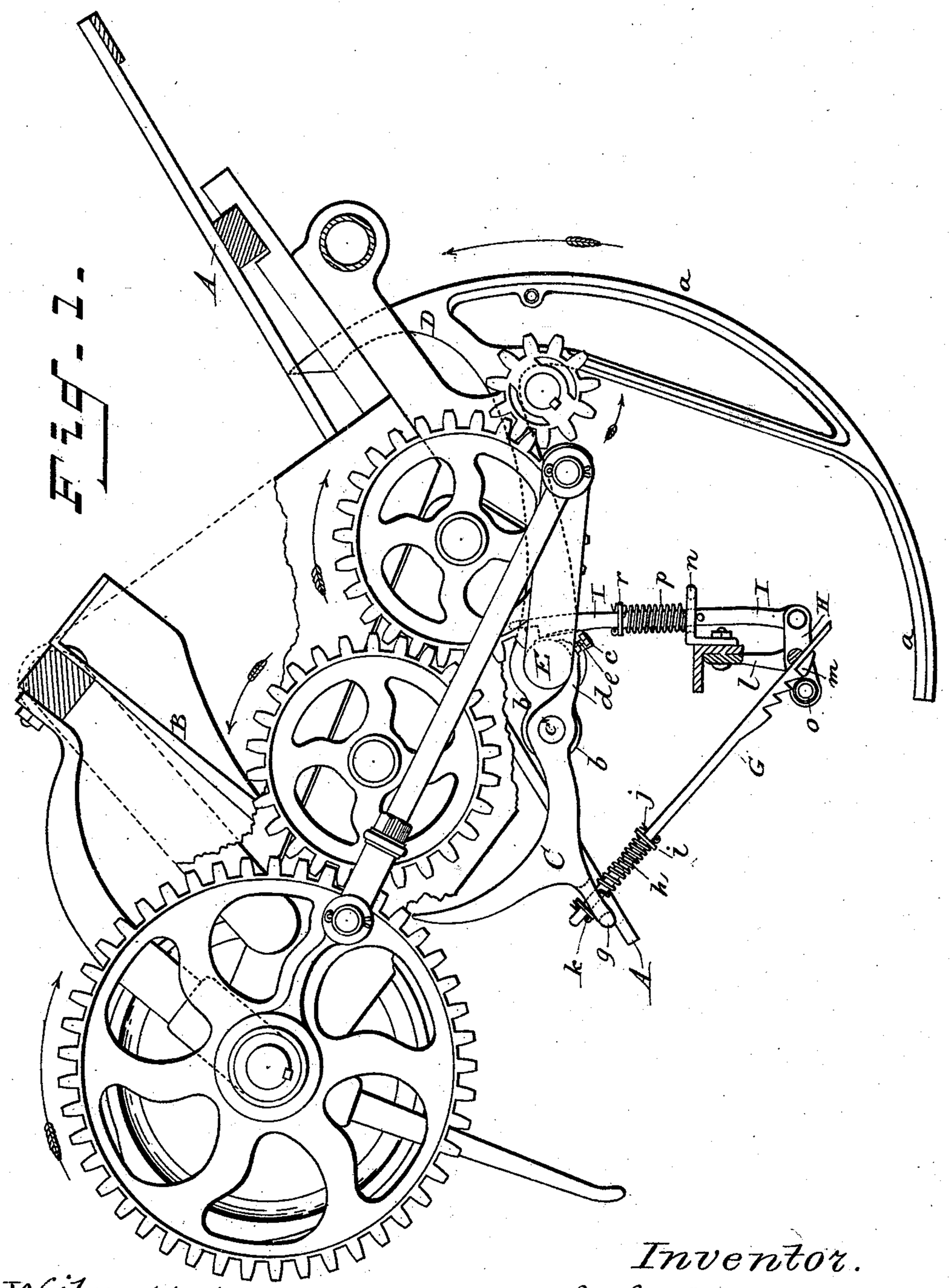
(No Model.) 4 Sheets—Sheet 1.

A. C. MILLER.

GRAIN BINDING MACHINE.

No. 339,573. Patented Apr. 6, 1886.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

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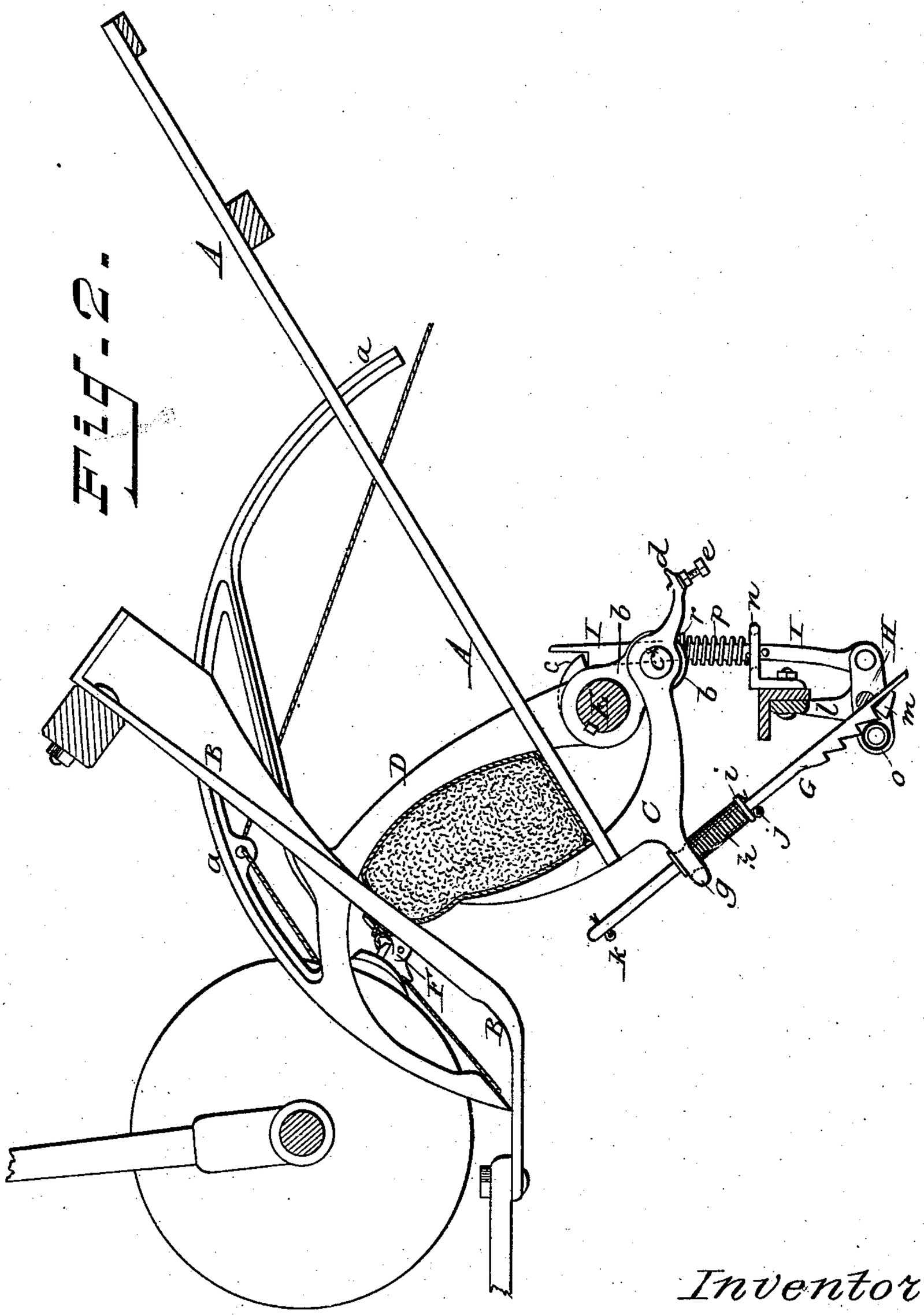
Fig. 2.



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(No Model.) 4 Sheets—Sheet 3.

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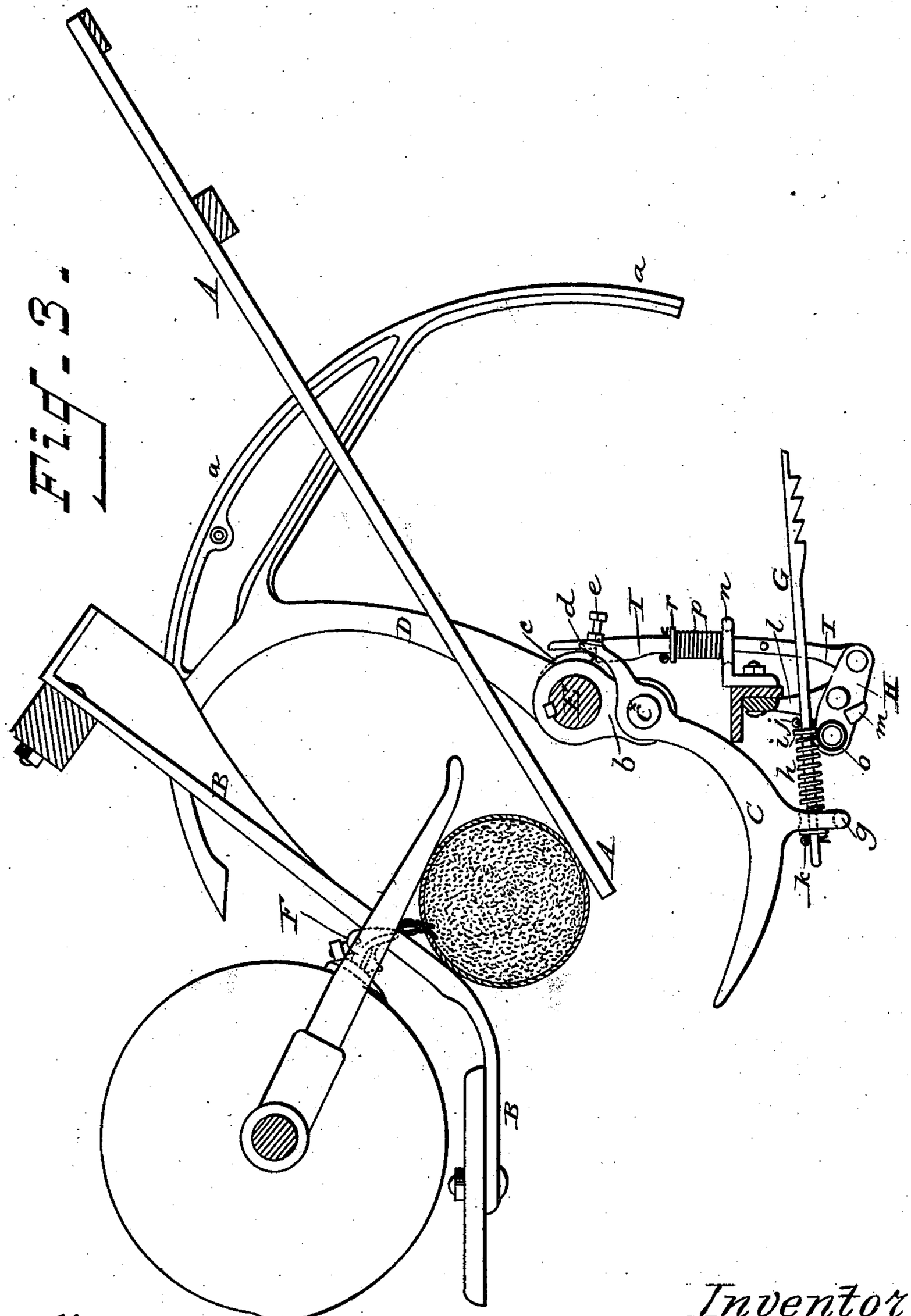
GRAIN BINDING MACHINE.

No. 339,573. Patented Apr. 6, 1886.

Fig. 3.



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(No Model.) 4 Sheets—Sheet 4.

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GRAIN BINDING MACHINE.

No. 339,573. Patented Apr. 6, 1886.

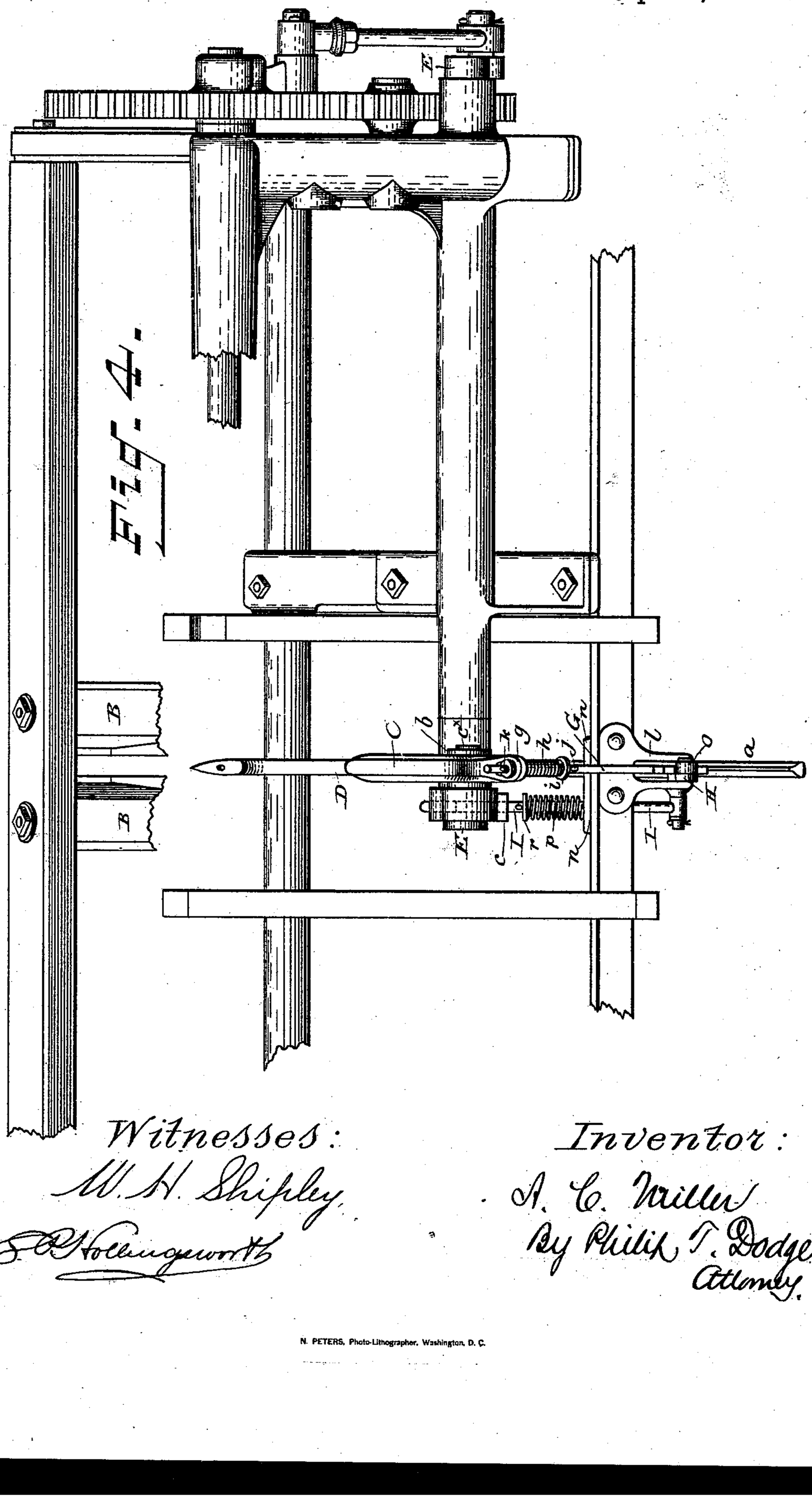

FIG. 4.

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UNITED STATES PATENT OFFICE.

ANDREW CALVIN MILLER, OF AUBURN, NEW YORK, ASSIGNOR TO D. M. OSBORNE & CO., OF SAME PLACE.

GRAIN-BINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 339,573, dated April 6, 1886.

Application filed January 5, 1885. Serial No. 152,114. (No model.)

To all whom it may concern:

Be it known that I, ANDREW CALVIN MILLER, of Auburn, in the county of Cayuga and State of New York, have invented certain Improvements in Grain-Binding Machines, of which the following is a specification.

My invention relates to that class of machines in which the gavel is confined and compressed between a vibratory needle or binder arm and a vibratory compressor-arm, which falls backward after the completion of the binding action, in order that the bundle may be discharged thereover.

The invention has special reference to an improved manner of raising the compressor to its operative position, sustaining it while in action, and releasing it automatically when its duty has been performed.

In my improved machine the compressor is jointed to a heel projection on the needle or needle-shaft, and the parts constructed in such manner that as the needle retreats it engages rigidly with the compressor and lifts the latter to an operative position. A latch is provided to sustain the compressor when elevated, and a cam applied at the heel of the needle and combined with other parts in such manner as to effect the release of the latch and permit the descent of the compressor when the needle begins its retreat.

In the drawings I have represented my improvement in connection with binding mechanism of a type familiar to every person skilled in the art.

With the exception of the peculiarities herein described and shown, the machine may be of ordinary construction in all its details. I have, therefore, omitted from the drawings such parts as would obscure or conceal its novel features.

Figure 1 represents an elevation of the binding mechanism viewed from the rear end, certain portions of the frame being represented in section, and the parts represented in the positions which they occupy at the instant that the compressor assumes its operative position. Fig. 2 is a vertical cross-section of the binder on a plane just forward of the driving-gear, looking in a forward direction, the needle and compressor being shown in the act of compressing the gavel. Fig. 3 is a similar view of said parts as they appear after the completion of the binding operation with the needle moved slightly backward. Fig. 4 is an elevation looking against the stubble or delivery side of the machine, the binding-table, the breast-plate, and other parts being removed to expose the devices thereunder.

A represents the inclined deck or binding-table, which receives the loose grain in a continuous stream at its upper end; B, the breast-plate, overlying the table to assist in confining the grain; C, the compressor to arrest the descending grain that it may accumulate and form a gavel; D, the needle or binder arm, which serves to divide the gavel from the following stream of grain and pass the cord or other binding material about the same to the tying devices, at the same time co-operating with the compressor-arm to compress the gavel. The needle is fixed on a horizontal rock-shaft, E, and swings upward through the table and breast-plate across the intervening grain-passage, in order to present the cord to the tying device F. It is made of the usual form, with an approximately radial arm to confine the gavel, and with a concentric guard, *a*, extending rearward from its outer end, to hold back the free grain. At the inner or heel end of the needle I provide a rigid arm or projection, *b*, and a cam, *c*, either or both of which may be formed integral with the hub of the needle, or may be separately formed and secured to the needle-shaft, as preferred. The compressor C is pivoted to the heel projection of the needle at $c^{\times}$, and is extended rearward beyond this pivot in the form of an arm, *d*, so arranged that when the needle has swung backward to a certain point the arm *d* will encounter the under side of the needle-hub, as as in Fig. 3, thus causing the needle and compressor to interlock rigidly, so that the continued descent of the needle will swing the compressor positively upward above the binding-table to its operative position, as shown in Fig. 1.

In order that the needle may raise the compressor a greater or less distance, according to the size of the bundle to be produced, I provide between the needle and the heel end of the compressor an adjustable bearing, which may be of any suitable form, although I pre-

fer as the most simple device a set-screw, *e*, inserted through the arm *d* of the compressor, and secured by a check-nut thereon. It will be seen that by adjusting this screw the position of the compressor with respect to the needle at the time they interlock may be varied, so that the needle descending to a fixed point will elevate the compressor to one point or another, as may be demanded.

For the purpose of sustaining the compressor in its operative position, I employ an automatic latch, G, which, in its preferred form, consists, as shown, of a rod having its lower end provided with a series of ratchet-teeth, and its upper end extended loosely through a projection, *g*, on the back side of the compressor. A spiral spring, *h*, encircles the upper end of the latch, bearing at its upper end beneath the arm *g* of the compressor and at its lower end upon an adjustable collar or washer, *i*, secured to the latch by a pin, *j*, or otherwise. This spring tends to urge the compressor upward and maintain it in an operative position when the lower end of the latch is secured in place. Through the upper end of the latch I insert a pin, *k*, which prevents its accidental escape when its lower end is released. The latch will be provided with a series of holes, in order to admit of the pins *j* and *k* being changed from place to place, so that the tension which is applied to the spring may be varied, and thereby the degrees of compression which is applied to the gavel.

For the purpose of engaging and holding the lower end of the latch, I pivot to an arm, *l*, on the main frame, or to any other suitable support, a detent-lever, H, one end of which is provided with a stud, *m*, to engage the teeth of the latch, and with a roller, *o*, to lift the latch out of engagement with the teeth when the compressor is to be released. To one end of the detent-lever I pivot an upright rod, I, which rises through a slotted guide-plate, *n*, on the frame, with its upper end in position to be engaged by the cam *c* of the needle when the latter is swung forward to the limit of its movement. The rod I is surrounded by a spiral spring, *p*, the lower end of which bears on the guide *n*, while the upper end bears beneath a collar, *r*, secured on the rod, as shown in the several figures, so that the spring acts to urge the rod upward, and thereby place the detent-lever H in such position as to engage the compressor-sustaining latch.

The operation of the parts is as follows: A bundle having been bound and the compressor released, the latter descends below the table to a position represented in Fig. 3, permitting the bundle to escape thereover. The needle now swings backward, and in the course of its descent the heel-arm *d* of the compressor encounters the hub of the needle, as shown in Fig. 3, so that the compressor interlocks, as before stated, with the needle. By the continued descent of the needle the compressor is carried upward to the position represented in Fig. 1. As the compressor rises, its arm *g*, acting against the pin or washer on the upper end of the latch G, lifts the latter until one or another of the teeth in its heel end engage the stud *m* of the detent-lever H, the effect of which is to support the latch so that it will in turn, through the spring *h*, give support to the compressor. After a gavel of proper size has accumulated on the table against the compressor, the needle-arm swings forward, compressing the gavel and passing the cord about the same to the tying devices. During this movement the cam *c*, turning forward with the needle, rises past the side of the rod I, and at the instant that the needle completes its forward movement the cam passes the upper end of the rod, which engages thereunder, as shown in Fig. 2. As soon as the tying operation is completed, the needle retreats, whereupon the cam *c*, turning therewith, forces the rod I downward, causing the latter in turn to vibrate the detent-lever H, so that its roller *o*, acting against the under side of the latch G, will lift the latter out of engagement with the stud *m*. The effect of this action is to release the latch and compressor, which immediately descend to the position represented in Fig. 3.

It is to be observed that the retreating needle acts to lift the compressor in a positive manner, that the compressor, when lifted, is sustained in position by an automatic latch connected therewith, and that the release of this latch at the proper time is effected by the retrograde action of the needle.

It will of course be understood that the form of the latch and of the intermediate devices through which its disengagement by the backward movement of the needle may be modified in various respects without changing essentially their mode of action.

The forms represented in the drawings are recommended because of their extreme simplicity and of their adaptability to machines such as are now in common use without necessitating material change in other respects.

It is to be remarked that the latch is provided with several teeth. This feature is of importance in connection with the adjustable bearing *e*, for the reason that it secures the maintenance of the compressor in either of the different positions to which it may be lifted.

Having thus described my invention, what I claim is—

1. In combination with the needle, the compressor pivoted thereto and arranged to engage firmly therewith during the retrograde motion thereof, the latch G, to sustain the compressor, the pivoted detent by which the latch is sustained, the rod to disengage the detent, and the cam or shoulder operated in unison with the needle to actuate the rod.

2. In combination with a rising and falling compressor, the latch to sustain the same in operative position arranged to engage a rigid stop or support, and the spring applied between the latch and compressor, whereby the

compressor is permitted to yield while the latch remains at rest.

3. The needle-arm and the cam *c*, in combination with the opposing compressor, the latch and spring to sustain the compressor, the pivoted detent H, the rod I, and the spring *p*, to urge said rod endwise.

4. In combination with the vibratory needle and the heel projection thereon or on its shaft, the opposing compressor pivoted to said needle and adapted to be lifted into action thereby, the adjustable bearing between the compressor and needle, whereby the compressor may be lifted to a greater or less height, and the locking devices adapted to sustain the compressor at different heights, whereby the machine may be adjusted to produce bundles of large or small size, as demanded.

5. In combination with a pivoted falling compressor to sustain the gavel, a supporting latch or arm provided with a series of teeth and adapted to maintain the compressor in the different positions to which it may be raised.

In testimony whereof I hereunto set my hand, this 22d day of December, 1884, in the presence of two attesting witnesses.

ANDREW CALVIN MILLER.

Witnesses:
E. E. HAMILTON,
W. T. HAMON.