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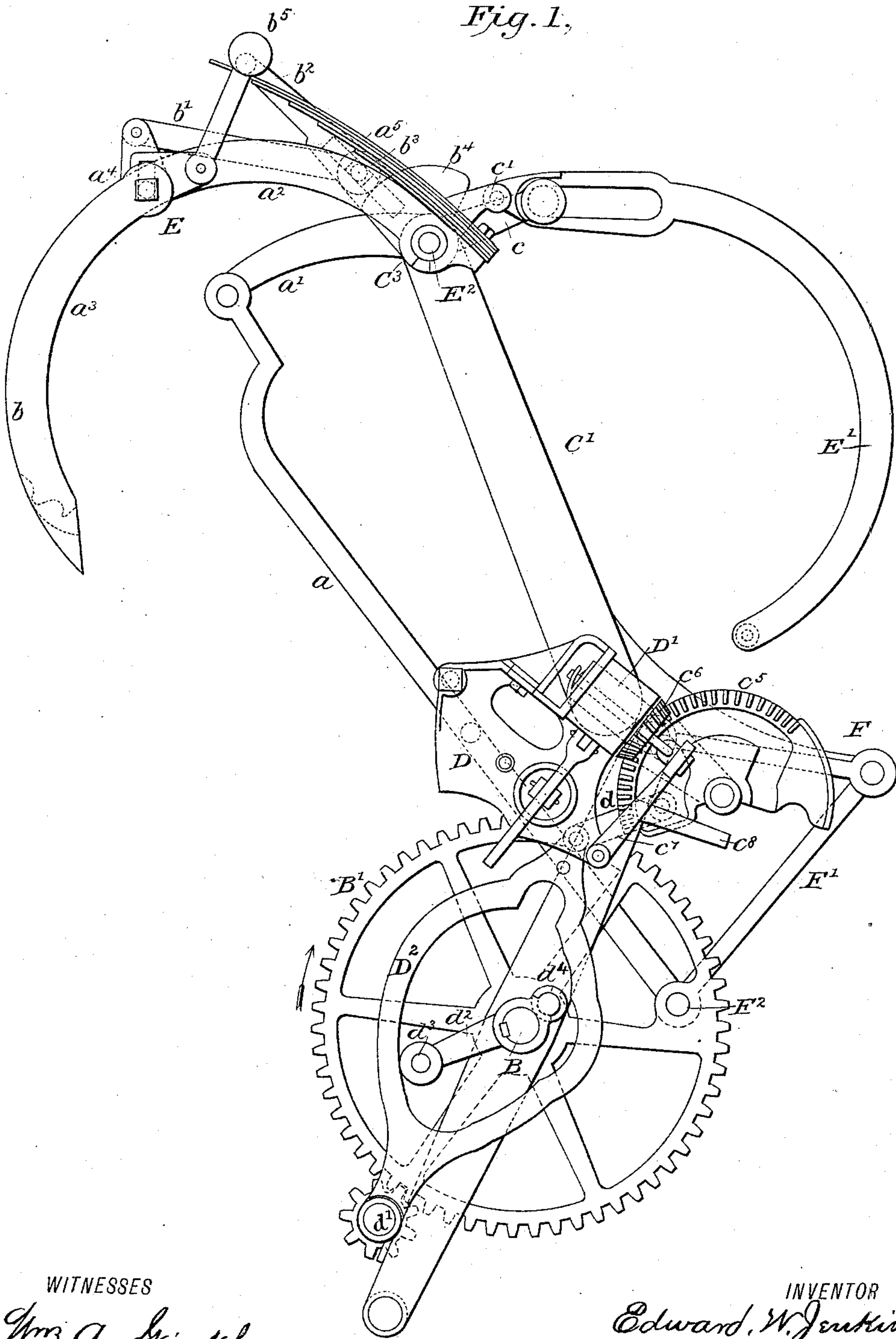
E. W. JENKINS.

GRAIN BINDER.

No. 324,771.

Patented Aug. 18, 1885.

Fig. 1,



WITNESSES

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(No Model.)

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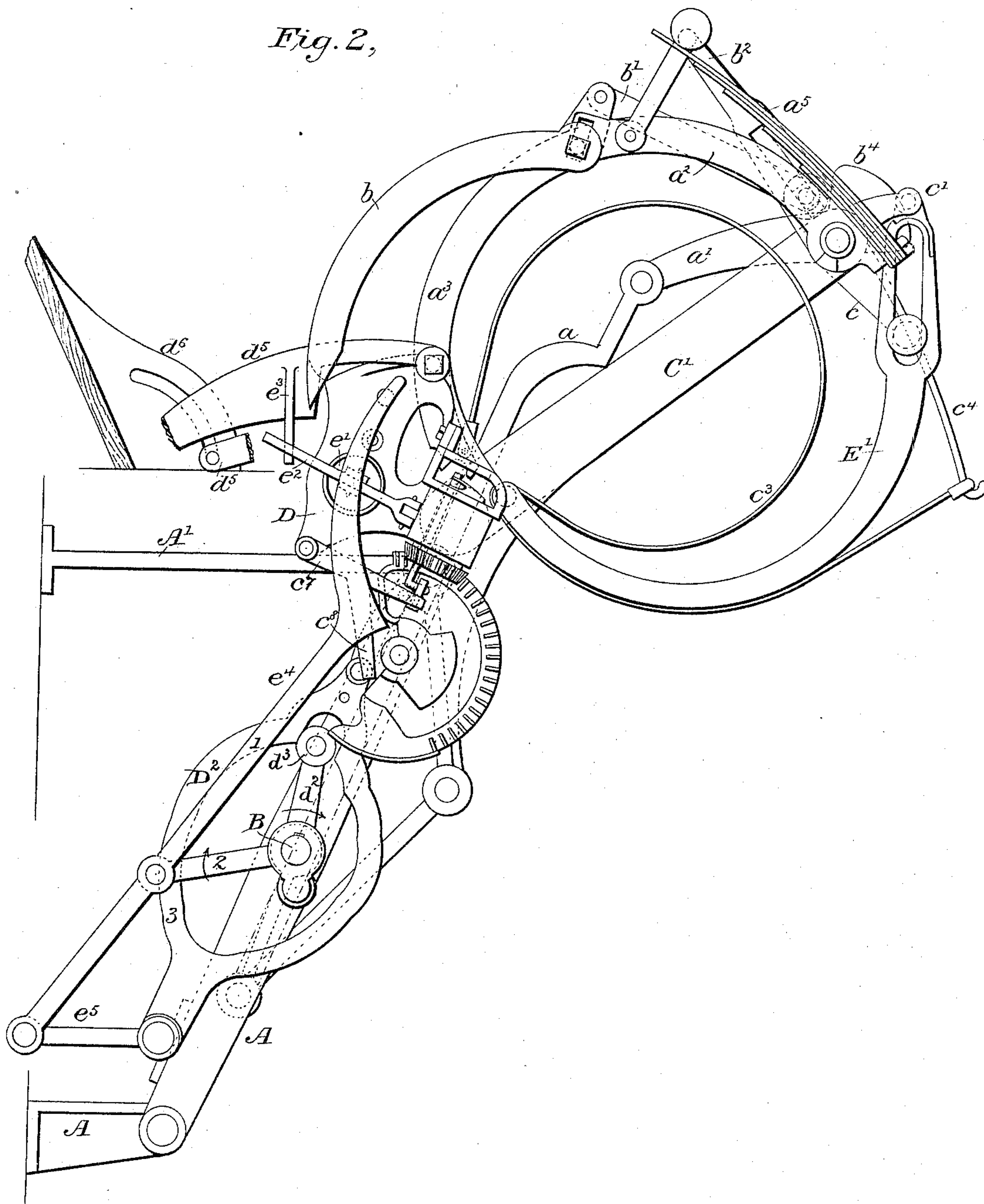
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Fig. 2,



WITNESSES

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Fig. 3,

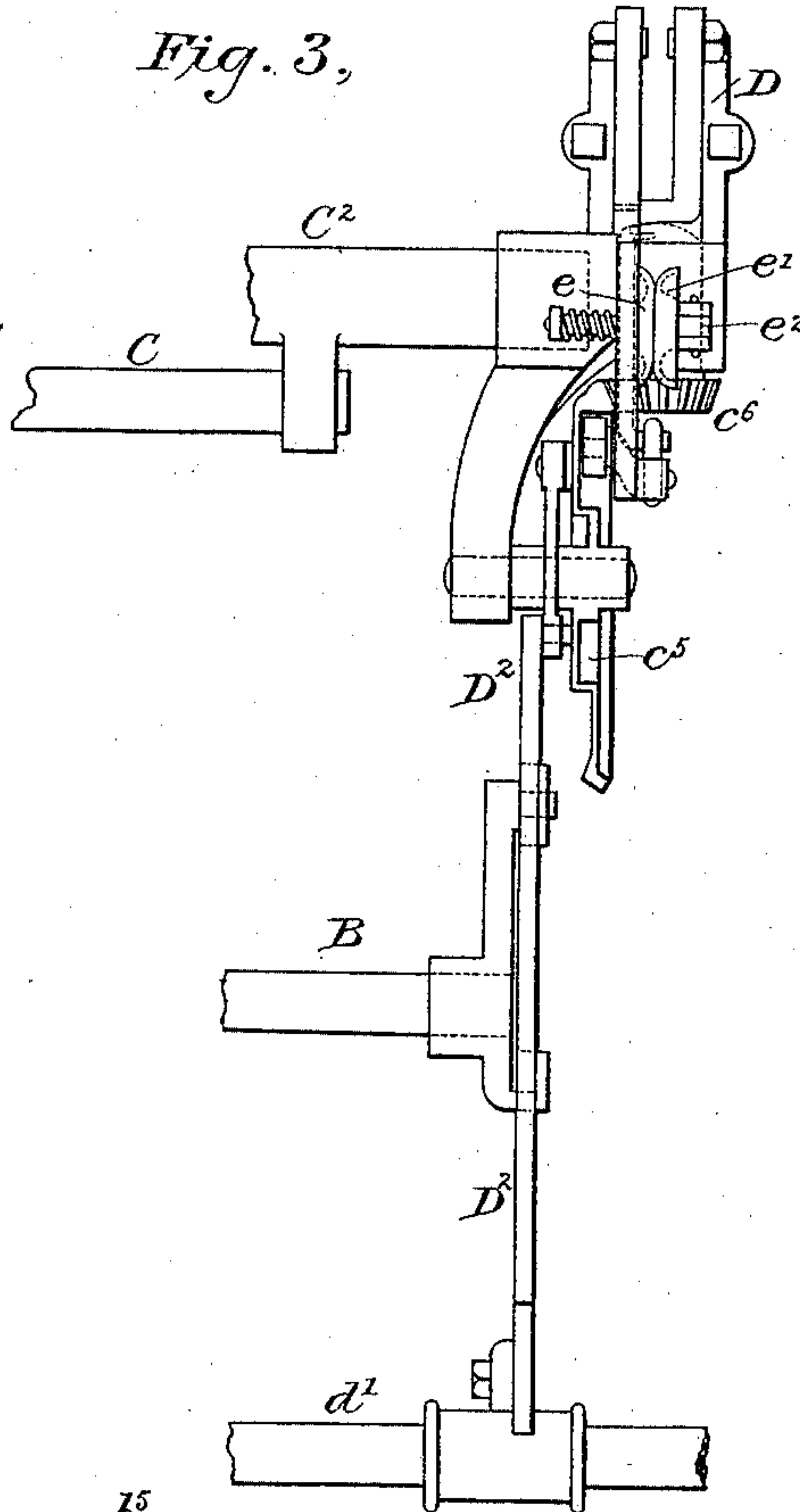


Fig. 4,

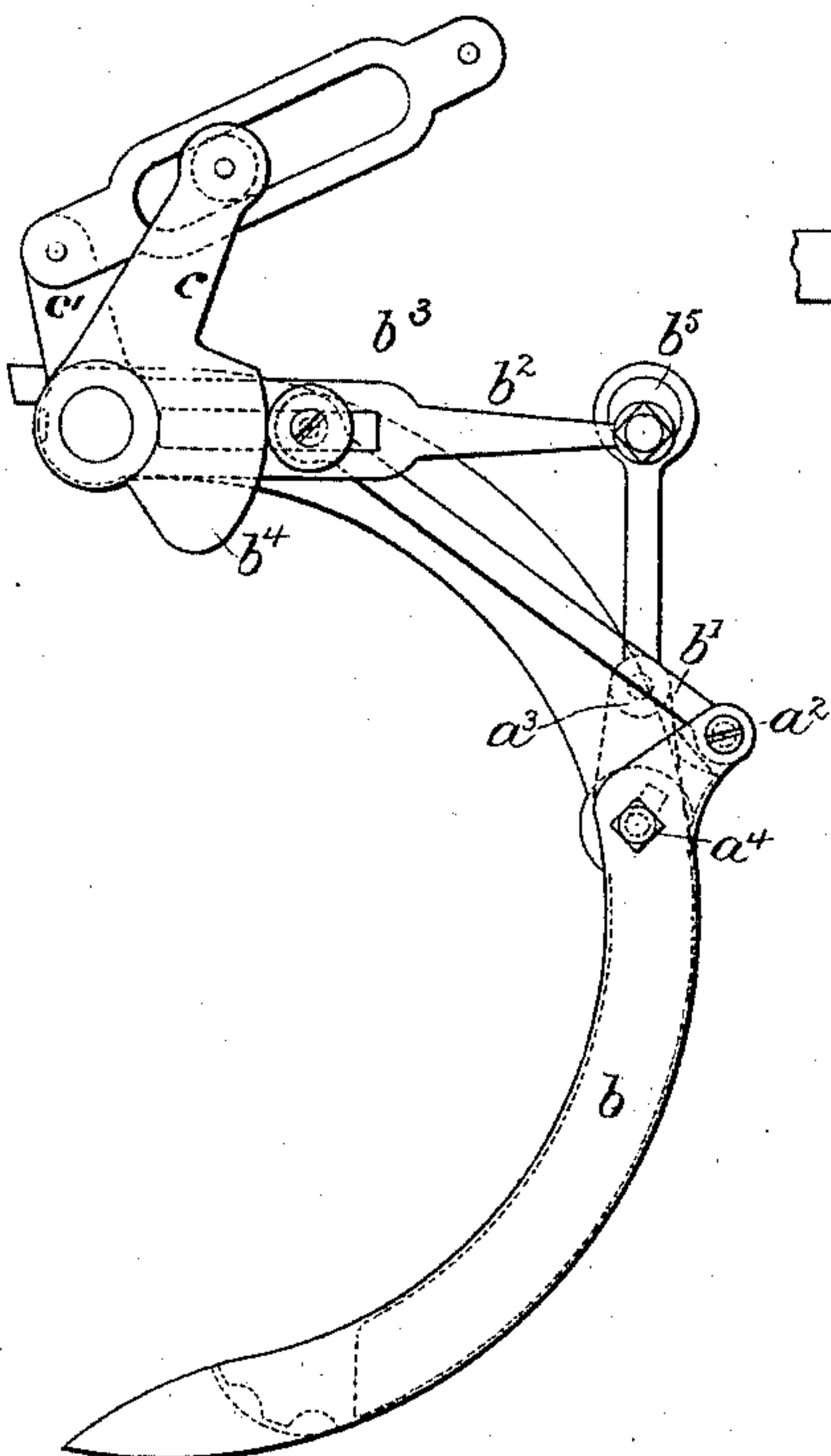
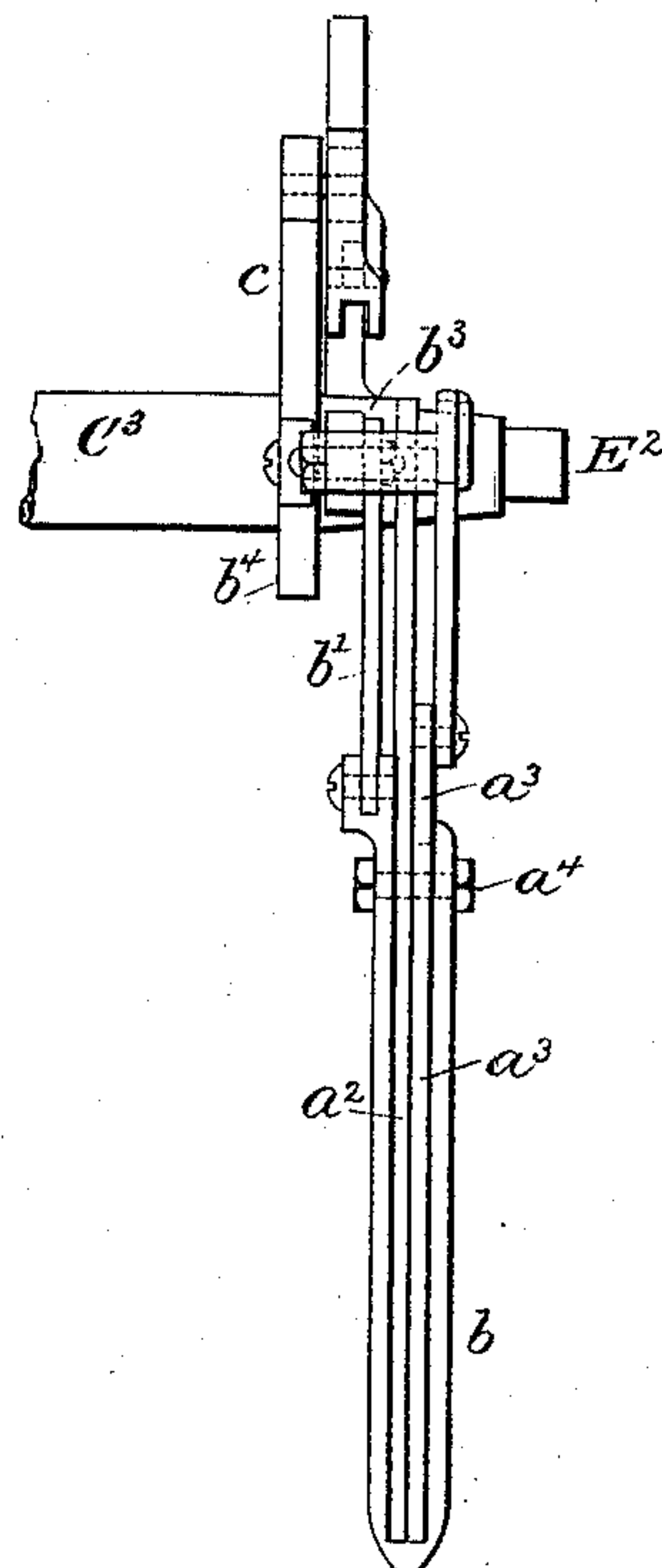


Fig. 5,



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UNITED STATES PATENT OFFICE.

EDWARD W. JENKINS, OF NORRISTOWN, PENNSYLVANIA.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 324,771, dated August 18, 1885.

Application filed December 30, 1881. (No model.)

To all whom it may concern:

Be it known that I, E. W. JENKINS, of Norristown, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Grain-Binders, of which the following is a specification.

The object of this invention is to simplify and improve the construction and operation of automatic or self-binding attachments to harvesters, and it is adapted to the use of either wire or cord as band material, according as either a twister or knotter is employed; but for the purpose of illustration it is herein described in connection with cord-knotting devices, and it will be understood that when wire is to form the band material a twister will be substituted for said knotting devices and suitably connected with the gearing.

The invention consists in a compressor of improved construction to compress and give form to the bundle and to relieve the band and band-applying devices of this duty and of the strain incident thereto; in mechanism for causing the needle or binder-arm and compressor to act upon the grain; in an improved tension device acting upon the cord as it runs from the spool to the binder-arm; in the mechanism by which the various movements are produced and controlled, and in details and combinations hereinafter explained.

In the accompanying drawings, Figure 1 is a rear elevation of the improved binding attachment, showing the binding-arm at the moment it descends to gather the gavel of grain, and including a detail of the mechanism for actuating the knotter. Fig. 2 is a like elevation of the binding attachment with the binding-arm and compressor closed, and at the end of their outward traverse ready to open and discharge the bound sheaf; Fig. 3, a detail of the gearing, and Figs. 4 and 5 details of the binding-arm shown in the two initial figures.

A, A' represent the immediate supporting frame of the binding mechanism secured to the stubble side of the harvester-elevator, either fixedly or in such manner as to be capable, together with the grain-receptacle, of adjustment therealong to compensate for varying lengths of grain, as is customary in this class of machines.

Mounted in the vertically-trending stand-

ard or standards A, of which there may be one at the front and another at the rear of the machine, is a shaft, B, constituting the main shaft of the binding attachment and driven through the gear B' in any suitable manner from the harvester.

Upon a journal-shaft, C, at the top of this frame and below the plane of the grain-receptacle or binding-table is pivoted the post-frame C', consisting of a vertical post at the front of the machine, an arm, C², subtending the binding-table and supporting at its rear end beneath the slot in the grain-table the slotted block D and binding-head D', and an overhung arm, C³, terminating above the slot in the grain-table and supporting there the binding-arm E and compressor E', which are actuated, as will be presently described, by means of a rock-shaft, E², having its bearings in said overhung arm.

From the foot of the post-frame projects a heel-piece, F, which by means of a link, F', is connected with a crank or wrist pin, F², upon the face of the gear B', so that as the gear revolves, the post-frame, carrying with it the binding-arm and compressor and the binding-head, may be rocked or tipped upon its bearings, and the binding-arm caused to traverse the grain-table alternately in toward the elevator-head or grain-chute and out toward the stubble side.

To the same wrist-pin F² is attached another link or connecting-rod, a, which at its top is pivoted to the crank-arm a' of the rock-shaft E², and this, as it is drawn down by the revolution of the gear, forces down the binder-arm and causes it to pass through the grain, and when it rises lifts also the binding-arm. As the two links a and F' are inclined away from each other, their dead-centers will not correspond, and their arrangement is such that the motion of the link a is slightly in advance of the link F'. The binding-arm, therefore, commences its descent, due to the action of the link a, slightly before the termination of the inward traverse due to the link F', and with the supplemental downward motion from the inward tipping of the post-frame, whereby it is caused to descend quite rapidly, and as it commences its outward traverse it is brought home to the binding-head and delivers the cord thereto. The downward motion of the

link a still continuing, the binding-arm would be jammed against and tend to drive past the binding-head, and this being in its way one or the other must break. To prevent this, and still allow it to lie snug against the binding-head during the knotting or tying operation, and at the same time providing for it to grasp the end of the cord when it again rises, it is made in two sections, a^2 a^3 , the former being attached to the rock-shaft, as described in the succeeding paragraph, and the latter being secured to the side of said first section by a slot-and-pin connection at a^4 , which, in connection with other instrumentalities presently explained, causes it to slide longitudinally of said section at certain times.

The section a^2 is jointed to the rock-shaft in such manner as to be permitted a limited vibration thereon, and normally pushed down to the extreme of this vibration by a strong spring, a^5 , interposed between it and its actuating-crank b^2 , and the heel of the section a^3 is connected with said crank by means of a link, as shown. The joint between the link and crank may be an eccentric, b^5 , in order to increase the motion of the sliding section. When the nose of the binding-arm comes against the binding-head and is stopped, the spring will yield under stress and take up the further motion of the crank as to section a^2 , which will, therefore, be held steadily against the binding-head; but as to section a^3 , the crank, continuing its motion, will push it down upon the pin at a^4 , and cause it to slide along the other and thus open a jaw, which it carries at its end, away from a converse jaw to cut the cord and seize it afresh upon the succeeding rise.

In order to secure a clean separation of the gavel from the incoming stream of grain, a separator, b , composed of a cap or sheath, is placed over the binding-arm and advisably pivoted upon the same pin which unites the sections of the latter. From the cranked heel of this separator a link, b' , proceeds to the slotted crank b^2 fast to the rock-shaft, and takes therein by means of a pin which carries an anti-friction roll, b^3 . Upon the overhung arm is also fixed a cam, b^4 , of segmental shape and in such relation to the slotted crank that the roll may travel upon its periphery.

When the binding-arm is raised at the termination of the inward traverse, the roller is carried by the action of the crank up to the curved crest of the cam, and the cap or separator-arm, hereinafter called the "cut-off," is closed upon and held against the binder-arm, and the shape of the cam and motion of the post-frame are such that it is thus firmly held until, at the end of the inward traverse, it has descended with the binder-arm through the stream of grain and reached the slotted block D, against which it strikes and is stopped, while the roller at the same moment, passing off the crest of the cam, descends along the inner face thereof with a retreating movement just sufficient to hold the

cut-off to its position. The binder-arm, however, passes on through the slot in block D until it reaches the binding-head and is itself stopped, as before described.

To the overhung arm C^3 , on the side away from the binder-arm, is fixed a bracket or offset, c , and near to this the rock-shaft E^2 is provided with a crank, c' , to which is pivoted the compressor-arm E' . A pin or anti-friction roll from the bracket c takes into a long slot in the body of the compressor-arm and guides it, so that as the crank c' is raised with the descent of the binder-arm the compressor is also caused to descend.

If desired, a strap, c^3 , may be attached to one end of the binder-arm and carried over a pulley at the end of the compressor-arm and up to a strong spring, c^4 , as shown, whereby the grain may be gathered within the compass of this strap and directly compressed thereby.

In the heel extension F of the post-frame is pivoted a segmental cam-gear, c^5 , which meshes with and gives motion to the pinion c^6 of the knotter, and also imparts the to-and-fro motion to the knotting-hook by means of the pivoted link c^7 , having its fulcrum on the block D. This cam-gear, it will be understood, may be made to drive twisting mechanism, or, by a slight modification, twisting, holding, and cutting mechanism for wire-binding. Being mounted upon the rocking-frame, it partakes of its movements, and is therefore always in gear with the knotter-pinion. It is connected by means of a link, d , with an upright cam-lever, D^2 , pivoted near the foot of the supporting-frame A upon a journal-shaft, d' , and having a cam opening or aperture, substantially such as shown, into which take a crank and roller, d^2 d^3 , from the main shaft B. The action of this crank upon the surface of the cam causes the intermittent vibration of the lever in such relation to the rocking post-frame and binder-arm that the segmental cam-gear, and consequently the knotter, are actuated in unison therewith.

The motion for tying the knot takes place sharply when the crank enters the slot at the head of the cam-slot, and has just been completed when the parts reach the position shown in Fig. 2, and at that point the inclined hanger c^8 from the link c^7 is struck by a pin on the head of the cam-lever D^2 , forcing up said link c^7 to release the knot.

A second roller, d^4 , opposed to the first, is advisably employed to steady the cam-plate in its motions and make them positive.

To facilitate the delivery of the grain to the binding-arm and its compression about the waist, and to form a cradle for the reception of the incoming stream during the binding operation, links or bars d^5 are pivoted to the block D, and so connected by pins at their inner ends to curved slots in the ledges or abutments d^6 at the bottom of the grain-chute and on each side of the slot in the platform that as the post-frame rocks inward said inner ends rise in the slots, while their outer ends sink

with the tipping of the block. They therefore at the moment form a continuation of the chute on each side of the slot, and the binding-arm passes between them to gather and compress the gavel; but when the frame rocks outward their motion is reversed and they assume the position shown in Fig. 2, and form a cradle for the incoming grain checked by the cut-off.

10 The cord for binding is drawn up from beneath the table and carried to the point of the binder-arm. On its way it is caused to pass through a tension device composed of two disks, e e' , on the side of the block D, held together by
15 spring-pressure. It is desirable to release the tension during the initial portion at least of the rise of the binder-arm, and to this end a short lever, e^2 , is fulcrumed upon the block D and pivoted along its length to the outer disk,
20 e' , and a beveled dog or pendant, e^3 , is arranged upon one of the bars d^5 to come in contact with the end of said lever as the latter is rocked upward near the termination of the outward traverse, and to force it, and with it
25 the disk e' , away from the disk e against the stress of the spring.

In order to eject the bound sheaf, should the tipping of the post-frame and binding-arm be insufficient to certainly accomplish this, an
30 ejector-arm, e^4 , is pivoted beneath the table to a crank, 2, from the rotating shaft B, and controlled and guided at its heel end by a link, e^5 , so that as the binder-arm and compressor are thrown open it rises from beneath the
35 table in an orbital path, moves against the sheaf and ejects it, and then is withdrawn.

I claim as my invention—

1. The combination of the rocking post-frame, the band-securing mechanism and binding-arm mounted thereon, the segmental cam-gear, and the vibrating cam-lever and its connecting-link.

2. The pivoted post-frame carrying the binding-arm, combined with the crank on the
45 gear-wheel, and the two links, one for rocking the post-frame on its pivots and the other for actuating the binding-arm.

3. The combination of the slotted compressor, the bracket or offset on the post-frame having a pin taking into said slot, and the crank on the rock-shaft pivoted to the heel of said compressor.

4. The combination of the binding-arm, its actuating-crank, the slotted compressor and
55 its actuating-crank, and the bracket and pin from the post-frame.

5. The combination of the cut-off pivoted upon the binder-arm, the link from its heel-extension, the slotted crank-arm on the rock-shaft, and the cam upon the post-frame traveled by a pin or roller from said link.

6. The combination of the rocking post-frame, and the bars or rods connecting said post-frame with the slotted abutments on each side of the slot in the grain-receptacle, whereby the bars are caused to rise and fall, for the purpose described.

7. The combination of the rocking post-frame, the bars connecting it with the slotted abutments on each side of the slot in the grain-table, the binder-arm, and the cut-off.

8. The combination, with the tension-disks, of the pivoted lever attached to the movable disk and a tappet or hanger on one of the bridge-bars to actuate said lever.

9. The tappet or hanger on one of the bridge or cradle bars arranged to actuate the tension-lever as the rocking frame nears the end of its outward oscillation to release the tension.

10. The combination of the binder-arm formed in two sections and connected to each other, as described, the crank upon the rock-shaft, the spring interposed between said crank and the first or main section of the binder-arm, and the link connecting said crank
85 with the heel-extension of the second section.

11. The crank, whereby the binder-arm is actuated, slotted to receive a pin from the link connecting it with the cut-off arm, and allow said pin to play as its roller travels over
90 the cam on the post-frame.

12. The vibrating slotted cam-lever to actuate the gear-segment having a cam-aperture shaped substantially as shown, and controlled by the crank and two anti-friction rolls.

13. The combination of the main shaft, the main gear-wheel, the rocking post-frame actuated by a link from said wheel, the vibrating cam-lever actuated by a crank from the main shaft, and the oscillating segmental gear actuated by a link from said cam-lever.

14. The binder-arm made in sections, combined with the crank-arm, the link, and the eccentric to move one of said sections relating to the other.

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Witnesses:

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