

I. LANCASTER.  
Grain Binder.

2 Sheets—Sheet 1.

No. 71,023.

Patented Nov 19, 1867.

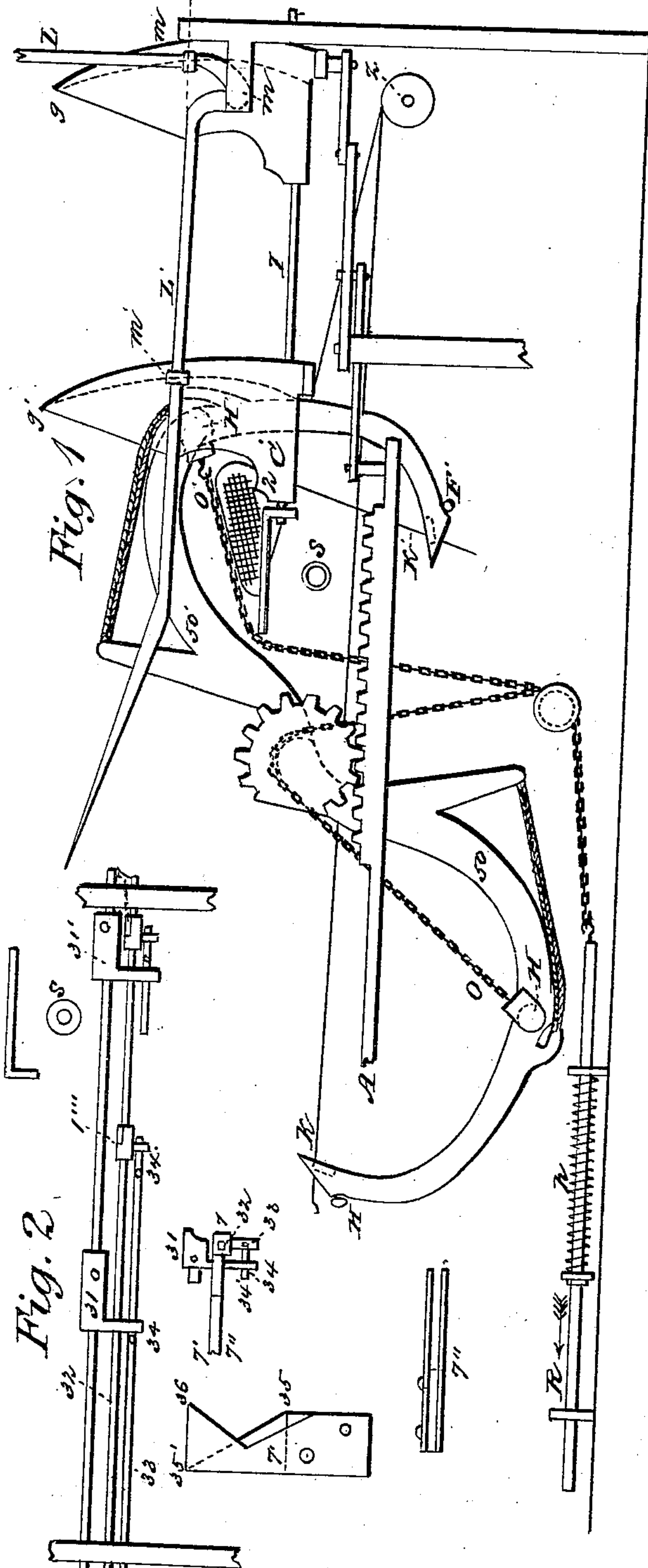


Fig. 2.

Witnesses:  
Richard Hopkins  
J. W. Plummer

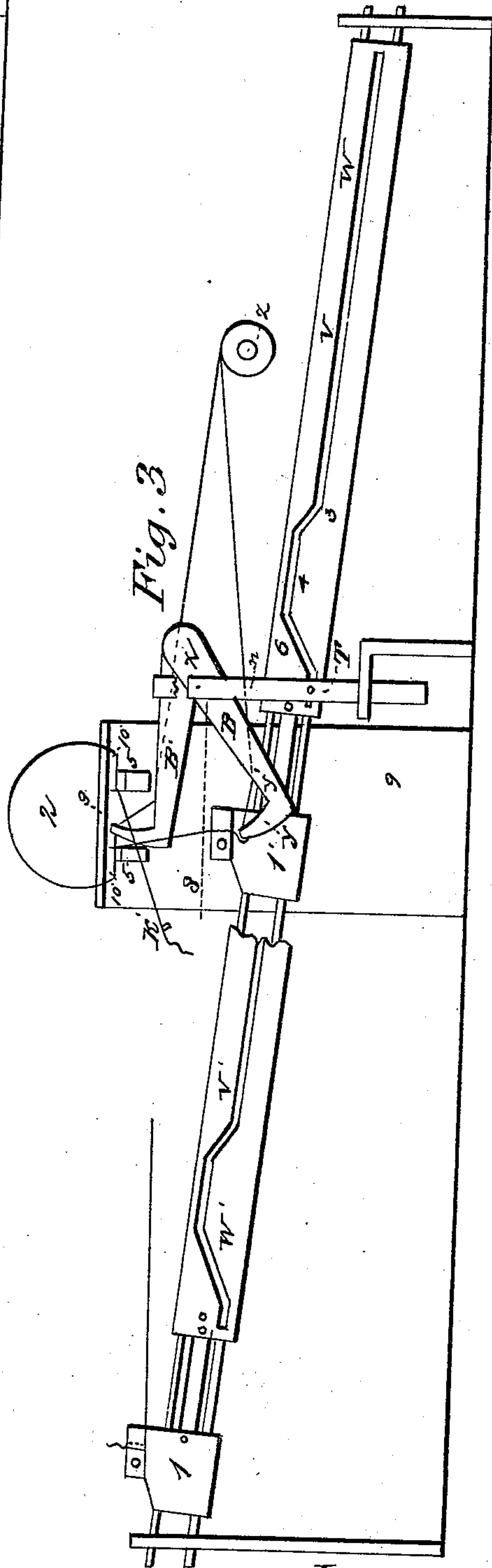


Fig. 3.

Inventor:  
Israel Lancaster

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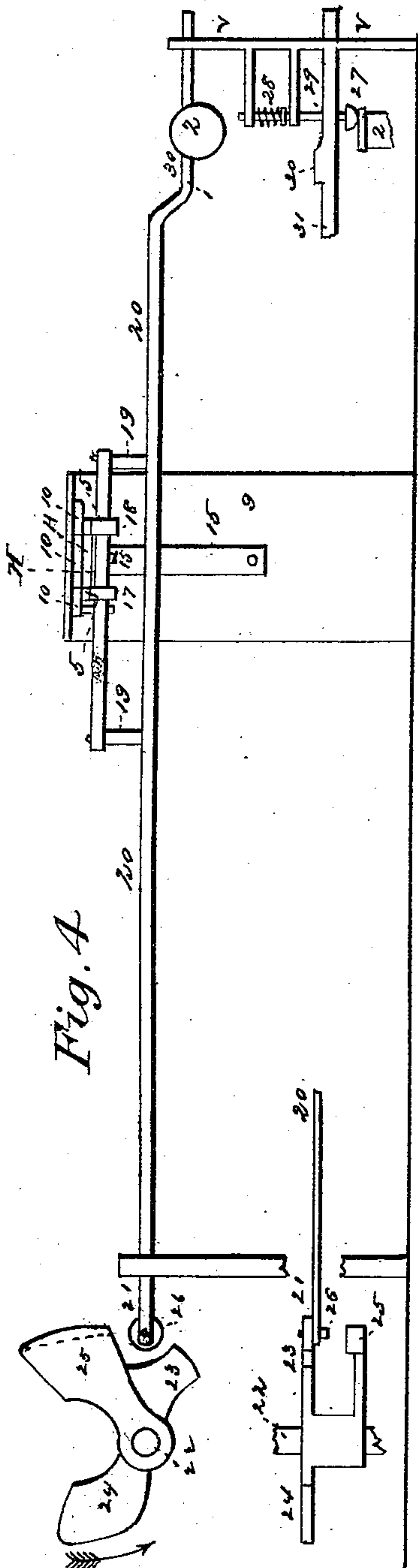


Fig. 4

Witnesses:

Richard Hopkins

F. W. Sumner

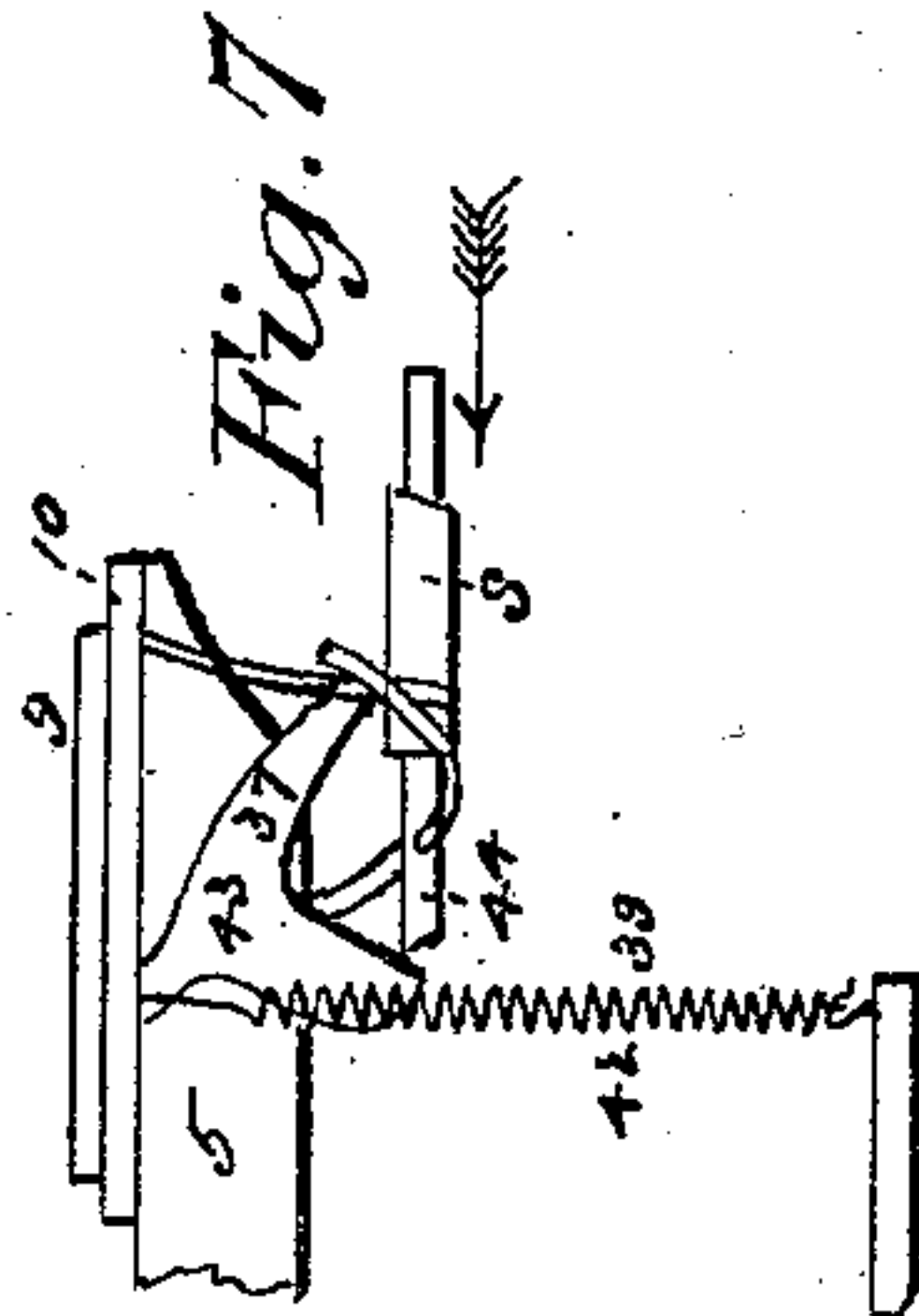


Fig. 7

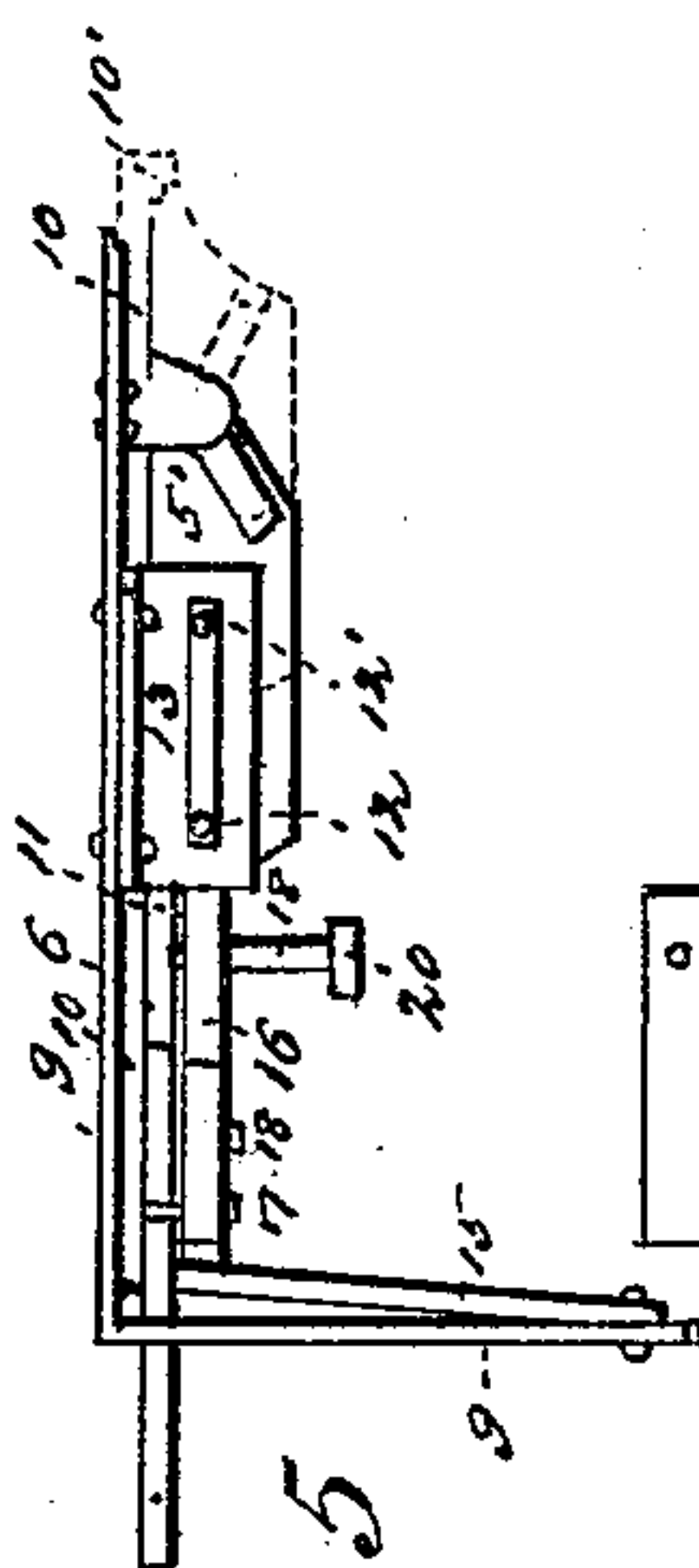
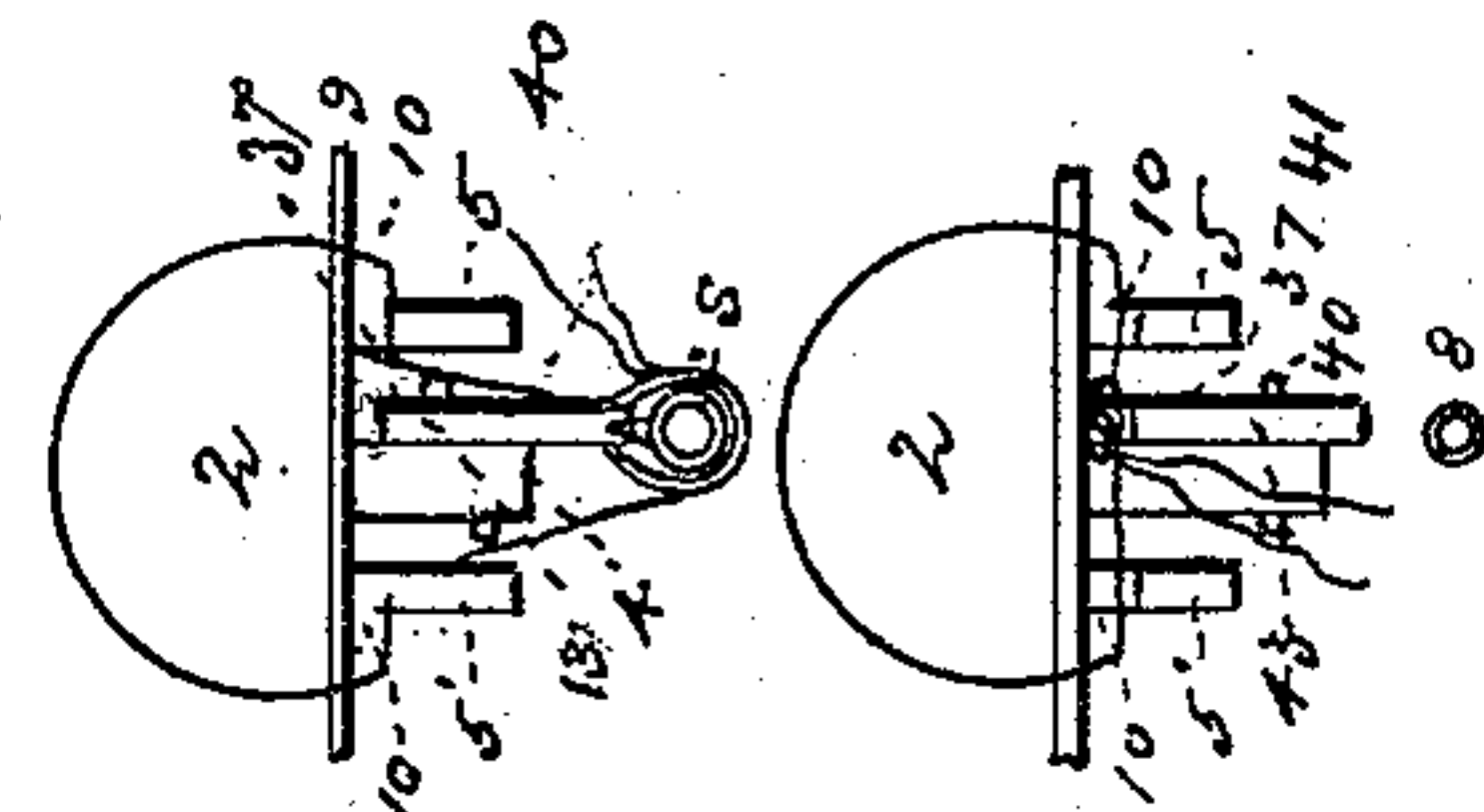


Fig. 5

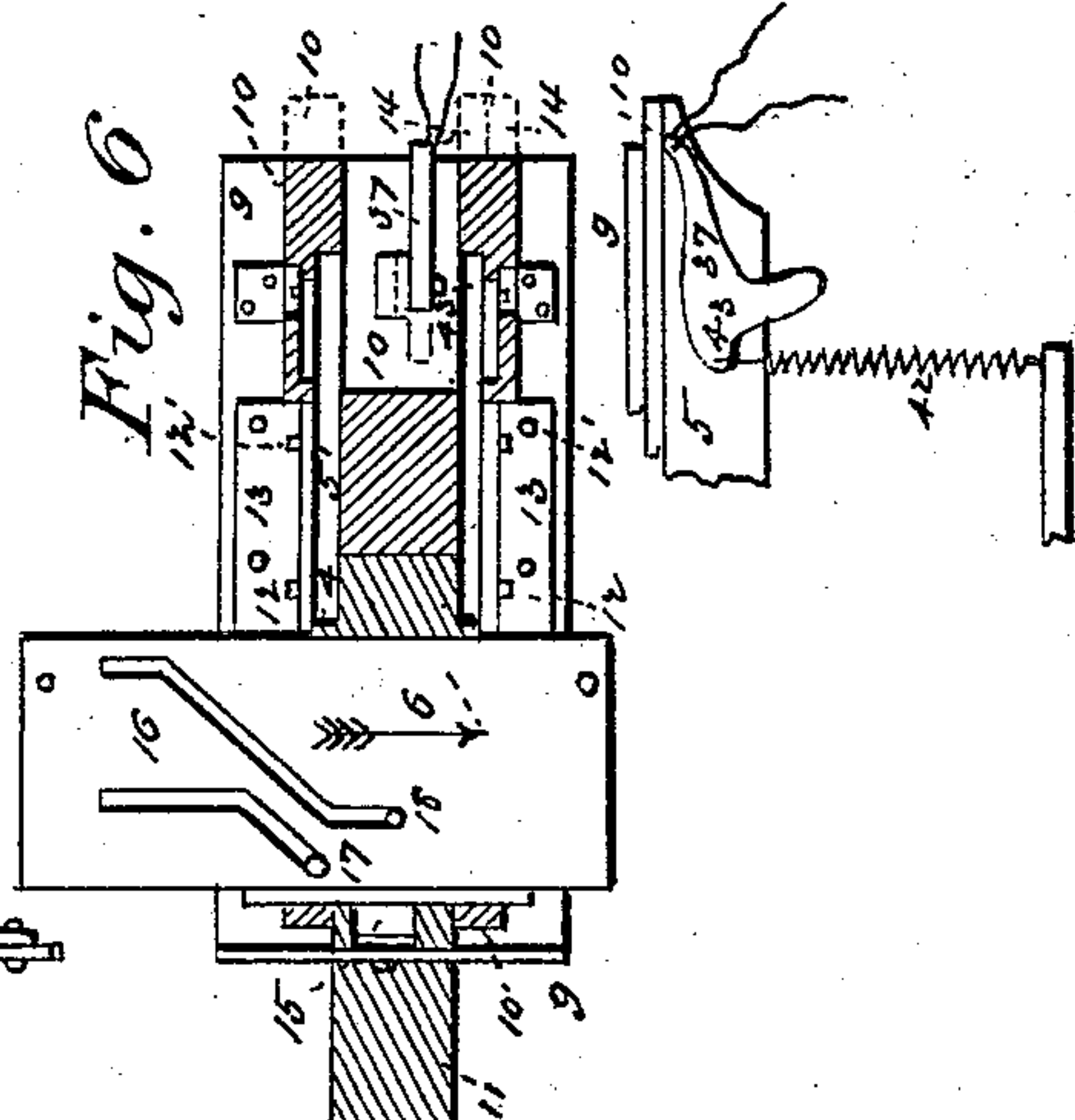


Fig. 6

Inventor:

Israel Lancaster.



# UNITED STATES PATENT OFFICE.

ISRAEL LANCASTER, OF BALTIMORE, MARYLAND.

## IMPROVEMENT IN GRAIN-BINDERS.

*Specification forming part of Letters Patent No. 71,023, dated November 19, 1867.*

*To all whom it may concern:*

Be it known that I, ISRAEL LANCASTER, of Baltimore, in the county of Baltimore and State of Maryland, have invented new and useful Improvements on Grain-Binding Machines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is an elevation seen from the front, and showing the operation of the band-carrier 50, and the operation and construction of the wing C, the bar L, and the chain O. Fig. 2 is an elevation parallel to Fig. 1, and seen from the opposite side, showing the operation of the knife, and also various views showing its construction. Fig. 3 is an elevation, seen from the front, showing the operation and construction of the adjusting lever-B. Fig. 4 is a front elevation and partial view from above, showing the construction and operation of the irregular cam and the bar which operates the pinching device, and which regulates the friction on the spool from which the band material is drawn. Fig. 5 is a side elevation of the pinching device, seen at right angles to the preceding figures. Fig. 6 is an under-side view of the same. Fig. 7 shows four views of the device for tightening the knot in the sheaf-band.

To assist any one skilled in the art to fully understand and construct these devices, I will say that they are specific improvements upon grain-binding machines secured to me by Letters Patent of the United States, and which machines are fully described in their construction and operation in the specifications and drawings making a part of those patents. One of those patents was issued April 24, 1866, No. 54,177. Another was issued January 23, 1866, No. 52,175. An examination of the last-mentioned of these patents will give the information needed to construct these improvements. It will show the position of the platform of the binder in regard to its working parts. It will show the method of actuating the band-carrier 50, Fig. 1, by means of the reciprocating bar A, driven from the cam-shaft. It will show the operation of the sliding block 31, also driven from the cam-shaft. This block is seen in Fig. 2. It has a reciprocating movement from 31 to 31', and actuates the knot-tying device. It shows the construction and operation

of the cord-carrying block 1, Fig. 3, also driven from the cam-shaft; also, of the jaw holding the band material and its operation, which jaw forms part of this block. It also shows the operation and construction of the cam-shaft, identical with 22, Fig. 4, upon which shaft is placed the irregular cam 23, 24, 25. The cams on this cam-shaft give the initial movements to the entire binder in the proper time, as clearly shown. It also shows the construction and operation of the knot-tying devices. These different parts form no part of this application, but are referred to as explanatory.

I shall now proceed to explain the construction and operation of the improvements forming the subject of this application.

At C, Fig. 1, is seen a sliding wing, constructed with two side pieces, D D, and the back piece E. D D and E is a section of C on the dotted line E'. The back piece E is slightly curved. This wing C slides on the guide-bar I from C to C' and back. At 50 is seen the band-carrier, composed of two parts, held open by a spring. The office of this band-carrier is to place the band round the sheaf. If this is done by allowing the band-carrier to complete its movement from 50 to 50' before the hinged end begins to close on the joint H, the band will be in danger of breaking. The length of cord reaching from the spool Z to the jaw K of the band-carrier is sufficient to pass round the largest sheaf which can be contained within the embrace of the band-carrier, wing C, and platform of the binder, when the band-carrier is at 50' and the wing C at C', or, in other words, when the sheaf is compressed. When the sheaf is large and the band-carrier has made half its movement, there is no longer cord enough to reach round it in its expanded condition, without the cord itself is sufficiently strong to compress the sheaf partially. This it cannot always do, particularly when the sheaf contains weeds, and the difficulty of breakage occurs. I remedy this defect by operating the band-carrier and wing C simultaneously, C passing to C' while 50 is passing to 50'. By this arrangement, when the jaw K of 50 is at that part of its passage round the sheaf where the pressure begins to endanger the safety of the band, the part F of the hinged end of 50 strikes the back piece E of C near g', and closes the hinged end of the band-carrier as it passes to the posi-



tion at F'. Thus the end of the band at K approaches the sheaf as it passes round, and the danger of breakage is removed; the operation being similar to that of winding a piece of cord round a cylinder; the end of the cord approaches the cylinder as it passes round. The simultaneous movement of 50 and C is effected in any convenient manner, either by attaching the wing C to the reciprocating bar which actuates the band-carrier 50, or by attaching it to an arm fastened to the shaft carrying 50.

At L is seen a bar standing vertically. This bar travels in the guide *m*, which is fastened to a stem passing through the back piece E of C. It works on the pivot *n* at its lower end. As the wing C passes to C', this bar assumes the position seen at L', being carried there by the guide *m*. The return of C restores it to its vertical position, seen at L. The object of this bar is to compress any loose or tangled grain which might project above the point *k* of the band-carrier within the circle described by that point.

At O is seen a chain, fastened at one of its ends to the band-carrier at or near the joint H, and at the other end to the rod R, upon which rod is placed the coiled spring *p*. One end of this spring rests against a stop, the other against a washer resting against a pin passing through the rod R. By this arrangement the rod R is always thrust in the direction of the arrow, and consequently the chain is always kept strained. This chain rests on the end of the shaft carrying the band-carrier when the band-carrier approaches the position seen at 50. The tension on the spring *p* is regulated to nearly balance the weight of the band-carrier when it is at the position 50. The object of this chain, always kept strained by the spring *p*, is to assist in lifting the band-carrier from and returning it to the position 50, overcoming the inertia in one case and balancing the momentum in the other.

The adjusting-lever is seen at B, Fig. 3. This lever is pivoted to a support at one of its ends at *x*. The other end is angular and furnished with an eye at *y*, through which passes the cord from the spool Z. This lever has a reciprocating movement from B to B' on the pivot *x*. The bar *u* is pivoted to B at one of its ends, and passes through a guiding-support at the other, and is furnished with a pin, T, which projects from the back of *u* into the slot *v* in the plate *w*. This slot actuates the bar *u*, which in its turn moves the lever B. The plate *w* is fastened to the block 1 at one of its ends, and slides from *w* to *w'* on guide-rods. As the pin T passes along the different parts 6 4 3 of the slot *v*, as the plate *w* passes to *w'* or returns, B is elevated to B' or returned, by means of the bar *u*.

The lever B performs two duties. At B' it places the cord in position to be grasped by one set of pinching-bars 10 5', hereafter described, and at B it places the cord in position

to be grasped by the jaws of the cord-carrying block 1.

At 7', Fig. 2, is shown a side view of the knife. At 7'' is shown an edge view, both drawn full size. This knife is formed of two cutting-blades, riveted together at their shanks upon a piece one-eighth of an inch thick. The cutting-edge of one of these blades is V-shaped, that of the other straight, and in the direction of a diagonal across the width of the blade, as at 35 35'.

At 7 is seen a block through which is passed the guide-bar 32. This guide-bar is rectangular to prevent the block from turning.

From the lower side of this block depends a stud, to which is fastened one end of the rod 33. The other end of this rod passes through a guiding-support. Two pins are fastened to the side of this rod, which project laterally, seen at 34 34'. The knife 7' 7'' is fastened to the block 7, projecting its cutting-end sideways. The block 7, carrying the knife, has a reciprocating movement from 7 to 7''' on the bar 32, moving the knife on the dotted line 8, Fig. 3, across the stretched cord in that line depending from the set of pinching-bars 10 5' to the jaws of the reciprocating block 1, cutting it on the line 8. This motion of the knife is given by an arm depending from the block 31. This block has a reciprocating movement from 31 to 31', operating the knot-tying device and completing the closing of the hinged end of the band-carrier on its arrival at 50', Fig. 1. (See former patent.) This arm of the block 31 actuates the block 7 by moving against the pins 34 34', shown in Fig. 2.

The action of the knife is peculiar. The cord strikes the edge 35 35' near 35. It may slip against the edge of the other blade 7' 36, when the combined action of the two cutting-edges always succeeds in dividing it. Without the intervention of the edge 7' 36, it would sometimes slide entirely around the end 35', when the edge 35 35' was not very sharp, without being cut.

At 20, Fig. 4, is seen the bar which actuates the pinching-bars and regulates the tension on the spool Z, which contains the binding material. This bar has a friction-roller, 21, and pin 26 attached to one of its ends, and an inclined projection near the other, shown at 30. It is held by supports near each end to its proper position. Near the center of the bar is fastened the plate 16, containing two slots through its thickness. The side of this plate is shown at 16, Fig. 6. This bar has three motions: the first to the right a short distance; the second to the right a greater distance; the third to the left over a space equal to the first two distances, and so continuing. These movements are given by the irregular cam-wheel 23 24 25 on the cam-shaft 22. This cam-shaft, with the cams upon it, has two movements, one continuous around its axis, and one reciprocating longitudinally. The cams 23 and 24 are plates situated in the same plane. The



cam 25 is in a parallel plane, a short distance from the other, and consists of a projection facing the other cam-plate. As the cam revolves in the direction of the arrow, the part 23 strikes the roller 21, and gives the bar 20 its first movement to the right; 24 next strikes the roller and gives the bar its second movement to the right. The shaft 22 now has a movement in the direction of its length, which gears the cam 25 with the pin 26, giving the bar its third movement to the left.

At Z is seen the spool containing the binding material. Against the head of this spool is held the friction-block 27, by means of the coiled spring 28 working on a rod fastened to the block. From this rod projects the pin 29. At the second movement of the bar 20 the inclined part 30 passes under the pin 29, withdrawing the block 27 from the end of the spool. This allows the spool to revolve easily, when the rapid movement of the lever B, Fig. 3, suddenly draws the cord from the spool. Danger of breakage is thus prevented. At the third movement of the bar 20 the head 27 returns to the end of the spool, preventing the unwinding of more cord than is wanted to bind the sheaf.

At Figs. 5 and 6 are seen views of the pinching or cord-holding device. 9 9 is the iron frame holding the different parts. 10 10 is a plate having two projecting parts at its right-hand end, which form the upper part of the two sets of pinching-bars. This plate has a pin, 17, which works in one of the slots in the plate 16. 11 11 is a sliding bar passing through the frame 9 9 at one end and having a head at the other. Against each side of this head are placed the two plates 5 5', which form the under jaws of the two sets of pinching-bars. 13 13 are angular supports screwed to the frame 9 and having a slot in each. The pin 12 passes through one end of each of the plates 5 5' and through the head of 11, working in the slots in 13 13 at each end. This pin supports one end of the plates 5 5', and the other ends are supported by a short bar, pivoted to the lower part of the plates at one end, and pivoted at the other end to a support depending from the plate or frame 7. When the part 11 11 is thrown forward, moving the pin 12 in the slots in 13 to 12', the jaws 5 5' are thrown forward also to the position seen by the dotted lines.

This device is operated as follows: At the first movement of the bar 20, Fig. 4, carrying the plate 16, Fig. 6, with it in the direction of the arrow, the pin 17 passes along the inclined part of the slot and throws out the plate 10 10 to the position shown by the dotted lines. The pin 18 travels in the straight part of the slot in which it works in the plate 16, which does not move the bar 11 11. The sheaf-band is now brought against one of the projections of the plate 10 by the arrival of the end K of the band-carrier 50, Fig. 1, to the point K', Fig. 3. It is brought against the other by the lever

at B'. The second movement of the bar 20 and plate 16 now takes place, the pin 18 traveling along the inclined part of the slot, throwing out the jaws 5 5' and grasping the two ends of the sheaf-band between 5 5' and 10 10, as seen at Fig. 3. At the third, or left-hand movement of 20 and 16, these pinching-bars are withdrawn. At 15 is seen a stiff spring, always thrusting the plate 16 forward. This is to keep a pressure on the band when the jaws have grasped it, and also to compensate for any wear of parts. At 37, Fig. 6, is seen the device for tightening the knot in the sheaf-band. This is supported from the frame 9 by the pivot 43. Two side views are seen at 38 and 39, and two end views at 40 and 41, Fig. 7. It consists of a plate with a hook-shaped head and downward-projecting part, against which the shaft of the knot-tying device acts. (Seen at 39.) It is held in its position, (seen at 38) by a coiled spring, 42, attached to its left-hand extremity. It works on the center 43. When the shaft 44 of the knot-tier is driven in the direction of the arrow against the foot of 37, (seen at 39,) Fig. 7, the head of 37 is brought down until it touches the tube S, round which the knot is formed. The knot is then formed round the head of 37 and the tube S together, just as though the head of 37 was part of the tube. When 44 and S are withdrawn the spring 42 throws 37 to the position, seen at 38, carrying the knot with it to a straight line between the pinching-bars. (Seen at 41.) When the sheaf is released by the opening of the pinching-bars, the expansion of the straw draws the knot off of the head of 37. As before stated, neither the shaft 44, the tube S, nor any process of tying the knot forms part of this application, what is new being the construction and operation of the plate 37, which carries the knot, after it is formed, from the tube S to a straight line between the pinching-bars, tightening its folds as it does so.

What I claim as of my invention, and desire to secure by Letters Patent, is the following:

1. The combined action of the band-carrier 50 and wing C, substantially as described, and for the purpose mentioned.

2. The application to the band-carrier 50 of the chain O, constructed and operated substantially as described, and for the purpose mentioned.

3. The method of holding the two ends of the cord forming the sheaf-band, by means of pinching-bars placed at a short distance from each other, between which bars the knot is formed, substantially as described.

4. The plate 16 and the pinching-bar mechanism operated by it, constructed and operating substantially as described, and for the purpose mentioned.

5. The adjusting-lever B and slotted plate w acting in combination, constructed substantially as described, and for the purpose mentioned.

6. The removing of friction from the spool



Z during the rapid movements of the lever B, substantially as described, and to prevent breakage of the band material.

7. The operation of the bar 20 by cam-segments on the shaft 22, in the manner and for the purpose substantially as described.

8. The construction and operation of the knife 7' 7'', in the manner and for the purpose substantially as described.

9. Preventing slack in the sheaf-band on releasing the sheaf by forming the folds of the knot over an arm, which carries it to a straight line between the pinching-bars, in the manner substantially as described.

ISRAEL LANCASTER.

Witnesses:

RICHARD HOPKINS,  
F. W. PLUMMER.