(No Model.)

6 Sheets—Sheet 1.

G. P. HAZARD.

RING SPINNING MACHINE.

No. 257,162. Patented May 2, 1882.

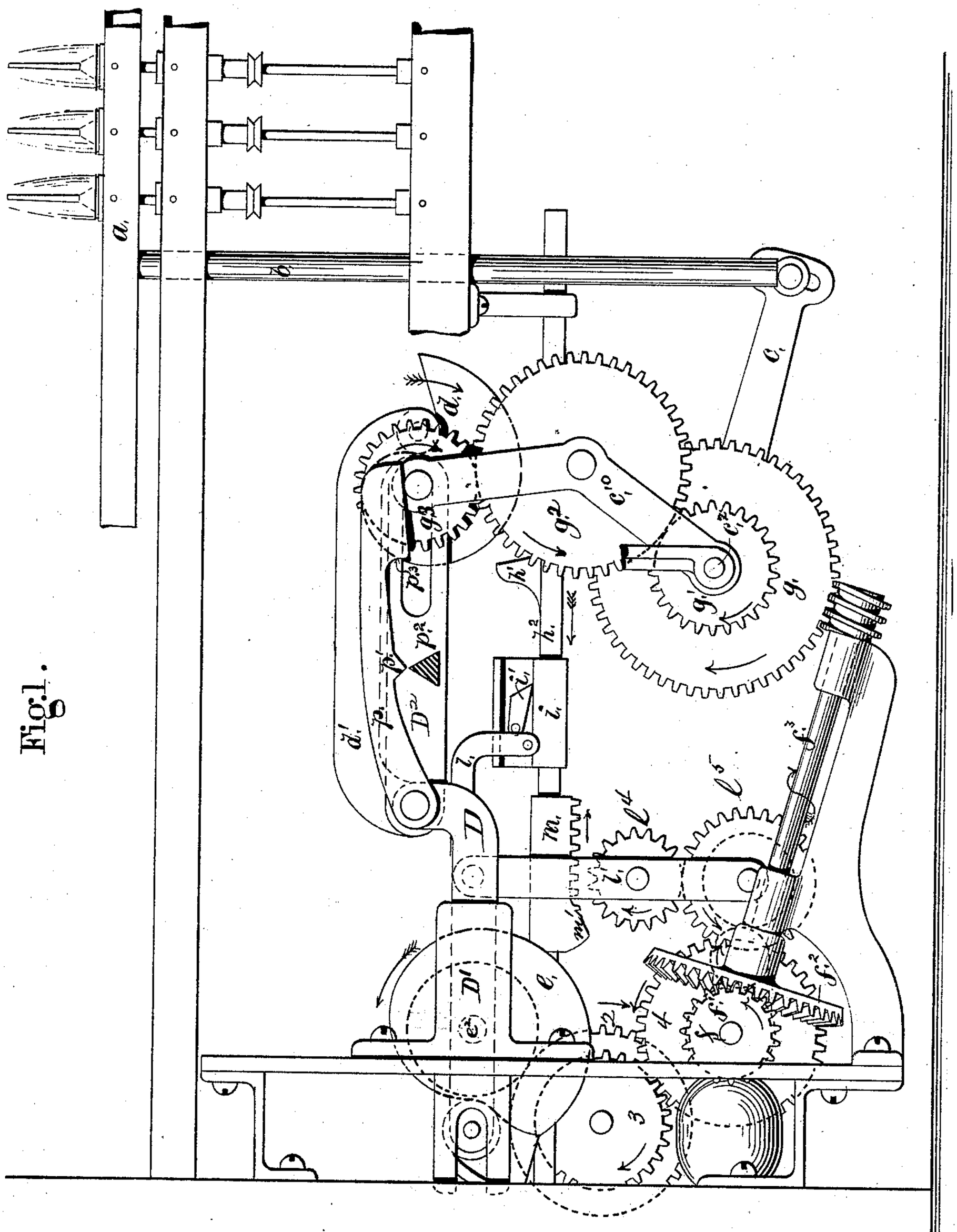

Fig. 1.

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Wm. L. Cook

INVENTOR:

George P. Hazard

by Joseph A. Miller atty

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G. P. HAZARD.

RING SPINNING MACHINE.

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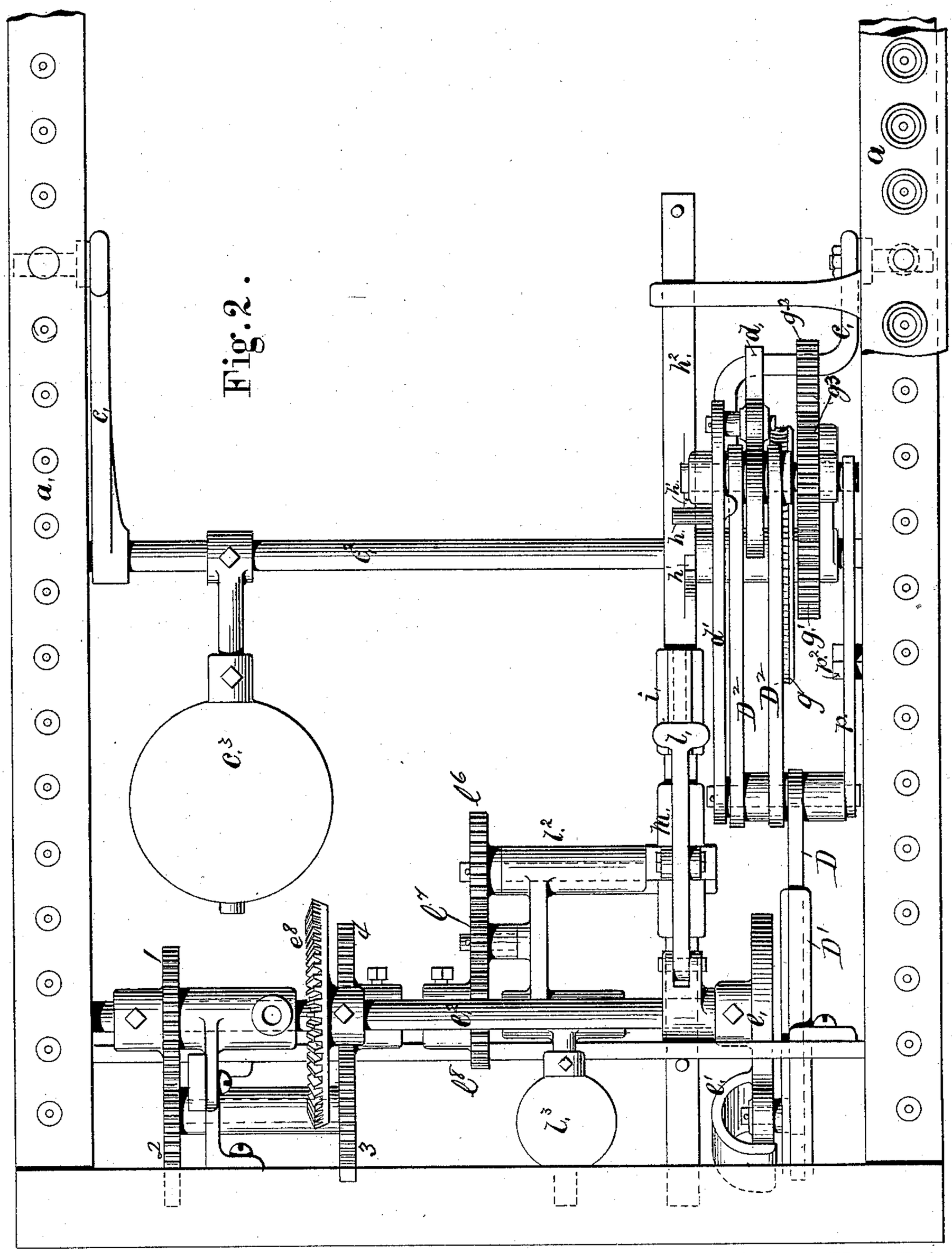
Fig. 2.



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(No Model.) 6 Sheets—Sheet 3.

G. P. HAZARD.

RING SPINNING MACHINE.

No. 257,162. Patented May 2, 1882.

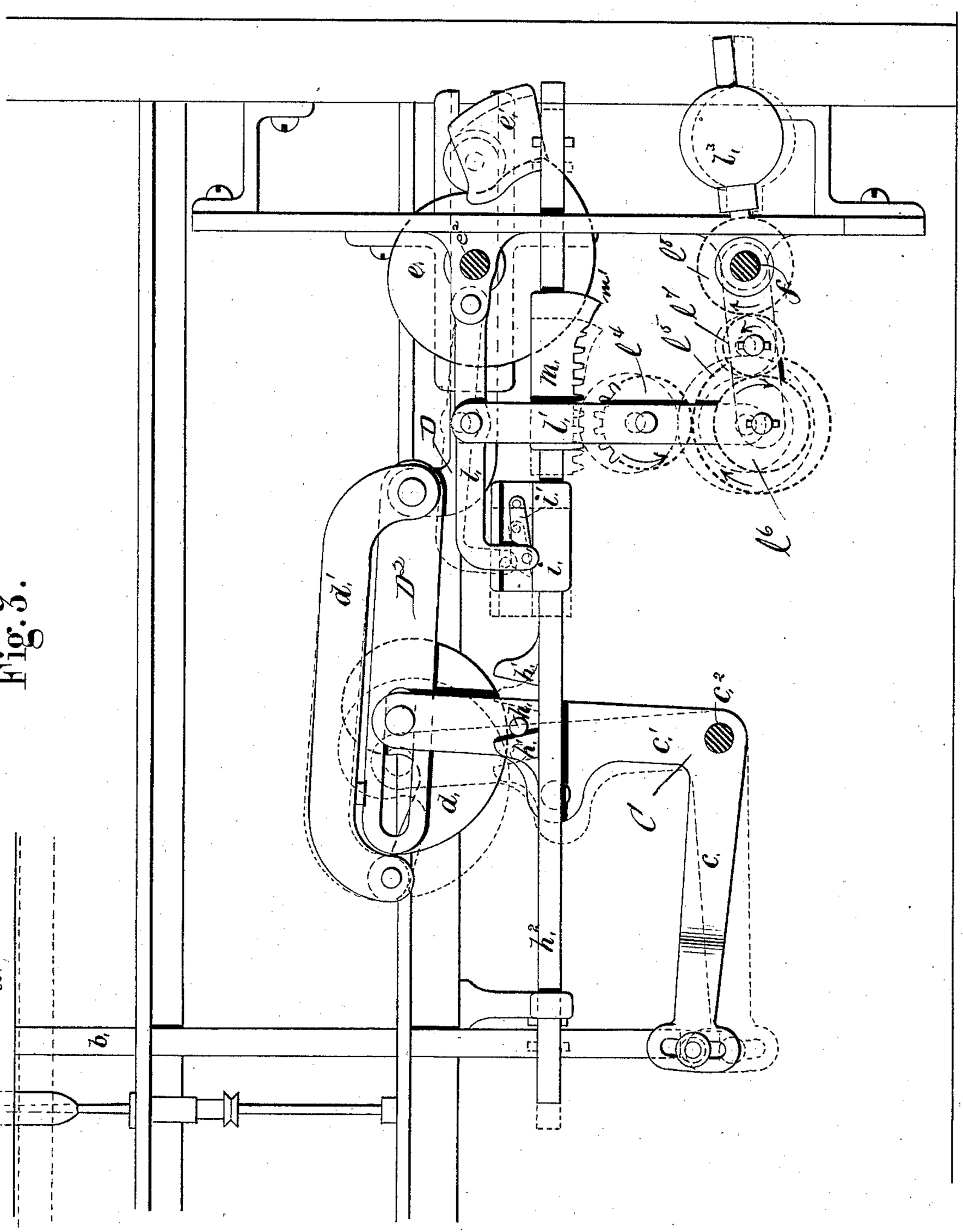

Fig. 3.

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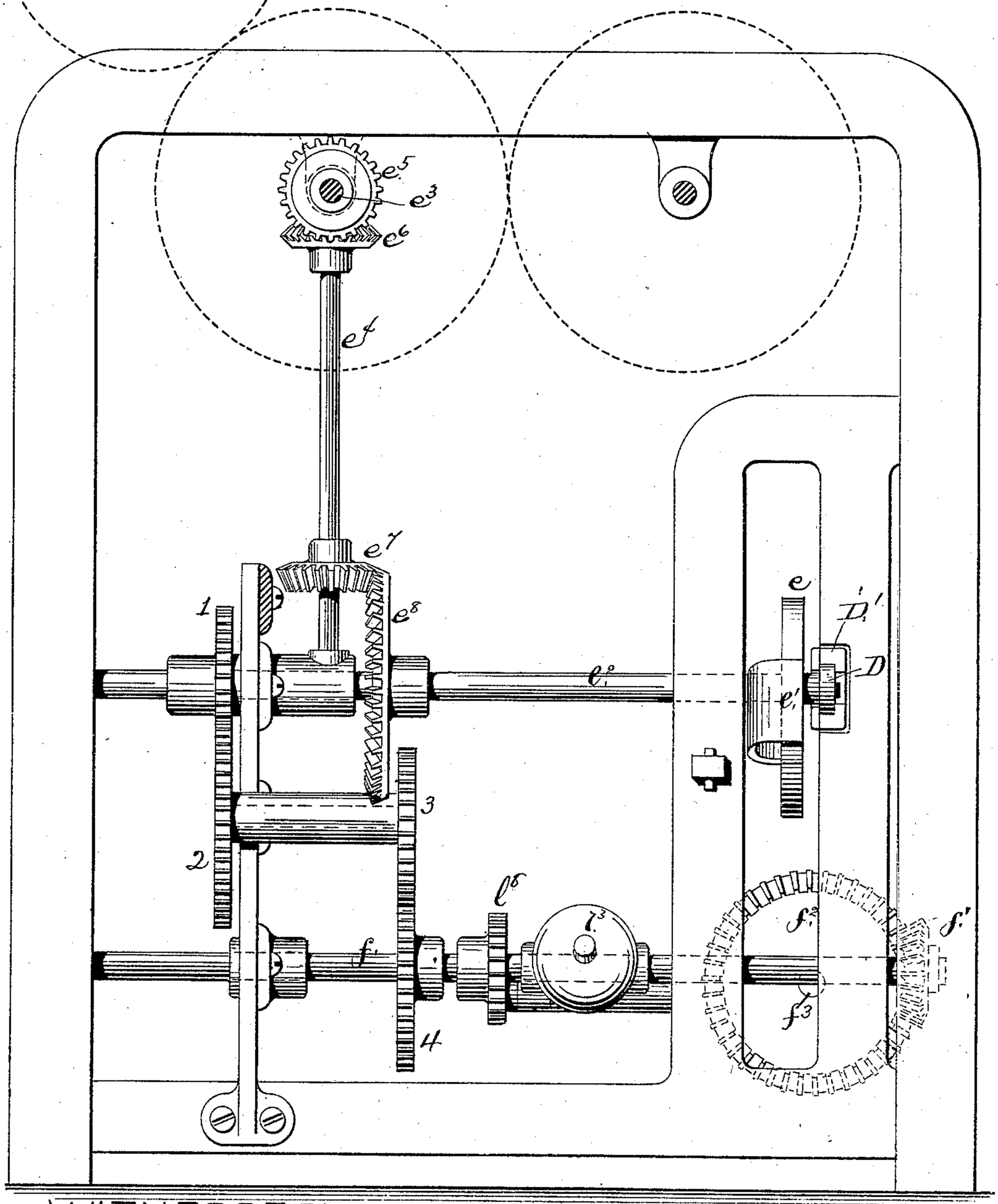
(No Model.) 6 Sheets—Sheet 4.

G. P. HAZARD.

RING SPINNING MACHINE.

No. 257,162. Patented May 2, 1882.

Fig. 4.



WITNESSES:

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(No Model.)

6 Sheets—Sheet 5.

G. P. HAZARD.

RING SPINNING MACHINE.

No. 257,162. Patented May 2, 1882.

Fig. 5.

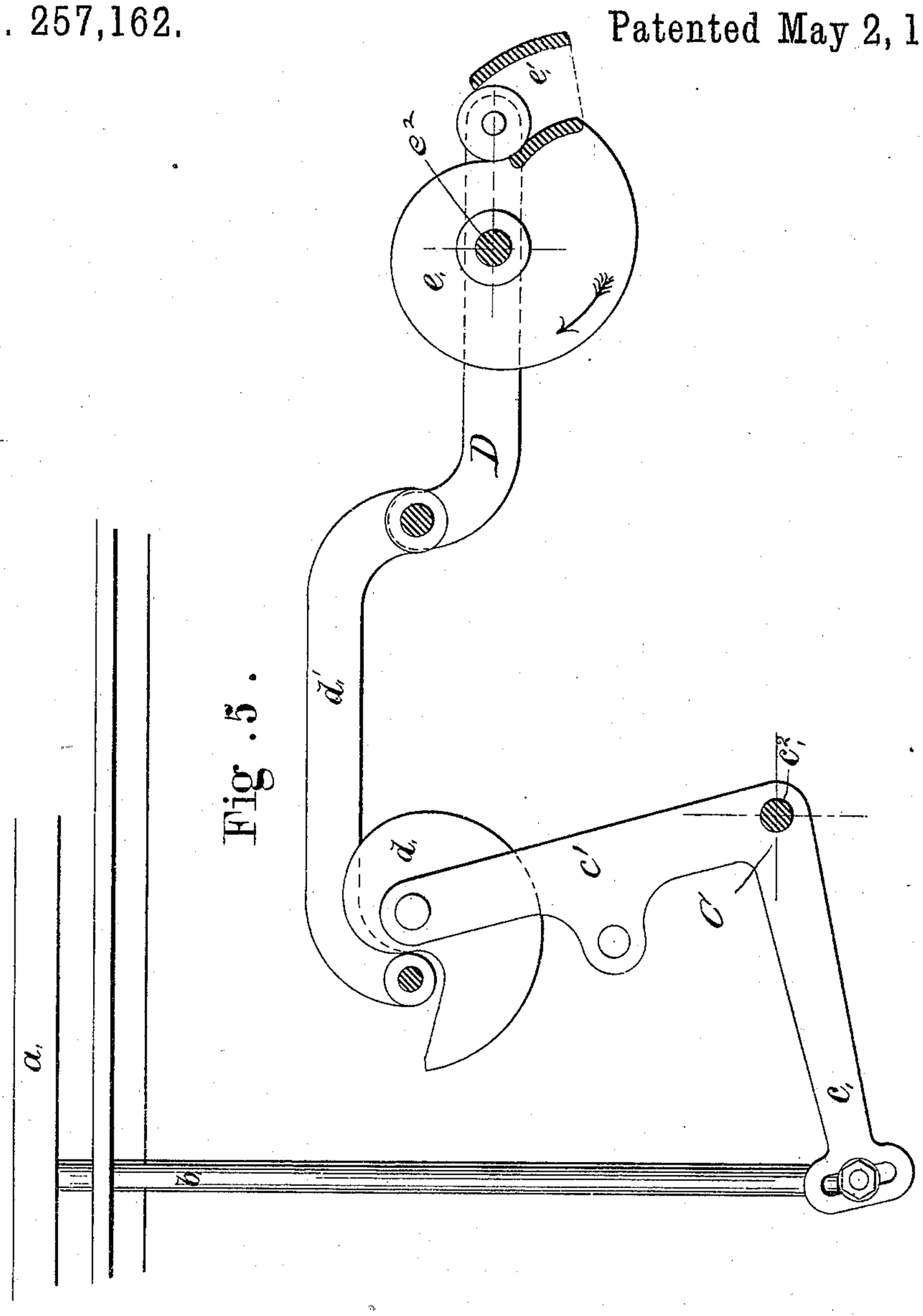
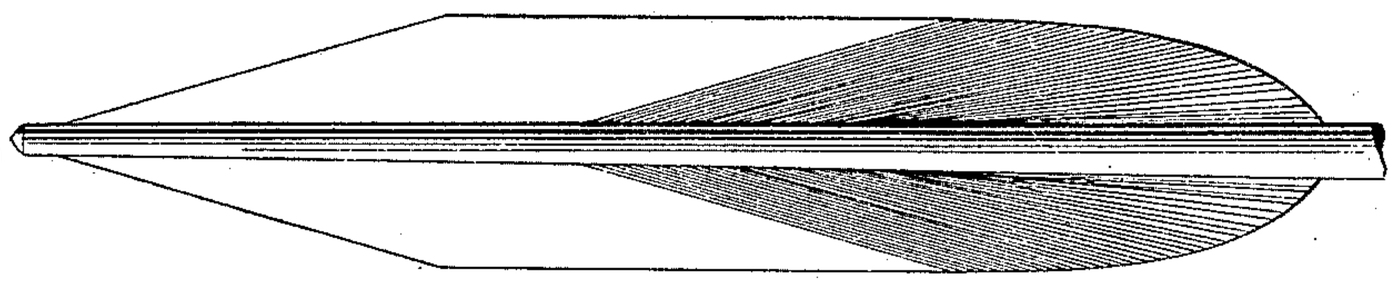


Fig. 7.



WITNESSES

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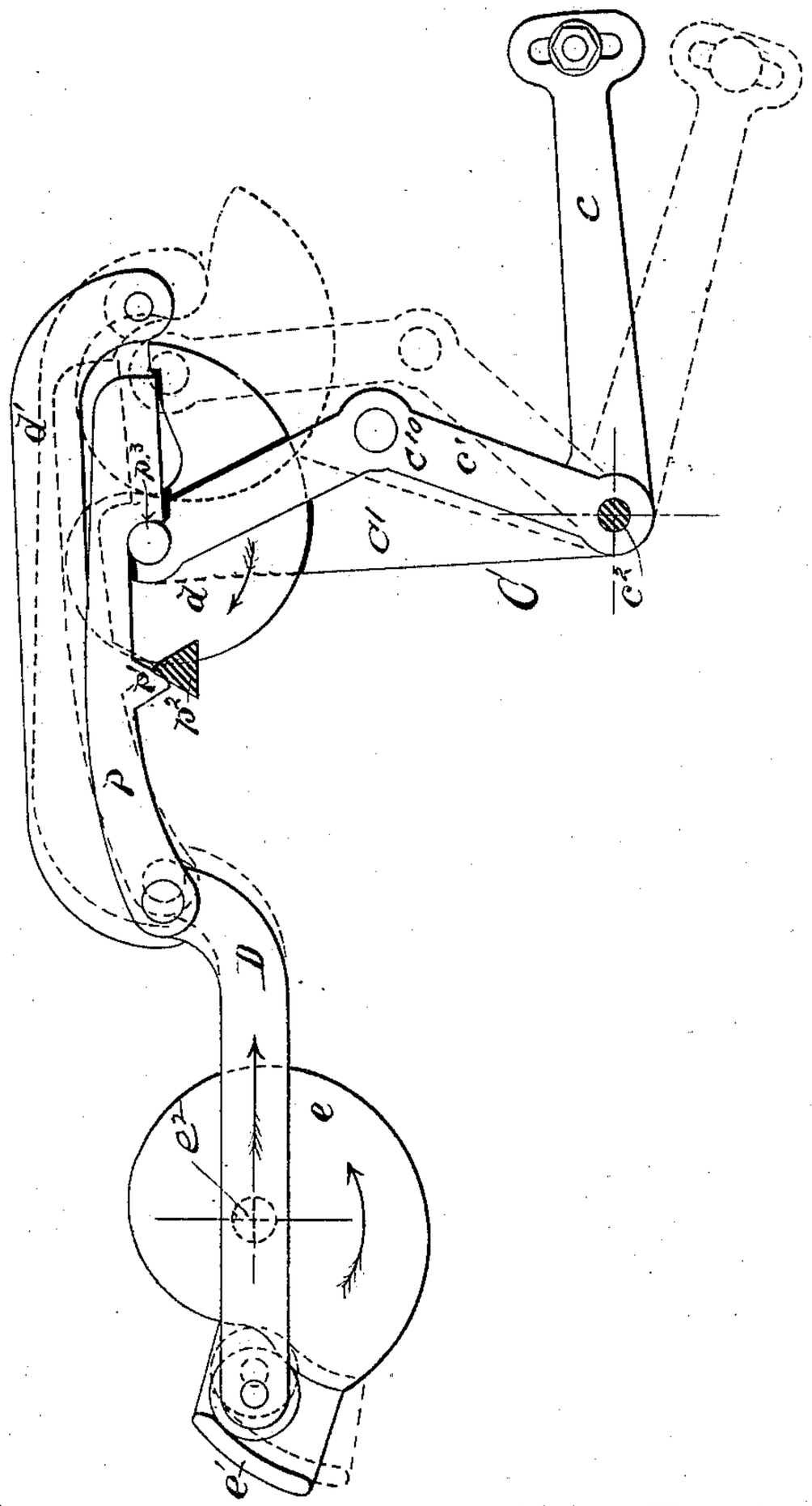
(No Model.) 6 Sheets—Sheet 6.

G. P. HAZARD.

RING SPINNING MACHINE.

No. 257,162. Patented May 2, 1882.

Fig. 6.



WITNESSES:

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UNITED STATES PATENT OFFICE.

GEORGE P. HAZARD, OF PROVIDENCE, RHODE ISLAND.

RING-SPINNING MACHINE.

SPECIFICATION forming part of Letters Patent No. 257,162, dated May 2, 1882.

Application filed February 5, 1881. (No model.)

To all whom it may concern:

Be it known that I, GEORGE P. HAZARD, of the city and county of Providence, and State of Rhode Island, have invented a new and useful Improvement in Ring-Spinning Machines; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to an improvement in ring-spinning machines constructed to spin the filling-yarn used in weaving, and to wind the same on cops to be used in shuttles.

The invention consists in the peculiar and novel mechanism by means of which the ring-rails of a spinning-machine are reciprocated, so as to lay the yarn to form a cop, either on a bare spindle or on an ordinary cop-tube of uniform, or nearly uniform, diameter, and when the cop is completed return the ring-rail automatically to the point of lowest traverse to commence a new cop or set of cops, as will be more fully set forth hereinafter.

Figure 1 is a view of the mechanism by means of which vertical reciprocating motion is imparted to the ring-rail of a spinning-machine, showing the worm and worm-gear through which and the connecting-gears a slow motion is imparted to the cam controlling the gradual building up of the cop, as also the cam by which the conical layers are laid in close spirals and bound by an open spiral binding-thread, by giving to the rail a slow vertical motion in one and a rapid motion in the opposite direction. Fig. 2 is a top view of part of a ring-spinning machine, showing part of the ring-rail as broken away, so as to exhibit the mechanism for controlling the vertical reciprocating motion more fully. Fig. 3 is a side view of the mechanism, showing the connection of the cams with the lifting-rod connected with the ring-rail. Fig. 4 is an end view of my improved mechanism secured to the frame of a spinning-machine, showing the connection from the main driving-shaft to the shaft on which the cam for laying and binding the cone of the cop is placed and the gears connecting this shaft with the lower shaft, from which the worm and worm-gear are driven and by which the builder-cam is operated. Fig. 5 is a skeleton view, showing the lifter-rod of the ring-rail, the bell-crank, the cam journaled at the upper end of the bell-crank, the laying-cam, and the connection between the two cams. Fig. 6 is a skeleton view of most of the parts shown in Fig. 5, seen from the other side, and also showing the latch for locking the bell-crank to the connection between the cams, together with the incline for lifting the latch. Fig. 7 is a sectional view of the cop built up by the mechanism forming the subject-matter of this invention when applied to a ring-spinning machine.

Similar letters of reference indicate corresponding parts.

In the drawings, *a* represents the ring-rail of a spinning-machine; *b*, the lifting-rod connected with the ring-rail, and *c* the horizontally-projecting arm of the bell-crank C, provided with an adjustable stud for supporting the lifting-rod of the ring-rail. The bell-crank C is fixed on the horizontal rock-shaft c^2, on the farther end of which another arm, *c*, is secured to support the lifting-rod of the ring-rail on the opposite side of the frame. A weight, c^3, is secured to another arm of the rock-shaft c^2 for the purpose of counterbalancing the ring-rails. The upright arm c' of the bell-crank C is supplemented by an upright arm, c^{10}, fixed on the rock-shaft c^2 at some distance from the arm c' of the bell-crank. These two upright arms, c' c^{10}, constitute a fork of the bell-crank. In the upper ends of these arms c' c^{10} of the bell-crank is journaled the cam *d*, on the shaft or journal of which is keyed a spur-wheel, g^3, for driving the cam with a continuous slow rotary motion from the main driving-shaft e^3 through a train of gearing which will be presently described. Cam *d* operates against an anti-friction roller on the outer end of the link d', the other end of which is pivoted on the stud-pin fixed in the eye of a slide-rod, D, fitted in a horizontal guide, D′, fixed to the frame. The slide-rod D carries an anti-friction roller which bears against the face of the cam *e*, fixed on the horizontal shaft, e^2, and constructed with a hood, e', for quickly drawing the anti-friction roller of the slide-rod from the widest to the narrowest part of the cam. The cam *e*, being rotated rapidly, rocks

the bell-crank C in one direction, while the weight of the ring-rails rocks it in the opposite direction, so that the result will be a constant reciprocation of the ring-rails and the laying of the yarn on the cop in conical layers bound by spiral binding-threads laid during the rapid descent of the ring-rails each time the hood e' of cam e passes the anti-friction roller on the slide-rod D. The hood e' of the cam e may be dispensed with; but I prefer to use it, because its presence enables me to more nearly counterbalance the ring-rails. The cam-shaft e^2 is driven from the main driving-shaft e^3 by means of a counter-shaft, e^4, and the bevel-wheels e^5 e^6 e^7 e^8, as best shown at Fig. 4. As the laying-cam e lays the yarn on the cop in conical layers the cop is gradually built up by the builder-cam d, hung in the upper end of the fork of the bell-crank C, as before described, and which gradually changes the traverse of the ring-rails by gradually lifting them until the cop is completed. Rotary motion is imparted to the builder-cam from the main driving-shaft by way of the cam-shaft e^2, connected by a train of spur-wheels, 1, 2, 3, and 4, to the shaft f, a beveled wheel, f', on which drives a beveled wheel, f^2, on the worm-shaft f^3, the worm of which drives the worm-gear g, journaled on the rock-shaft c^2, and connected with a spur-wheel, g', which drives the spur-wheel g^3 on the shaft of the cam d through the intermediate spur-wheel, g^2, journaled in the fork of the bell-crank C.

The following devices are used for the purpose of controlling the returning of the ring-rails from the highest to the lowest traverse. The upright arm c' of the bell-crank is provided with a laterally-projecting stud or pin, h, which plays between the projections or stops h' h' on a slide-rod, h^2, fitted to slide horizontally in suitable fixed guides. A block, i, with horizontal ways or grooves formed in its sides, is fixed to the slide-rod h^2, and is provided with pivoted switches i', arranged in said ways. This block i is embraced by the fork of the lever l, fulcrumed on the frame of the machine. The fork of said lever is provided with stud-pins which project into the ways of the block i, and are adapted to pass under the switches i' as the slide-rod h^2 is moved in one direction, and over said switches when such slide-rod is moved in the other direction. A yoke, l', is suspended from the lever l, and in this yoke are journaled the intermeshing spur-wheels l^4 and l^5. The journal of the wheel l^5, being elongated, passes through a sleeve on a hanger-frame, l^2, and carries at its outer end a spur-wheel, l^6, which is driven by a spur-wheel, l^3, on the shaft f through the intervening spur-wheel, l^7, journaled on a stud on the hanger-frame l^2. The hanger-frame l^2 is pivoted on the shaft f, and is nearly counterbalanced by the weight l^3, adjustably fixed on an arm of said hanger-frame.

The rack m is fixed on the slide-bar h^2 in position to be engaged by the spur-wheel l^4. The rear end of the rack m is constructed with a cam-wheel, m', as shown in Figs. 1 and 3. The weight of the yoke l' and its adjuncts and connections tends to hold the lever l with its studs resting on the lower edges of the ways in the sides of the switch-block i. As the bell-crank C is gradually turned by the action of the builder-cam d it gradually forces the slide-rod h^2 in the direction of the arrow shown in Fig. 1 until the free end of the switches i' finally passes beyond the studs of the lever l by the time the cops have been completed. The moment the point of the builder-cam escapes from the friction-roller on the link d' the ring-rails descend, causing the bell-crank to move the slide-rod h^2 in the direction opposite that indicated by the arrow in Fig. 1, whereby the switches i' are forced under the studs in the fork of lever l, lifting said lever, and with it the yoke l', so as to throw the spur-wheel l^4 in gear with the rack m. The continuously-rotating pinion l^4 then moves the slide-rod farther in the same direction until the pivoted ends of the switches i have passed from under the studs of lever l, so that it can again descend to the lower edges of the ways in the switch-block, the descent being made positive by the cam-heel m' on the rack m depressing the pinion l^4. By the time this is accomplished the ring-rails have descended to the position of lowest traverse and the bell-crank returned to its first position, so that the building up of a new set of cops can be commenced as soon as the finished cops are doffed or removed. The laying-cam and builder-cam are so timed with reference to each other that during the highest and last traverse of the ring-rails the point of the builder-cam escapes from the anti-friction roller of link d' while the hood of the laying-cam is passing the anti-friction roller of the slide-bar D, as shown in Fig. 6.

In order that the bell-crank may remain with certainty under the control of the laying-cam up to the moment of the completion of the cop, and to insure the laying of the last binder-thread from the uppermost end of the cop, I provide the latch p, pivoted to the slide-bar D. The hook-head of this latch is elongated, and rests on without engaging the journal of the builder-cam during the lower traverses of the ring-rails; but during their higher traverses the latch drops and hooks over said cam-journal at each upstroke of the ring-rails, and is lifted at each downstroke by the fixed incline p^2 operating on the toe p' on the latch. Hence when the point of the builder-cam, having lifted the ring-rails to the point of highest traverse, is about to escape from the anti-friction roller of link d' the latch p will drop over the journal of the builder-cam, and the bell-crank will thus remain under the control of the layer-cam until the completion of the highest and last traverse, when the latch is again lifted by incline p^2 releasing the bell-crank, so as to allow it to swing or rock back to its first position and allow the ring-rails to descend to the

point of lowest traverse, in readiness, after the doffing of the finished cops, to begin the building up of a fresh set of cops. The journal of the builder-cam moves in slots of links D^2, which are pivoted to the slide-bar D and limit the movement of the bell-crank and the descent of the ring-rails.

Fig. 7 (representing a cop built up on this machine) illustrates the different conical layers, commencing on the spindle and gradually enlarging until the angle is reached at which the cop is built up, until completed.

With this machine filling-yarn can be spun and wound on cops that can be used in shuttles for weaving with great economy.

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

1. The combination, substantially as before set forth, of the ring-rail, the bell-crank for supporting it, the builder-cam journaled to the bell-crank, the laying-cam, and the slide-rod and link through which the laying-cam operates on the builder-cam for working the bell-crank.

2. The combination, substantially as before set forth, of the ring-rail-supporting rocking bell-crank provided with a stud or pin, *h*, the slide-rod engaged by said pin and carrying a rack, the movable pinion, a yoke for supporting said pinion, the lever from which the yoke of the pinion is suspended, and the switch on the slide-rod for lifting said lever to throw the pinion in gear with said rack.

3. The combination, substantially as before set forth, of the ring-rail-supporting rocking bell-crank provided with a stud or pin, *h*, the slide-rod engaged by said pin and carrying a rack constructed with a cam at its heel, the movable pinion, a yoke for supporting said pinion, the lever from which the yoke of the pinion is suspended, and the switch on the slide-rod for lifting said lever to throw the pinion in gear with said rack.

In witness whereof I have hereunto affixed my name.

GEORGE P. HAZARD.

Witnesses:
JOS. A. MILLER, Jr.,
WM. L. COOP.