in the other, a set-screw passing through the slot in one part and securing it to the other, as shown in Fig. 10.

A third trip is provided through the action of the yielding packing-arms above referred to. The heel ends of the packer-arms  $h$  and  $h'$ , connected with the vibrating links  $n'$ , are bifurcated, (or, for the same purpose, hereinafter explained, may be provided with laterally-projecting spurs or shoulders,) and the links are pivoted thereto through perforated blocks  $n^2$ , through which the end of the links may slide, said links being provided each with a retaining-pin and a spring for holding the swiveling block  $n^2$  at the end of the link, as explained above in the description of the picker-links. By this arrangement, as the grain becomes compressed between the compressors  $m^2$  and the packers the pressure on the points of the latter forces the shouldered heel end of the packer-arm to yield until it is brought into contact with an arm,  $p$ , on one end of the rock-shaft P, mounted in suitable bearings on the lower face of the binder-frame, thereby rocking said shaft, which at its forward end is provided with a secondary crank-arm,  $p'$ , having at its outer end a shoe or stirrup,  $p^2$ , on the outer side of the foot trip or lever  $l$ , the latter resting in said stirrup, as shown.

The yielding of the packers as explained,

caused by the pressure of the grain, is thus made to act on the lever  $l$ , and to trip the arm  $j$  for releasing and setting in motion the binder mechanism.

Parts of the machine not particularly described above may be constructed and arranged in any usual or preferred manner.

Having now described my invention, what I claim as new is—

1. The vibrating pickers interposed between the platform-carrier and the packers, in combination with the swinging links and the swiveling blocks, and springs interposed between the heel ends of the pickers and the supports for the swinging links, substantially as described.

2. The vibrating pickers connected with adjustable stands or brackets, in combination with yielding connections between said pickers and adjustable brackets, substantially as described.

3. The picker crank-shaft supported in dependent bearing-brackets attached to the longitudinal bar supporting the reel-post, in combination with means, substantially as described, for adjusting the pickers for changing their path.

4. In a grain-binder, the combination, with the binding mechanism, of the automatic tripping mechanism, and an independent tripping-lever adapted to be operated at will by the driver for setting the binding mechanism in operation, substantially as described.

5. The combination, with the binder mechanism, of an automatic trip adapting said binder mechanism to be automatically connected with and disconnected from its actuating-shaft, and a foot-lever operating independently of said automatic trip for enabling the driver to set the binder mechanism in operation at will, substantially as described.

6. The combination, with the foot-lever for tripping and setting in motion the binder mechanism, of the rock-shaft, and the pivoted and yielding arm connected with the grain-compressor, substantially as described.

7. The needle operating from beneath the binder-table and secured to the end of the actuating-shaft outside of the bearing of the latter, in combination with a cord-guide located in line or nearly in line with said shaft, and arranged to leave a space between it and the end of said shaft for the passage of the cord, and an eye in the heel of the needle whence the cord passes to the point of the needle, substantially as described.

In testimony whereof I have hereunto set my hand this 23d day of April, A. D. 1883.

LEWIS MILLER.

Witnesses:

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J. LEET YOUNG.