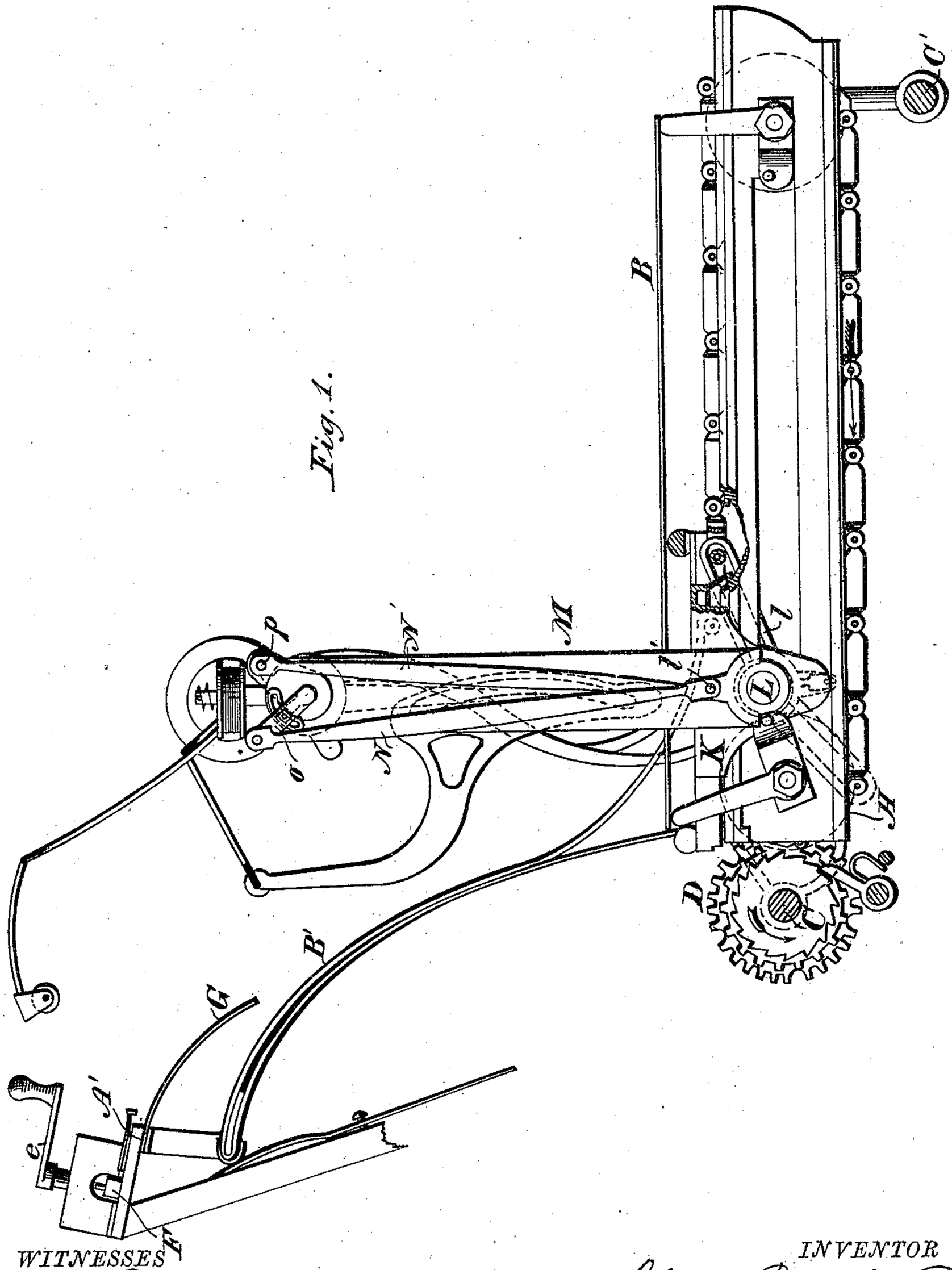
5 Sheets—Sheet 1.

C. B. WITHINGTON.

GRAIN-BINDER.

No. 174,454. Patented March 7, 1876.

Fig. 1.



WITNESSES

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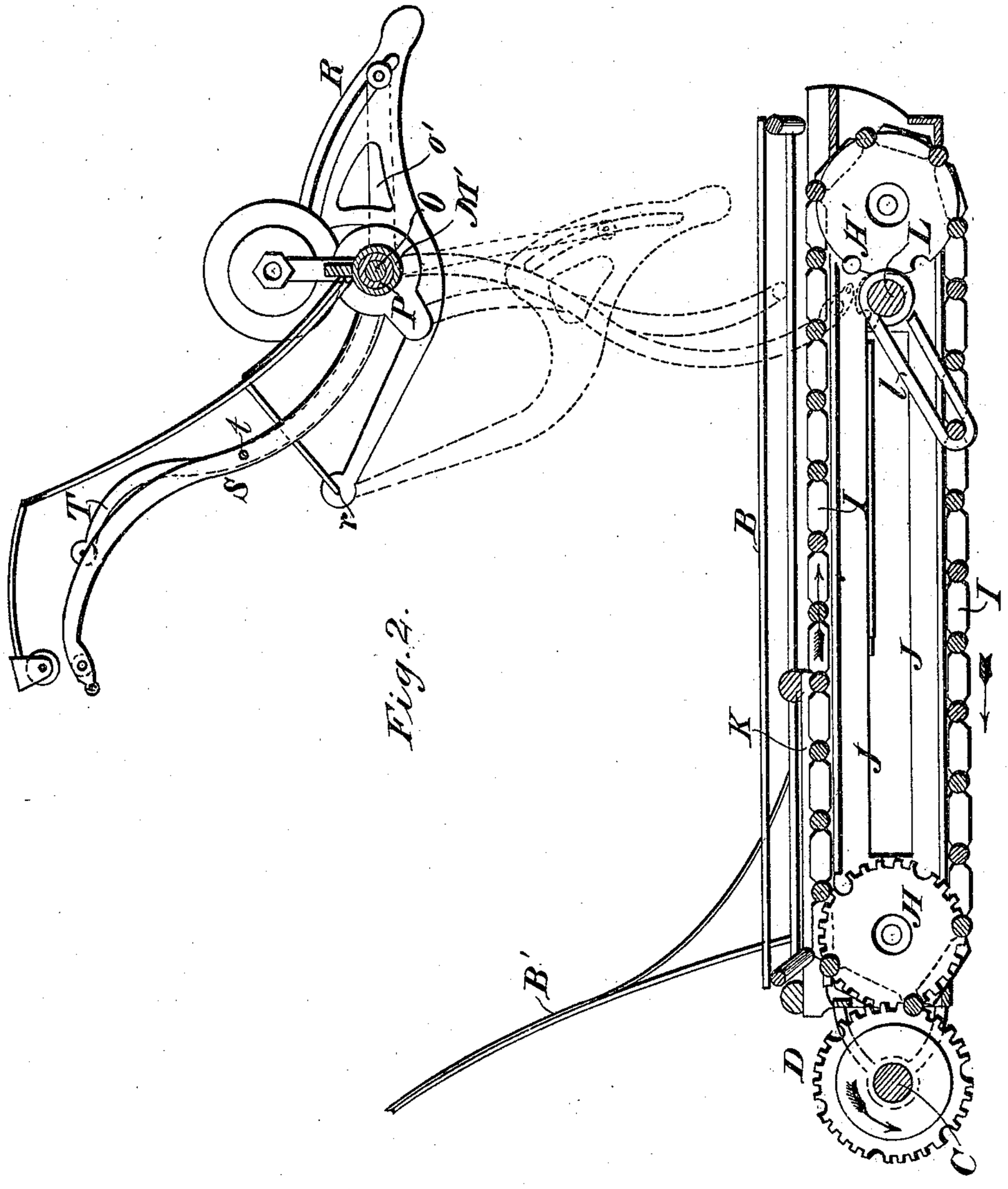

Fig. 2.

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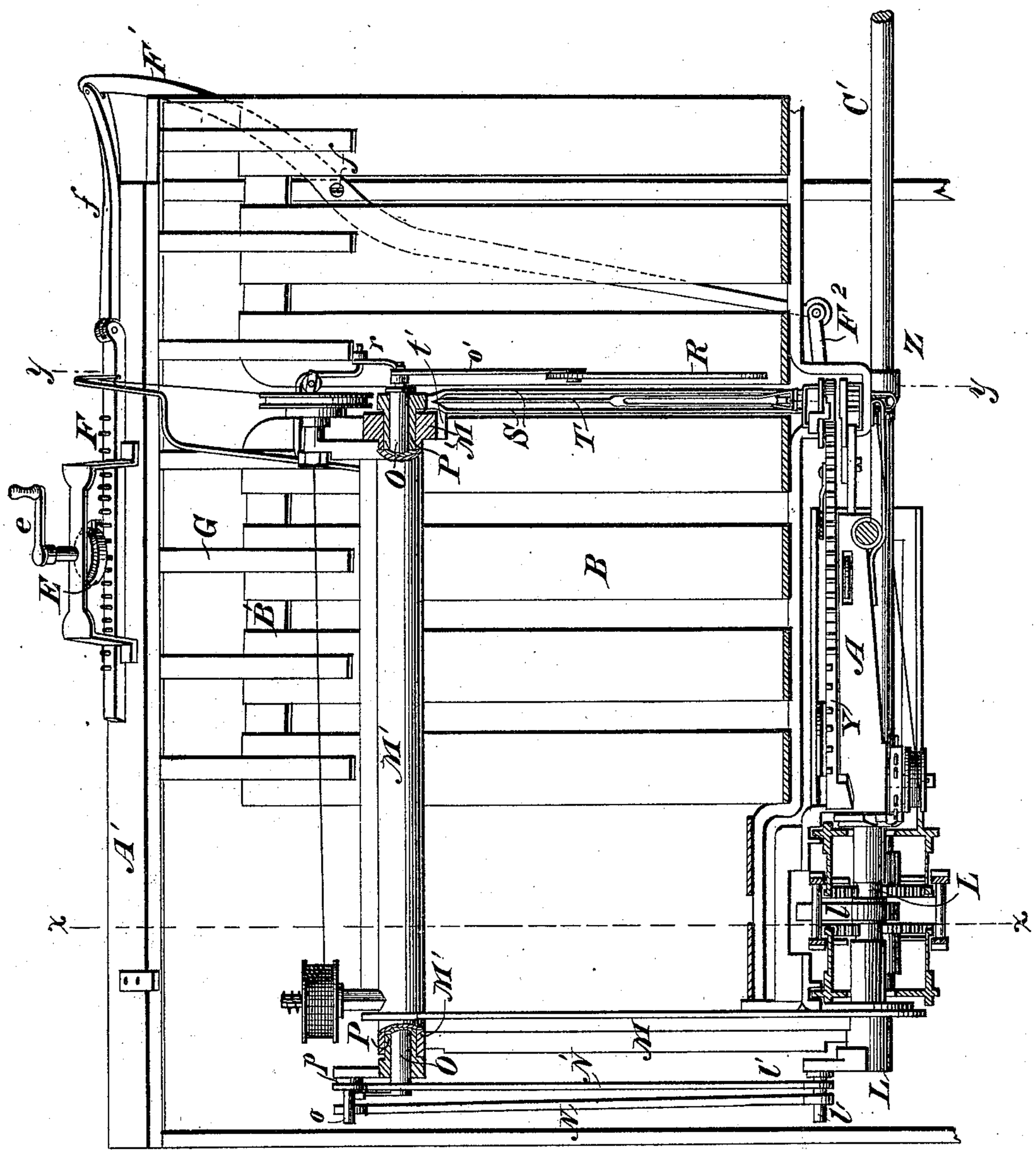

Fig. 3.

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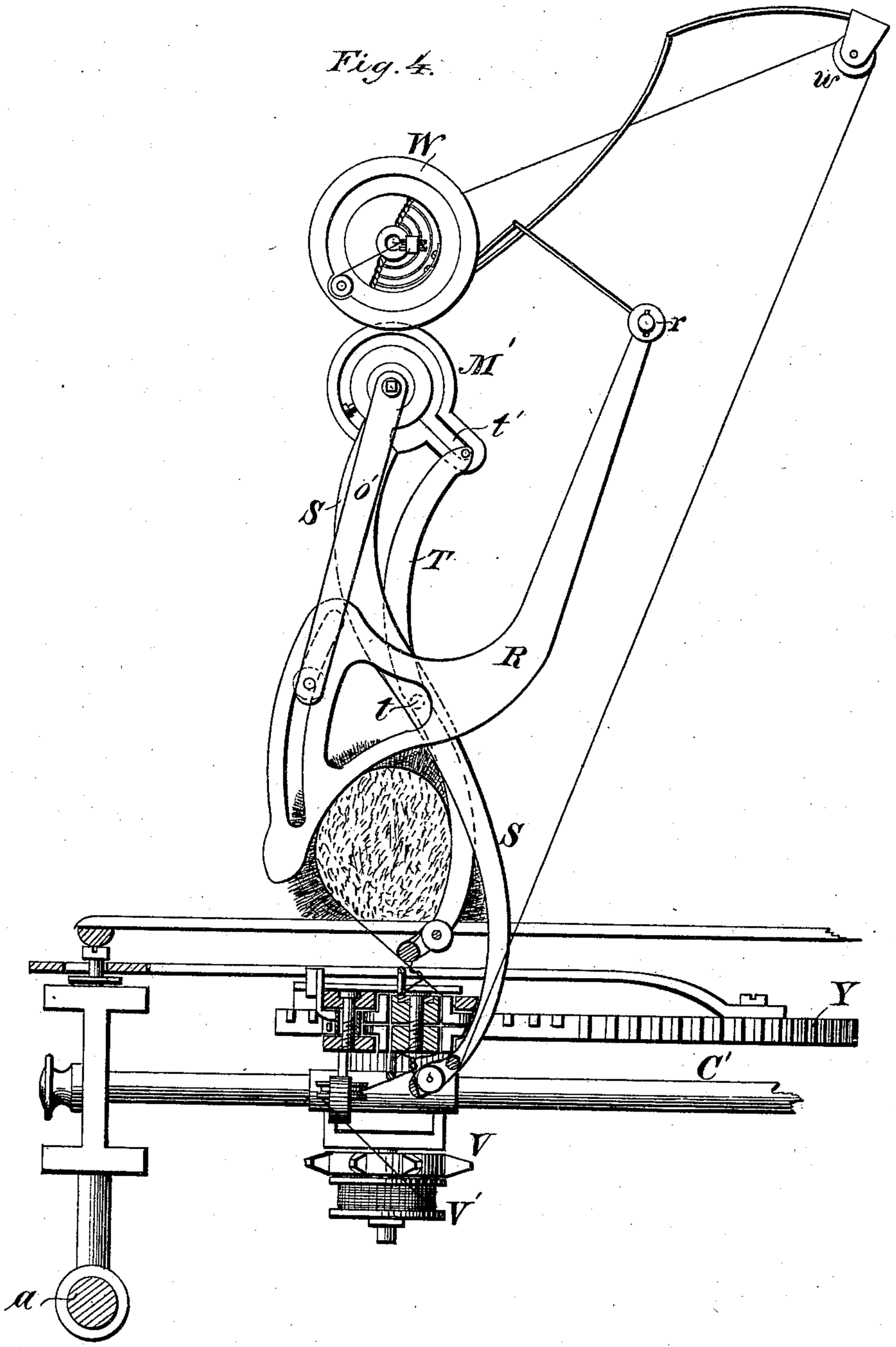
Fig. 4.



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5 Sheets—Sheet 5.

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GRAIN-BINDER.

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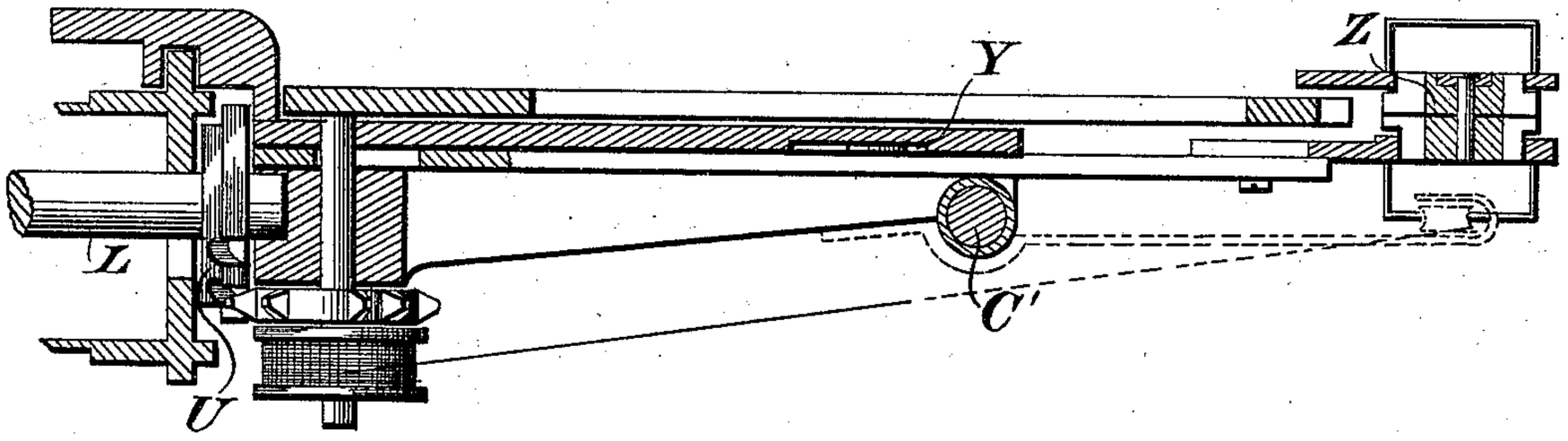
Fig. 5.



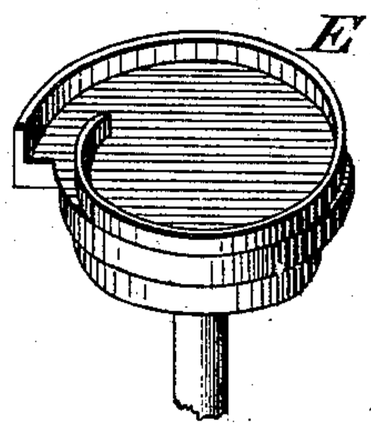


Fig. 7.

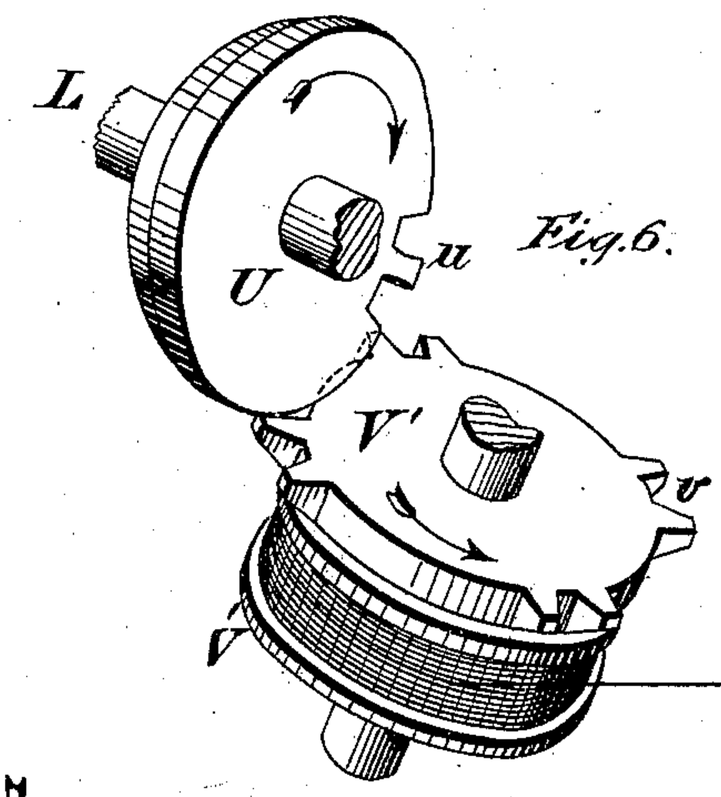
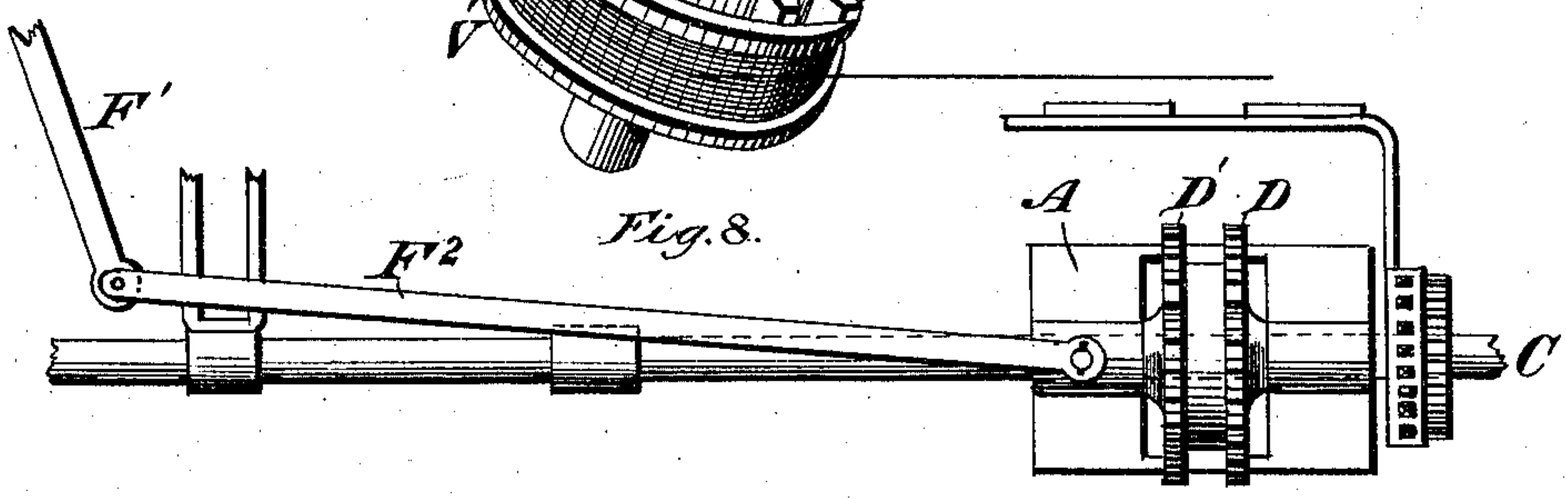


Fig. 6.

Fig. 8.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **174,454**, dated March 7, 1876; application filed November 10, 1875.

To all whom it may concern:

Be it known that I, CHARLES B. WITHINGTON, of Janesville, in the county of Rock and State of Wisconsin, have invented certain new and useful Improvements in Grain-Binding mechanism, of which the following is a specification:

My invention more especially relates to automatic binders, of the class having a binding or wire carrying arm moving in a circular path, and mounted on a reciprocating carriage.

The subject-matter claimed will hereinafter specifically be designated.

In the accompanying drawings, Figure 1 represents a view, in elevation, of so much of my improved apparatus as is necessary to illustrate the invention herein claimed, as seen from the rear, with the parts in the attitude they assume when the compressing and binding wires are closed upon the bundle. Fig. 2 represents a longitudinal vertical section through the apparatus, on the line *x x* of Fig. 3, showing in full lines the parts in the attitude they assume at the moment when the bound gavel has been discharged and the binding mechanism is ready to move forward again to seize another bundle; the dotted lines show the relation of the parts when the bundle is compressed. Fig. 3 represents an end elevation of the apparatus, partly in section, with the parts in the position shown in Fig. 1. Fig. 4 represents a view, in elevation, of a portion of the apparatus as seen from the front, partly in section, on the line *y y* of Fig. 3, showing the attitude of the parts at the time the wire is being carried into the twister, after the compression of the bundle. Fig. 5 represents a vertical longitudinal section through the binding mechanism beneath the platform; Fig. 6, a view, in perspective, of the positive stop-motion feed for the lower wire-spool; Fig. 7, a view, in perspective, of the snail-cam for adjusting the binder-frame on its ways, and Fig. 8, a view of another portion of said adjusting mechanism, showing the details of its connection with the binding-machine.

The binding mechanism is, by preference, mounted on a suitable frame, A, secured upon the frame of a harvester of any suitable, well-known construction, having an endless apron for elevating and delivering the cut grain into a suitable receiver, as in the well-known automatic binders of Watson, Renwick & Watson, Carpenter, and McCormick. The grain is delivered from the elevating apron, through an opening in a gallows-frame, A′, which constitutes a fixed part of the harvester-frame, upon a slatted inclined receptacle, B′, forming an extension of the binding platform B. In order that the wire may be passed around the middle of the bundle, notwithstanding variations in the length of the grain, I mount the entire binding mechanism upon ways C C′, which permit it to be moved freely backward and forward in a line parallel with the length of the grain. The binding mechanism is driven by cranks, sprocket-wheels, or gearing actuated by any suitable prime mover, and mounted on a shaft, C, turning in fixed bearings on the frame.

In order to accommodate the adjustment of the binding mechanism above mentioned, this shaft C is arranged parallel with the line of adjustment of the frame, and in fact, in this instance, constitutes one of the ways upon which said frame slides, and the double gear D D′, by which the binding mechanism is actuated, is likewise so constructed as to be free to move endwise on the shaft while compelled to turn with it by the usual spline or feather. This wheel revolves between jaws of the frame which keep it in proper relation to the gearing driven by it.

In order to place this adjusting movement under the control of the driver, while in his seat on the machine, I mount a snail-wheel or cam, E, Fig. 7, upon the gallows-frame above mentioned. This snail-wheel E works in a rack, F, sliding in bearings on the frame-piece A′, and connected by a link, *f*, with a vibrating lever, F^1, fulcrumed on the frame-piece A′ at *f′*, connected by a joint-link, F^2, with the sliding frame A, by which mode of construction the driver can readily shift the frame by turning the crank *e* to bring the binding-wire to the middle of the length of the bundle.

The binder's platform or receptacle B, it will be observed, is adjustable with the bind-

ing-arm, but is stationary relatively to the line of reciprocation of said arm. A deflector, G, mounted on this receptacle B, slides in guides on the frame-piece A′, and is thus kept in its proper relation to the other parts, while adjustable with the binding-platform or receptacle B.

The binding mechanism in most of its details is similar to that shown in an application for Letters Patent of the United States filed by me March 5, 1874, and, therefore, need not here be described in detail.

A double sprocket-wheel, D, mounted upon the driving-shaft C, gears into corresponding wheels H, over which the driving-chain I passes, as well as over corresponding wheels H′ on the opposite end of the slotted box-frame J, described in my application above mentioned.

The driving-shaft revolves in the direction indicated by the arrows in Fig. 1, and by means of a slotted link, *l*, hooked to the chain and connected with a shaft, L, mounted on a frame, K, which carries the standards M of the binding-arm, and imparts a reciprocating motion to said arm.

Pitmen N N′, pivoted on the crank *l′* of the shaft L, are respectively attached to the cranks *o p* of two rock-shafts, O P, concentric with each other, and inclosed within the tubular standard or support M′ of the binding-arm. (See Fig. 3.) The inner rock-shaft O consists of a steel rod, and carries at its forward end a crank-arm, *o′*, working in a slot of a vibrating compressor, R, pivoted at *r* on some projecting portion of the binding-arm frame, so as to give the compressor a movement eccentric to that of its driving-shaft O, which shaft, owing to the construction above described, constitutes a torsional spring, allowing the compressing-arm and its driving-crank to yield slightly under any excess of pressure over the normal strain of binding the bundle.

I do not claim, however, the adjustable crank and eccentric compressor above described, these devices being the invention of Wm. R. Baker, of Chicago, Illinois.

The binding-arm S is mounted on the rock-shaft P, and, of course, vibrates concentrically with it.

In a machine organized (as mine is) for the use of two wires, or even the use of a single wire, it is highly advantageous to press the wire into the twister with a positive force applied on each side of it. In order to obtain this desideratum I have heretofore used a bifurcated arm; but, as I find it advantageous to give a piercing action to the point of the binding-arm while obtaining the advantages above mentioned, I now form a vertical longitudinal slot in the binding-arm, and pivot therein, at *t*, a supplementary arm, T, vibrated at proper intervals by means of a pin on its inner end, taking into a cam-groove, *t′*, on the tubular support M′ of the binding-arm, as shown in Fig. 4. The organization of these parts is such that, as the binding-arm moves forward into the inflowing grain to separate it, the point of the supplementary arm is inclosed within the binding-arm, as shown in Fig. 2, so as not to interfere with the piercing action of the latter in separating the grain; but when the arm has passed around the bundle, as it is compressed the forward end of the supplementary arm is thrown inward by its cam, as shown in Fig. 4, and the wire is held securely in proper relation to the twister.

The construction and operation of the binding-head and twisting mechanism Z and its actuating sector-rack *y*, being similar to that shown in my application of March 5, 1874, need no particular description here. I have, however, substituted a positive feed for the wire-supplying device shown in that application. To this end I mount upon the intermittently-rotating shaft L a stop-wheel, U, having a single tooth, *u*, which revolves in the direction of the arrow shown in Fig. 6, and gears into a corresponding wheel mounted upon the wire-reel V′, and provided with teeth *v*, arranged in four sets or pairs, thus intermittently giving off a definite amount of wire, regulated by the size of the drum and the position of the teeth. The slack of the band is taken up by the intermediate take-up tension-drum W of the upper wire, which is shown as passing over a pulley, *w*, on an arm projecting from the binding-arm standard, so as to bring it in proper relation with the binding-head.

The operation of the mechanism, being substantially similar to that shown in my former application above mentioned, need not be particularly described, only so far as to illustrate the peculiarities of the devices herein claimed.

The grain is delivered continuously by the endless apron upon the binding-platform B. In Fig. 2 the parts are shown in full lines in the attitude they assume at the moment of the discharge of the gavel. The binding-arm then moves forward to the position shown in Fig. 1, and pauses while the stirrup-link *l* is turning with the chain around the sprocket H, which turns the shaft L, causing its crank *l′* to act through its pitman upon the binding-arms R S, causing them to descend upon and compress the bundle, and carries the wire into the binding-head, as shown in Fig. 4. The arm then moves backward to the position shown in Fig. 2, twisting and severing the wire as it goes, and the binding arm and compressor retract from the position shown in dotted lines in said figure to that shown in the full lines, leaving the bound bundle upon the platform to be shoved off by the succeeding bundle.

The positive feed of the lower wire takes place during the retracting movement of the binding-arm, and while the binding-carriage is stationary.

What I claim as my invention is—

1. The combination, substantially as here-

inbefore set forth, of the binding-platform, the deflector, and the binding mechanism, all mounted upon a common frame, adjustable relatively to the length of the grain, for the purposes specified.

2. The combination, substantially as set forth, of the reciprocating binding mechanism, the frame upon which it is mounted, the ways on which the frame traverses, the driving-gearing of the binding mechanism, mounted on one of said ways, the shifting-gearing, mounted on the main frame, and the link-connections between the shifting-gearing and the traversing binding-frame.

3. The combination, substantially as herein-before set forth, of a compressor, a torsion-spring, on which it is mounted, and a crank, by which they are actuated, for the purpose specified.

4. The combination, substantially as herein-before set forth, of the slotted binding-arm, the supplementary arm, pivoted centrally therein and vibrating through its slot, and the cam which vibrates said supplementary arm, for the purpose specified.

5. The combination, substantially as herein-before set forth, of a reciprocating binding-frame, a vibrating binding-arm mounted thereon, a supplementary arm pivoted on said vibrating binding-arm, and a twister mounted on the reciprocating binding-frame.

6. The combination, substantially as herein-before set forth, of the slotted binding-arm, the supplementary arm pivoted therein, and the vibrating compressor, for the purpose specified.

7. The combination, substantially as herein-before set forth, of a reciprocating binding-carriage, binding mechanism mounted thereon, and a wire-reel, actuated positively during the intermission of the reciprocation of the binding mechanism after binding the bundle.

8. The combination, substantially as herein-before set forth, of the reciprocating binding-frame, the vibrating binding-arm, the binding-head, the positive feed for one wire, and the intermediate take-up tension-drum for the other wire, whereby the slack of the positive feed is taken up by the tension-drum.

In testimony whereof I have hereunto subscribed my name.

CHAS. B. WITHINGTON.

Witnesses:
WM. J. PEYTON,
E. C. DAVIDSON.