(No Model.) 4 Sheets—Sheet 1.

E. K. BAKER.

SPINNING MACHINERY.

No. 519,491. Patented May 8, 1894.

Fig. 1.

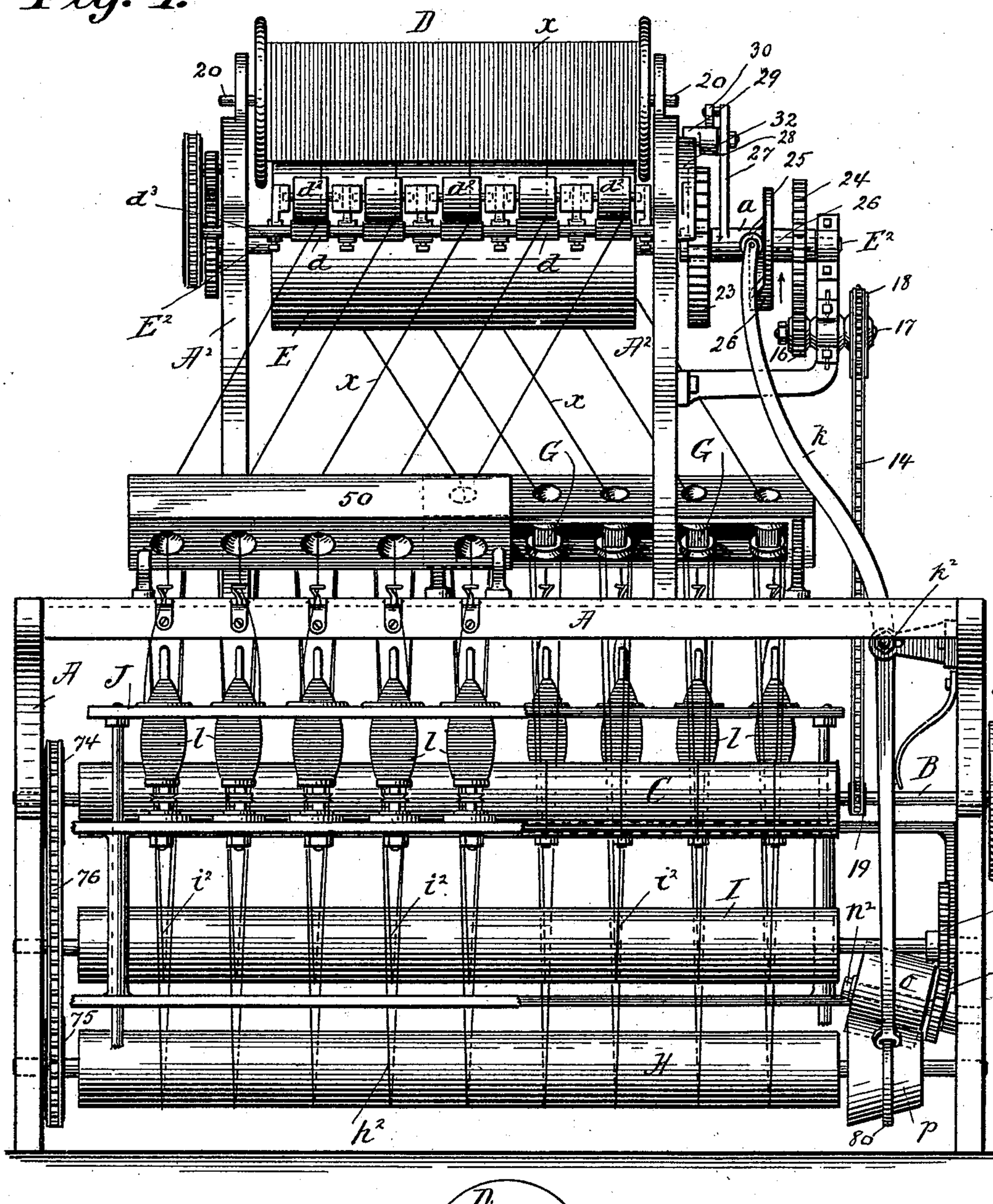

Fig. 1a

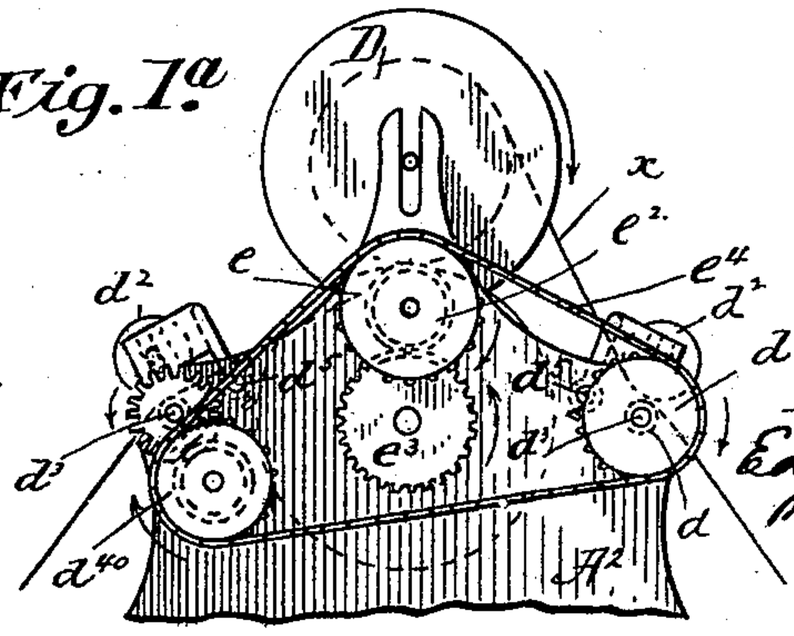

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Fig. 2.

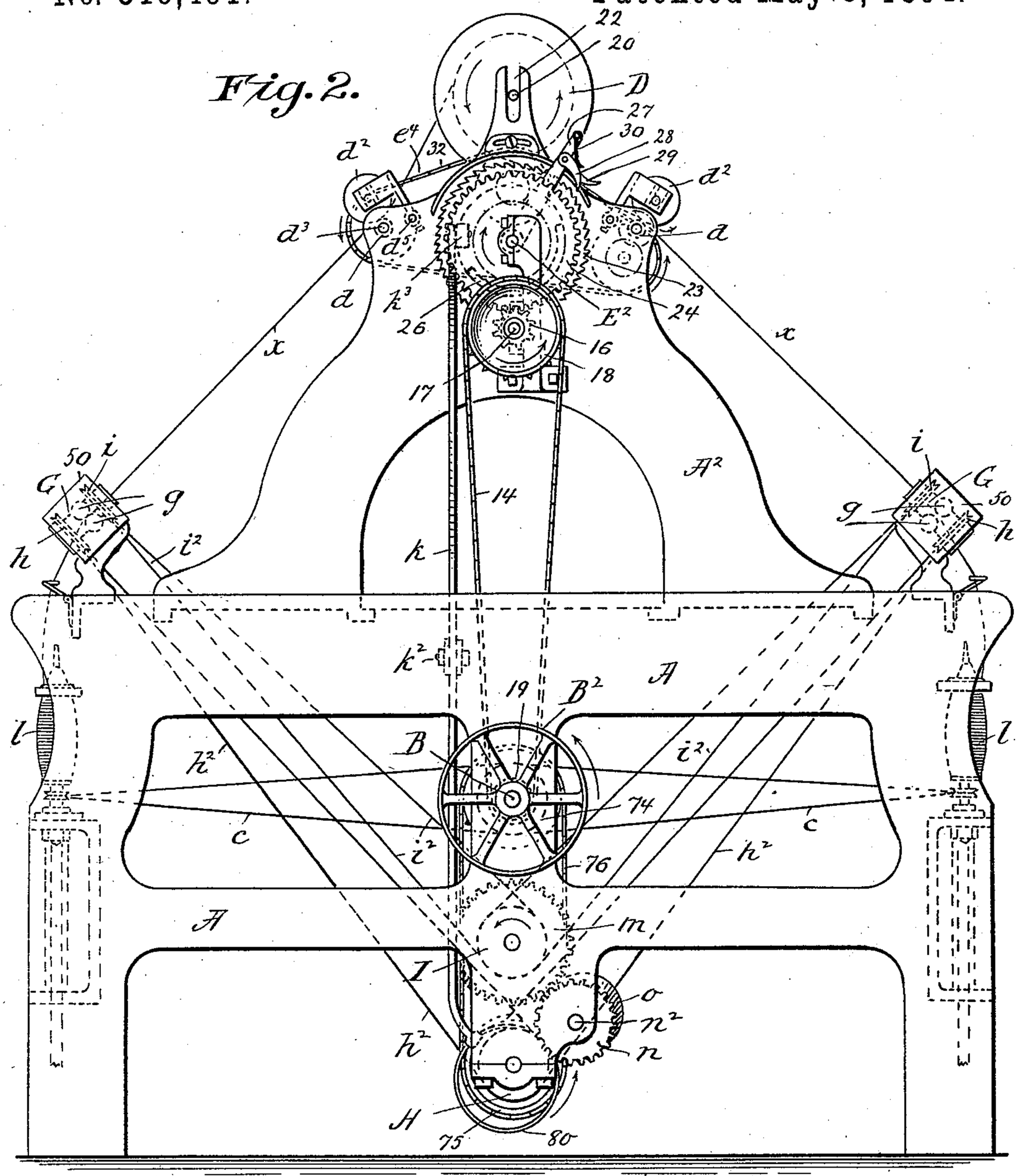
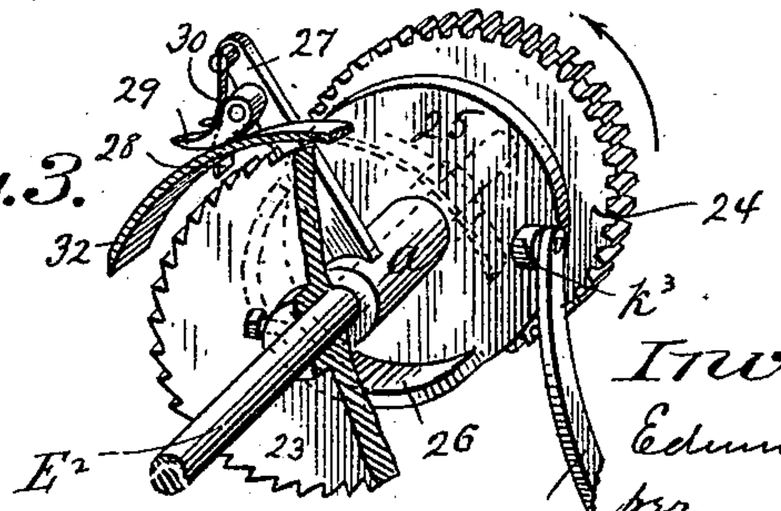


Fig. 3.



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SPINNING MACHINERY.

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Fig. 4.

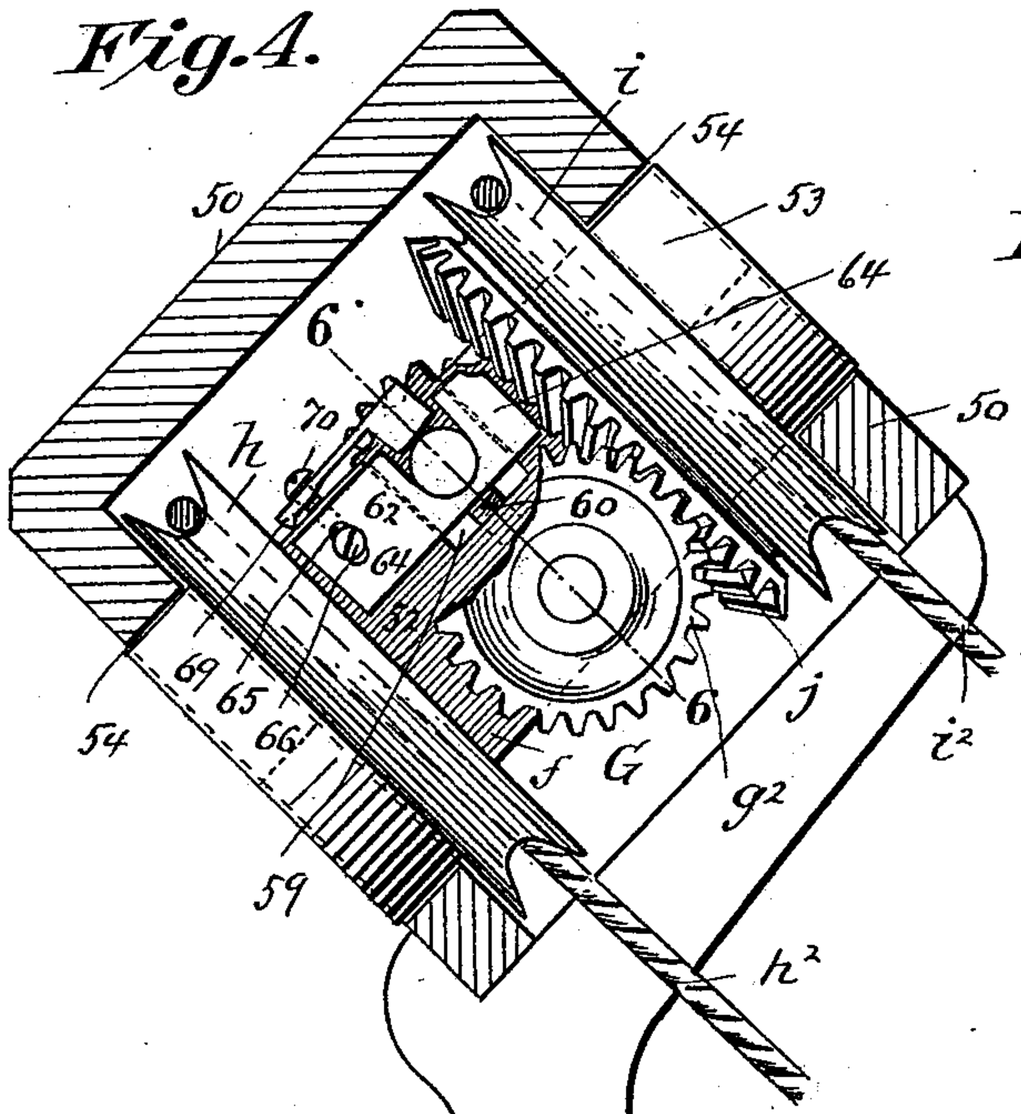


Fig. 5.

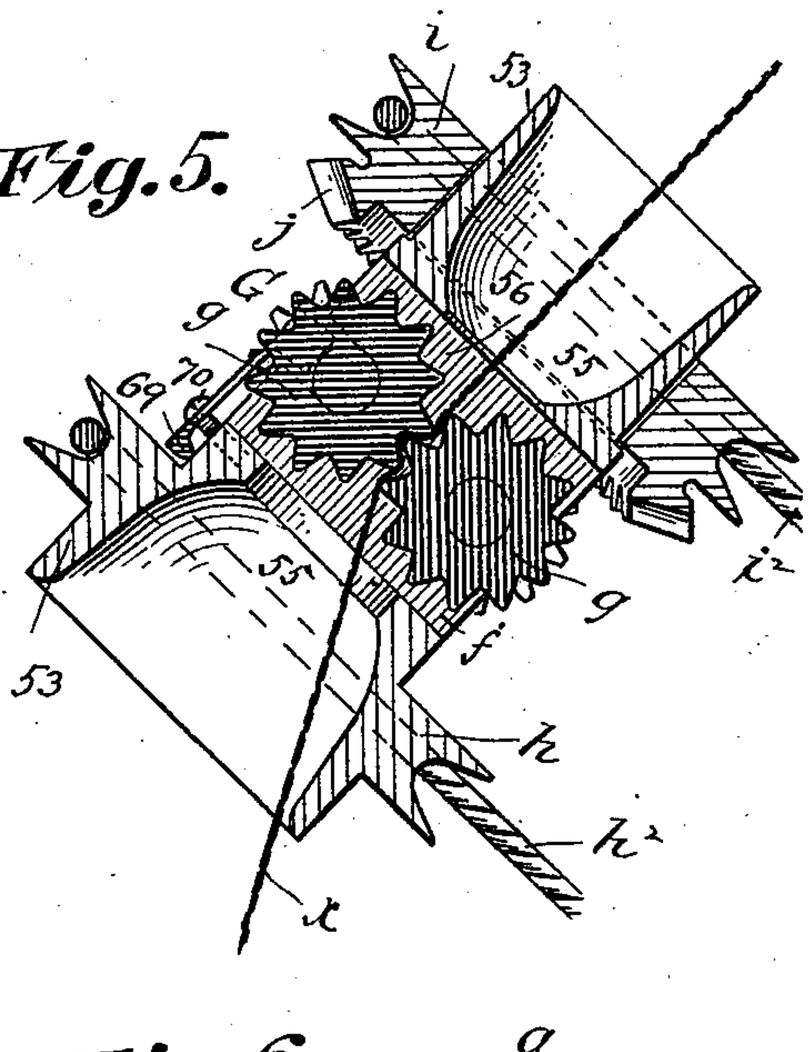


Fig. 6.

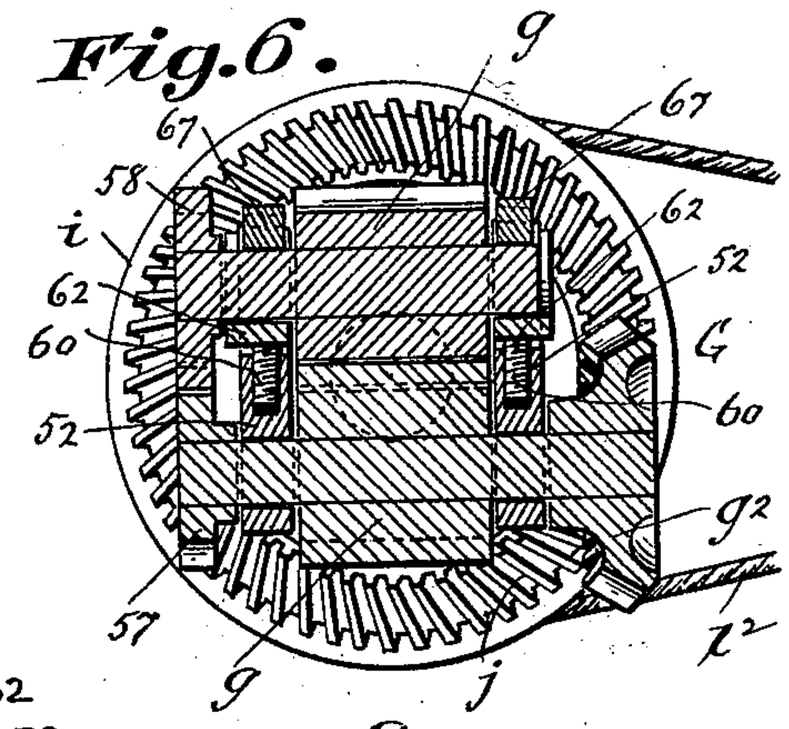


Fig. 7.

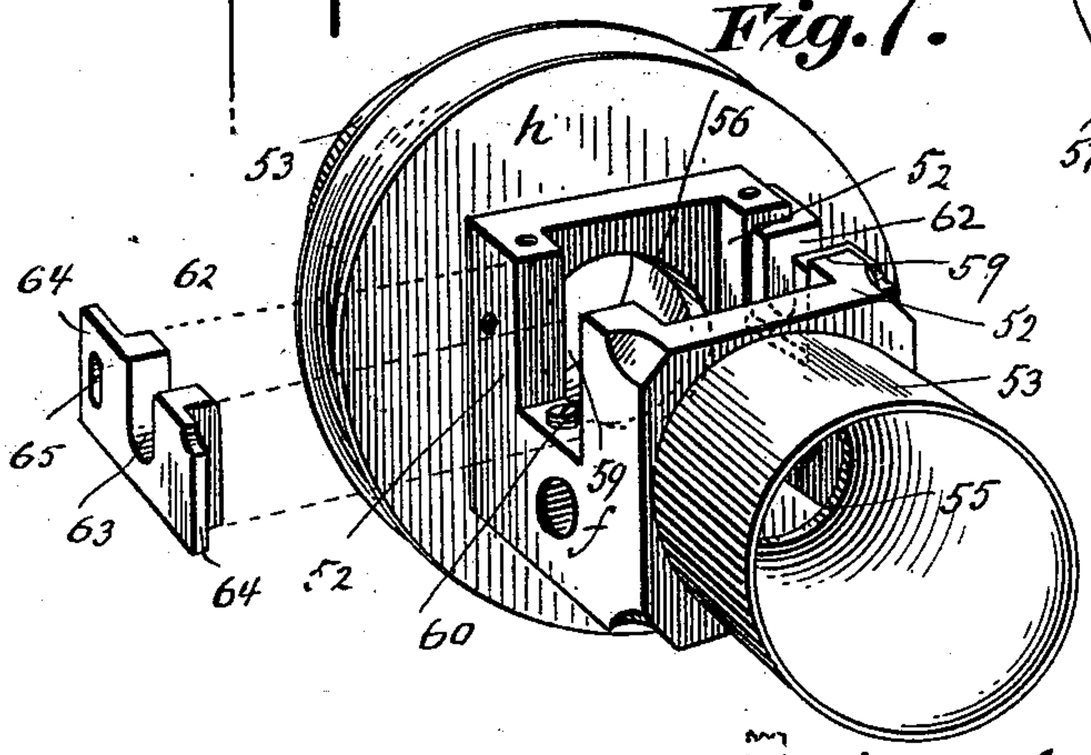


Fig. 8.

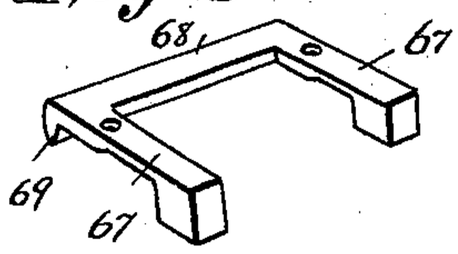
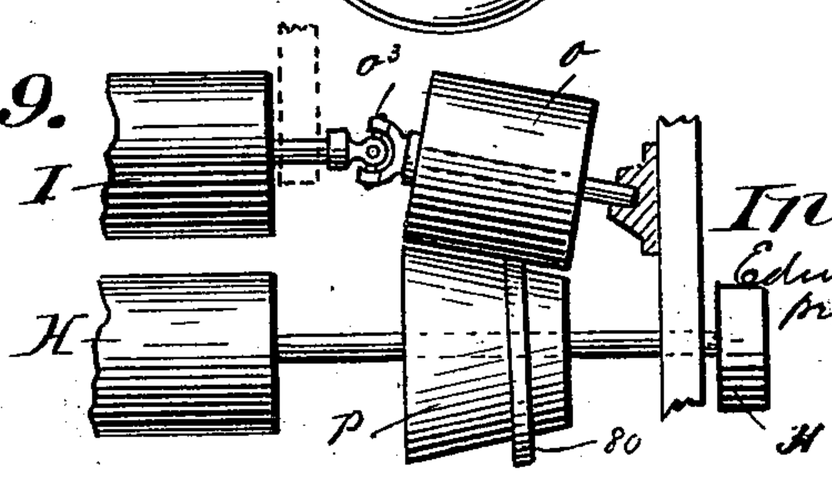


Fig. 9.



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SPINNING MACHINERY.

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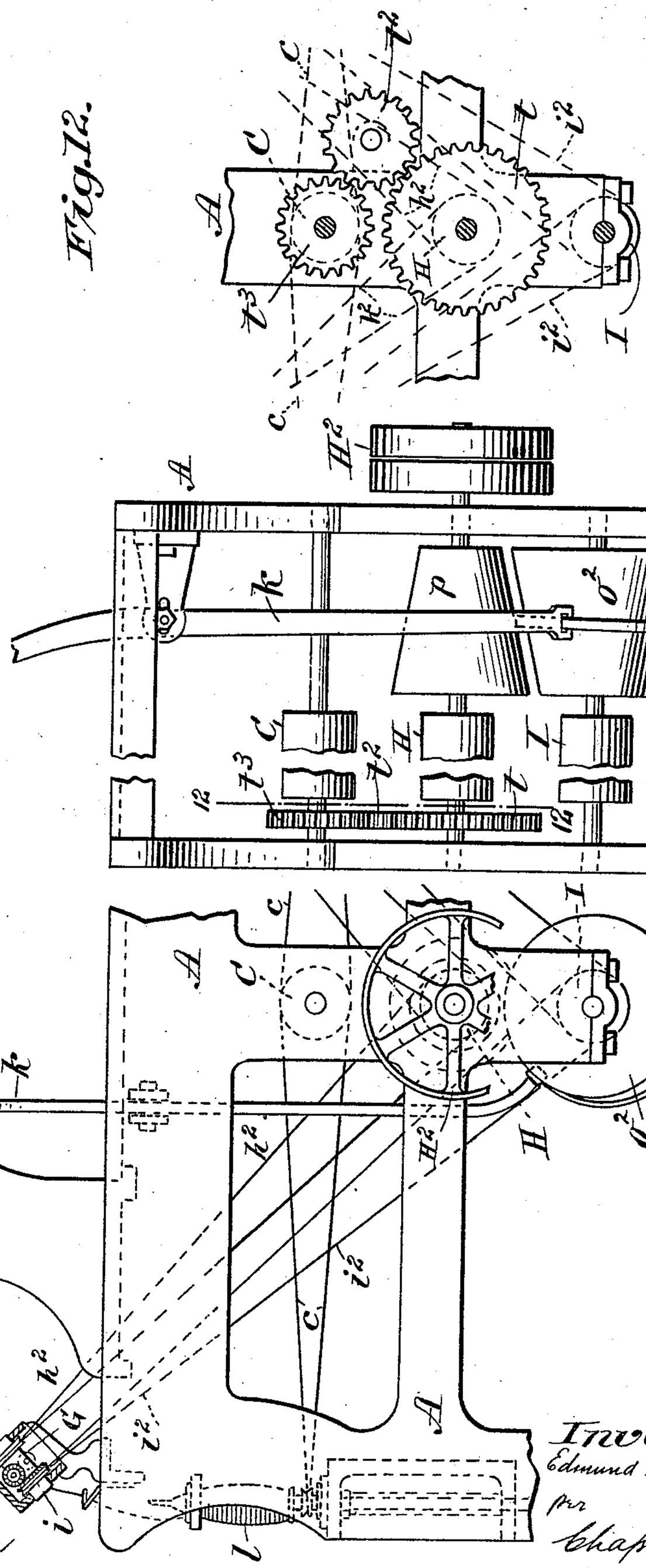

THE NATIONAL LITHOGRAPHING COMPANY,
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UNITED STATES PATENT OFFICE.

EDMUND K. BAKER, OF SPRINGFIELD, MASSACHUSETTS.

SPINNING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 519,491, dated May 8, 1894.

Application filed January 5, 1894. Serial No. 495,808. (No model.)

To all whom it may concern:

Be it known that I, EDMUND K. BAKER, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Spinning Machinery, of which the following is a specification.

This invention relates to spinning machinery more especially designed for spinning wool; the purpose of the invention is to greatly simplify and cheapen the machine without impairing the capacity or efficiency thereof.

The invention consists in peculiar arrangements or combinations of mechanisms, and in the particular construction of certain of the mechanisms, all substantially as will hereinafter fully appear and be set forth in the claims.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of the improved spinning machine. Fig. 1ª is an end view of an upper portion thereof for illustrating the means for imparting the rotary movements to the feed rolls by reason of the let-off movements of the spool or beam carrying the rovings. Fig. 2 is an end elevation of the machine. Fig. 3 is a perspective view of mechanism principally comprised in the let-off. Fig. 4 is a side view of the novel drawing and twisting heads,—the hollow rail within which it is set for its operating movements being shown in vertical cross section. Fig. 5 is a central section of the said head taken axially of the body of the twister and, consequently, transversely of the included drawing rolls. Fig. 6 is a cross section of the head taken on the line 6—6, Fig. 4. Fig. 7 is a perspective view of the body of the twisting-head,—the drawing-rolls, and their driving gear being removed, although in this view the journal boxes for one of the drawing rolls are shown. Fig. 8 is a perspective view of the duplicated drawing-roll-spring. Fig. 9 is a view illustrating a modification in the arrangement of the parts constituting the means for variably speeding one of the driving drums. Fig. 10 is a partial end elevation, and Fig. 11 a partial front elevation to illustrate a different arrangement for the driving of the machine,—Fig. 12 being a vertical elevation showing the gearing comprised in this different form of driving mechanism.

Similar characters of reference indicate corresponding parts in all of the views.

The machine will be described with reference to the particular constructions and formations here shown, while at the same time it is understood that as certain parts of the invention are contemplated in their broader aspect the invention is not to be limited to the detail construction of the particular instrumentalities shown.

In the drawings, A represents the framing of the machine which occupies a rectangular space, and has at its middle part the horizontal driving shaft, B, with the driving pulley, B^2. This shaft, B, also carries the drum, C, which through the usual banding, *c*, *c*, drives the spindles, *l*, *l*.

The framing, A, has, toward each end, the uprights, A^2, A^2, having between them the spool, or beam, D, for the roving, *x*. This spool has end studs, 20, which loosely play in the slotted guide-ways, 22, of the standards, A^2, while the cylindrical body constituted by the wound rovings on the spool rests, for frictional contact, at its under side upon the upper side of a cylinder, E, mounted on the shaft, E^2, which has fixed on one extremity the ratchet wheel, 23. On one extremity of said cylinder shaft, E^2, is a loose sleeve, *a*, having thereon a spur gear wheel, 24, a disk, 25, with a cam-rib, 26, on its face and a radial arm, 27, which has a pawl, 28, pivoted near its extremity, said pawl also having the offset finger, 29. The spring, 30, exerts the pressure to place the pawl in engagement with the ratchet wheel, 23. The gear-wheel, 24, is in mesh with a spur pinion, 16, supported on the stud, 17, having thereon the sprocket wheel, 18; a small sprocket wheel, 19, is also fixed on the arbor of the spindle drum, C, this wheel through the drive chain, 14, imparting a regular rotary motion to the gear, 24, and the sleeve, *a*. On the side of the standard, or other support, adjacent, but outside of, the edge of the ratchet wheel, 23, is an arc-shaped guard, 32, having an extent corresponding to a portion of the circumference of the ratchet wheel. As the sleeve, *a*, continuously rotates and the arm, 27, revolves,

the pawl, 28, part of the time is in engagement with the ratchet wheel, causing then a rotational movement thereof and of the drum, E, which insures the delivery of the roving, while at other portions of the period of each rotation of the sleeve, the finger, 29, by being engaged by the said guard, 32, results in the cessation of the movement of the ratchet and delivery drum.

The rovings run off from the spool, or beam, D, through simple feed-rolls, d, d^2, which have intermittent motions concurrent and uniform with those of the drum, E, to the drawing and twisting heads. Said motions of the feed-rolls are imparted from the drum shaft, E^2, by parts in arrangement as follows: The feed rolls, d, of the lower series are mounted on the common long shaft, d^3, having bearings in the said uprights, A^2, A^2, and this shaft at one end is provided with the sprocket wheel d^4. There is another sprocket wheel, e, which is mounted on one end upright, A^2, and which turns as one with the pinion, e^2, formed thereon, or attached thereto, which meshes with the gear-wheel, e^3, on the end of shaft, E^2. The drive chain, e^4, passes around sprocket wheels, e^2 and d^4. As shown to accord with the set of drawing and twisting mechanism which is arranged at the rear of the machine, as well as the front, this drive chain is also passed around the duplicate sprocket wheel, d^{40}, geared to the lower common shaft for the second set of feed rollers. The upper feed rolls, d^2, are mounted for individual and independent swinging movements to have pressure bearings by gravity on the lower rolls, d, upon which latter rolls the said upper rolls, d^2, are supported. Each upper feed roll is, therefore, mounted in a yoke, or swing frame, the rear or inner end of which is hung on the long rod, d^5.

The individual combined drawing and twisting heads, G, G, are shown as mounted in long, hollow rails, or boxes, 50, at the front and rear of the frame, the axes of the rotary bodies, f, being oblique, they extending rearwardly and upwardly, while the axes of the paired parallel drawing rolls, g, g, are at right angles to the axis of the head. The twisting bodies have continuous and uniform rotary motions, while the feed rolls have continuous, but variable, rotary motions, at a different speed from the twisting bodies; and the detail construction of one of these heads will be now described in detail:

The combined twisting and drawing head comprises as to the body, f, a construction, intermediately, in the form of a cubic box with opposite side walls, 52, 52, the sides at right angles to these being recessed, or open, while the extremities of the head are constituted by the exteriorly cylindrical journal members, 53, 53, which are fitted for free rotary movements in the circular holes, 54, in the upper and lower obliquely tipped boards of the hollow rail, 50. These end portions of the body have the hollow, outwardly opening, spaces, 55, also communicating with the intermediate chamber, or opening, 56. The body has the fixed, or integral grooved rim, or pulley, h, toward one end, while at its other end portion it receives, loosely, the sleeve-like part which exteriorly is formed to constitute the grooved pulley, i, and inside thereof the bevel gear j the teeth of which, instead of being radial to the center of the axis of the gear, are tangential to a smaller circle within the perimeter thereof (see Figs. 6 and 4) whereby the said gear, j, may mesh with the bevel pinion, g^2, on the end of one of the pair of drawing-rolls, g, g. These drawing rolls are journaled in the space within the middle of the said body, their axes being parallel with each other, and at right angles to the axis of rotation of the head as a whole. The shaft of the drawing roll which has the bevel pinion, g^2, thereon also has, at its opposite end, the spur pinion, 57, which meshes into the like pinion, 58, on the shaft of the other drawing-roll, g. The journal bearings of this latter drawing-roll are spring-pressed and yielding and are mounted in the side walls of the body, as follows: The side walls, 52, have the rectangular recesses, 59, 59,—extended from their edges in the base of each of which is the screw-tapped socket for the screw, 60, the head of which stands outwardly beyond the base surface; the journal-box, or support, 62, with the edgewise journal opening, 63, is set in one of the recesses, 59, its lower edge resting on the protruding head of the screw, 60. The journal box, 63, has on its outer side the edgewise extended flanges, 64, which overlie the outer wall of the twister body and one of these flanges is slotted, as seen at 65, parallel with the length of the recess, 59, and with the movement of the journal support; and the headed screw, 66, holds the box against displacement, laterally of its front face. The springs, 67, 67, press the movably journaled drawing-roll against its fellow whose rotation is, as already seen, about a fixed axis. The spring arms for the two journals may be formed in a single piece, the right angular bar, 68, being formed integrally with the spring arms. The rib, 69, forms a rocking bearing for this double spring and the regulating screws, 70, 70, determine the yielding pressure which the drawing-rolls are to have, the one toward the other, for the most efficient drawing effect upon the roving. The drawing-rolls may be of any of the well known or approved forms, as for simple drawing. It will be here pointed out with respect to this peculiarly constructed twisting and drawing head that should the driving of the pulley, i, be at exactly the same rate as the driving of the pulley, h, the bodily rotation for twisting of the twisting body would be unaccompanied by any rotary motion of the drawing-rolls, but that any variation in the speed of rotation of the pulley, i, relative to that of the twister-pulley, h, will cause the driving of the drawing-rolls through the gearing, j, g, and 57, 58. The pulleys, h,

of the twister heads are driven by the bands, h^2, from the drum, H, which has a constant rotary speeding, while the drawing-roll pulleys, i, are driven by the bands, i^2, which are rotated at a variable speed from the drum, I.

As shown in Figs. 1 and 2 the drum, H, is driven from the spindle drum, C, through the sprocket wheels, 74, 75, and drive-chain, 76. The drum, I, has on its arbor a gear, m, which is larger than the engaging gear, n, on the stud, n^2. On said stud, n^2, is also the cylinder, o, which rotates in peripheral proximity, but not in contact, with the cone, p, on the arbor of the drum, H. An endless band, 80, passes loosely around the cone, having a continuous running motion in unison with the surface speed of the cone, and by being borne upon peripherally by the cylinder, the cylinder has a surface speed corresponding to that of the cone. These driving parts are so formed and designed that the twister pulley, h, is rotated faster than the pulley, i, for the drawing-rolls, all whereby the amount of twist may be, for instance, three or four to every inch of the drawing of the roving. At the time of the left-off of roving the drawing roll pulley, i, has a retarded motion (so that it runs less nearly up to the speed of the twister-head, and thereby the drawing speed is increased at the time of let-off) therefore at the time of let-off the roving is drawn proportionately more relatively to the amount that it is twisted, than at the time intervening between one let-off and the next. By this method it is practicable to impart to the roving a twist, termed the "drawing-twist" in its greatest degree at the time after the let-off) when it is most needed on account of the attenuated condition of the roving) at which time the drawing action relative to the amount of twist imparted to the roving is the slowest. This action is assured by reason of the impingement of the cam, 26, upon the roller stud, k^3, of the lever, k, practically at the beginning of the period of let-off, so that through the swinging of said lever, k, the band, 80, is moved along the cone toward its smaller end whereby the rotational movement of the drawing-roll pulley, i, is, slowed, producing thereby a greater difference between its speed and the speed of the twister-body pulley, h,—the degree of which difference determines the increased rate of speed of the drawing-rolls. This shifting of the band, for the purpose stated, is insured through the medium of the band-shifting-lever, k, which is intermediately pivoted at k^2, one end having an engagement with the band, while its other carries a friction roll, through which it receives the actuating impingement of the aforementioned cam-rib, 26, of the disk, 25, which is on the sleeve, a, before described as entering into the composition of the intermittent let-off mechanism for the roving.

The spindles, l, l,—one for each of the twisting and drawing heads, G,—are mounted, as usual, on the horizontal rail at each side of the machine, they being very rapidly driven by the driving bands, c, c, which run around their respective whirls and the drum on the main shaft in the usual manner. The rovings drawn under twist by the heads emerge from the heads devoid of twist, and run through the guides of the usual rising and falling rail, J, Fig. 1, to the rapidly driven bobbins carried by the spindles, which impart the final, or yarn-twist.

The cam-rib, 26, is abrupt at its forward end and is gradual in its hind end inclination, whereby, when the roving spool is given its let-off, the acceleration of the drawing is immediately at its maximum, and so that after the roving has been given its entire let-off, the slowing of the drawing speed becomes gradual to its regular minimum speed.

In practice, new roving is let off at each rotation of the sleeve, a, in an extent to reach about half-way from the bite of the feed-rolls, d, d^2, to the heads, G; and that roving which lies between the forward end of the newly drawn off portion and the head, G, has, at such time received nearly, if not quite, its ultimate amount of elongation.

In Fig. 9 the shaft on which is the drum, H, for driving the twister-body-bands, h^2, indicated as the driving shaft, it having the driving-pulley, H^2; and the cone p is shown on this shaft as before. The cylinder, o, instead of being mounted on a stud and geared to the arbor of drum, I, which drives the drawing-roll-bands, i^2, has its stud, or arbor, hung by a universal joint at o^3, to the arbor of drum, I, for the attainment of the result derived by the exercise of the other described mode of variably driving the drum, I. Again, in Figs. 10, 11, and 12, instead of having the arbor of the spindle driving drum to constitute the driving shaft, as in the first described arrangement, I have the drum, H, which runs the bands, h^2, for driving the twister-body, the driving shaft. This shaft through its cone, p, and the endless band, 80, and second cone, o^2, imparts, as the band is shifted substantially as described, the variable speed to the drum, I, which runs the bands which drive the drawing-rolls. The spindle-drum, C, has the gearing, t, t^2, and t^3, whereby it receives its proper running speed from the driving-drum, H, and this gearing may be readily interchanged, or substituted, by other gearing for such classes of work as require a variation in the given speed of the spindles. Inasmuch as the speed of the spindles is that which is most often changed to accord with different yarns to be produced this last described arrangement is therefore desirable, but where it may be assured that the machine will be kept at work on a certain character or roving, and for the production of a given kind of yarn, the arrangement of the driving seen in Figs. 1 and 2,—wherein the spindle drum is on the driving shaft,—may be preferred.

Having thus described my invention, what

I claim, and desire to secure by Letters Patent, is—

1. In a spinning machine, the combination with an intermittently operating let-off device for controlling the delivery of the roving, of a uniformly rotating twister, and drawing-rolls having a continuous rotary motion and means for accelerating said motion concurrently with the let-off of the roving, substantially as described.

2. In a spinning machine, the combination with a cylinder for controlling the let-off of the roving, the feed-rolls, devices for intermittently imparting rotational movements for let-off to the said cylinder, and mediums of driving connection between the said cylinder and feed-rolls, of the rotary twisting head carrying also the independently rotatable drawing-rolls, and means for accelerating the rotation of the drawing-rolls concurrently with the let-off of the roving, substantially as described.

3. In a spinning machine, the combination with a cylinder for controlling the delivery of the roving provided on its arbor with a fixed ratchet wheel, 23, and a sleeve, *a*, loose on the arbor, having an arm, 27, a pawl, 28, on said arm, the finger, or projection, 29, the guard covering a portion of the circumference of the ratchet wheel and means for rotating the said sleeve, substantially as described.

4. In a spinning machine, the combination with a cylinder for controlling the delivery of the roving from the supply having on its arbor the fixed ratchet wheel and the loose sleeve with the gear, 24, the arm, 27, and the pawl, 28, having the finger, 29, the guard, 32, overlying a portion of the circumference of the ratchet-wheel a stud, or shaft, 17, with the gear wheel, 16, and a suitably driven shaft of the machine, and a medium of driving connection between this shaft and said gear stud, 17, substantially as described.

5. In a spinning machine, a mechanism for intermittently delivering forward a certain length of the roving, in combination with a rotating twister carrying a pair of drawing-rolls whose axes of rotation are at right angles to the axis of rotation of the twister, means for rotating the twister, a driving mechanism for the drawing-rolls and means for accelerating the motion of this driving mechanism concurrently with the let-off of fresh roving, substantially as described.

6. In a spinning machine, the combination with a mechanism for intermittently delivering roving from its supply support, of a twisting head comprising a rotatable body with a pair of drawing-rolls turning bodily therewith and rotating about axes angularly to the axis of rotation of the twister-body, means for driving the twister at a uniform speed, a drum and a driving connection between it and the drawing-rolls, a cone having a continuous uniform rotary motion, a medium of driving connection between this cone and the said drum, one part of which is in peripheral contact with, and movable endwise along, said cone, and means for automatically and intermittently moving the said part along the cone, substantially as described.

7. In a spinning machine, the combination with an intermittently operating let-off mechanism for the roving, and the rotary twisting body having the drawing-rolls which rotate independently and angularly to the axis of rotation of the said body, of a drum, having a driving connection with the twister-body and a drum, having a driving connection with the drawing-rolls, means for driving the first drum at a regular rate of speed, a differential driving mechanism for running the second drum at variable speeds and movable controlling connections between the intermittent let-off mechanism for the roving and said differential driving mechanism, substantially as and for the purpose set forth.

8. In a spinning machine, the combination with the rotary twister-body having the angularly arranged pair of drawing-rolls and a wheel, having driving connection with the drawing-rolls, a regularly rotating cone, a band running around said cone, and rotary driving connections driven by and intervening between it and the said drawing-roll drum, a band shipping lever, the rotary let-off mechanism for intermittently delivering new quantities of the roving, having, movable in conjunction therewith, a cam which periodically, and concurrently with the let-off, swings the band-shifting lever, substantially as described.

9. In a spinning machine, the combination with cylinder, E, controlling the let-off of the roving, having on its arbor the fixed ratchet wheel and the loose sleeve with the pawl-carrying-arm and pawl and the cam, 26, and the guard, 32, covering a portion of the periphery of the ratchet-wheel, of the regularly rotating cone, the drum, I, with a gear thereon, a cylinder, *o*, with gear *n*, the loose band, 80, running in contact with both the cone and cylinder, and the lever, *k*, connected to the band and having its extremity in operative contact upon said cam, all substantially as described.

10. In a spinning machine, the combination with an intermittently operating let-off device for controlling the delivery of the roving, of the twister-head comprising the intermediate box-like part with hollow cylindrical end portions which constitute journals, one thereof having the fixed pulley, *h*, while the other receives the loose sheave, *i*, with a gear thereon, in combination with a pair of fluted drawing-rolls one of which is journaled in fixed bearings in the said box-like part, while the other has bearings which are yielding relative to the box against the pressure of springs which are applied for action upon said movable bearings, said drawing-rolls being adapted to be driven the one from the other and the primary one having a gear in mesh with the gear on the said sheave, *i*, and means for

accelerating the rotation of the sheave, *i*, intermittently and concurrently with the let-off of the roving, substantially as described.

11. In a spinning machine, the twister-head having the tubular ends, 53, 53, and the hollow box-like intermediate part with the journal-receiving recesses, 59, 59, and a fluted drawing-roll mounted therein in fixed journal bearings transversely of, and to one side of the common axis of the said tubular ends, and the other fluted drawing-roll journaled yieldingly within the recesses of the box-like part, springs for pressing the movably journaled roll toward its fellow, the fixed sheave, *h* on one of the tubular ends and the sheave *i*, loose on the other tubular end and having a gearing engagement with the journal-shaft of one of the drawing-rolls, in combination with intermittently operating let-off mechanism for controlling the delivery of the roving, means for uniformly driving the twister-head and means operating in conjunction with the intermittent let-off for insuring an accelerated driving of the drawing-rolls concurrently with the let-off, substantially as described.

12. In a spinning machine, the combination with an intermittently operating mechanism for the let-off or delivery of the roving, of a uniformly rotating twister having drawing-rolls mounted therein and adapted for continuous rotary motions, means for accelerating the motions of the drawing rolls independently of the motion of the twister, and concurrently with the let-off of the roving, the spindles, means for driving the same, and the ring-rail, for imparting the final yarn twist to the drawn roving which is continuously delivered thereto from the variably speeded drawing and twisting mechanism, substantially as described.

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