No. 627,634. Patented June 27, 1899.

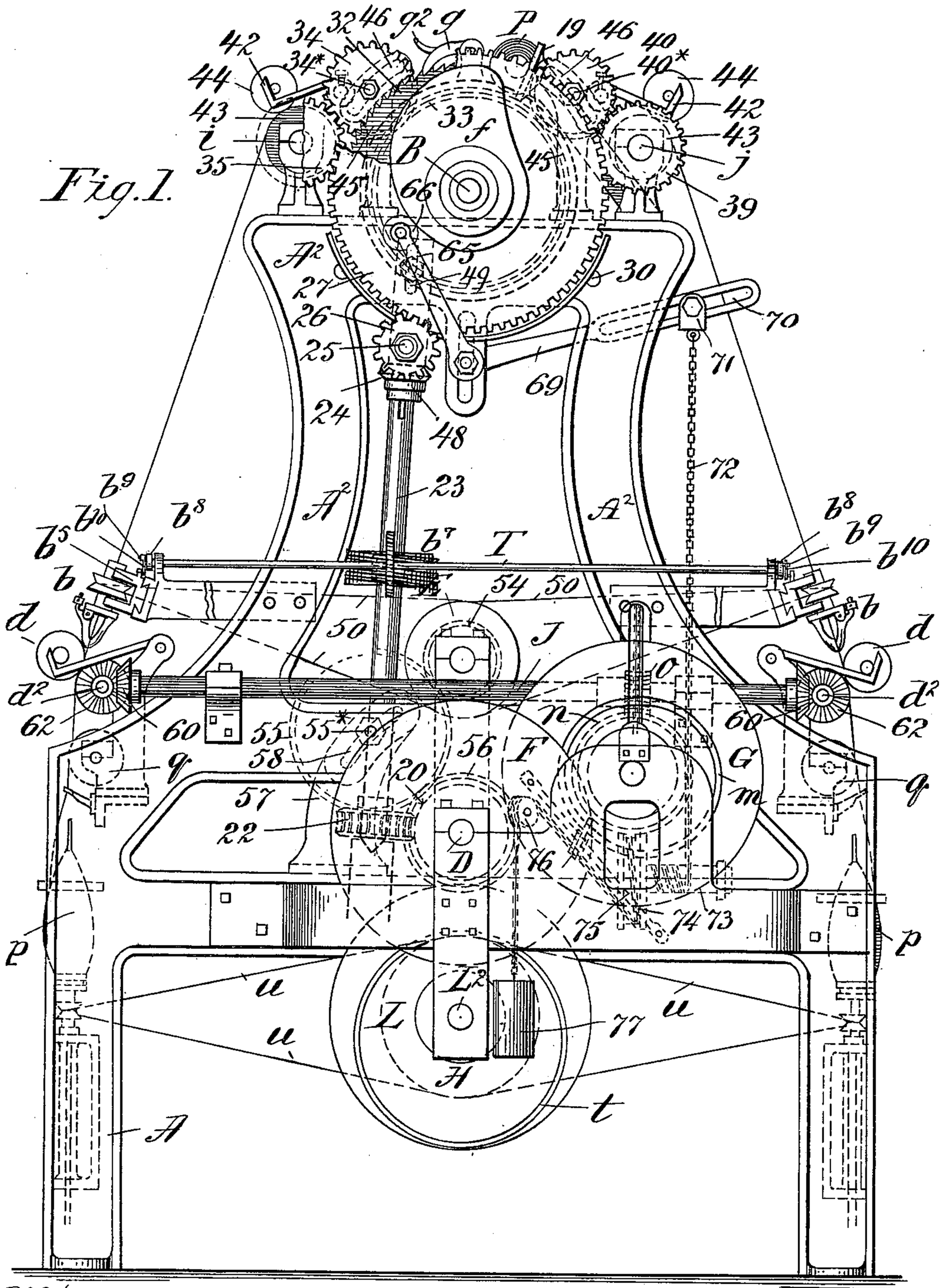
E. K. BAKER.

SPINNING MACHINE.

(Application filed Nov. 21, 1896.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

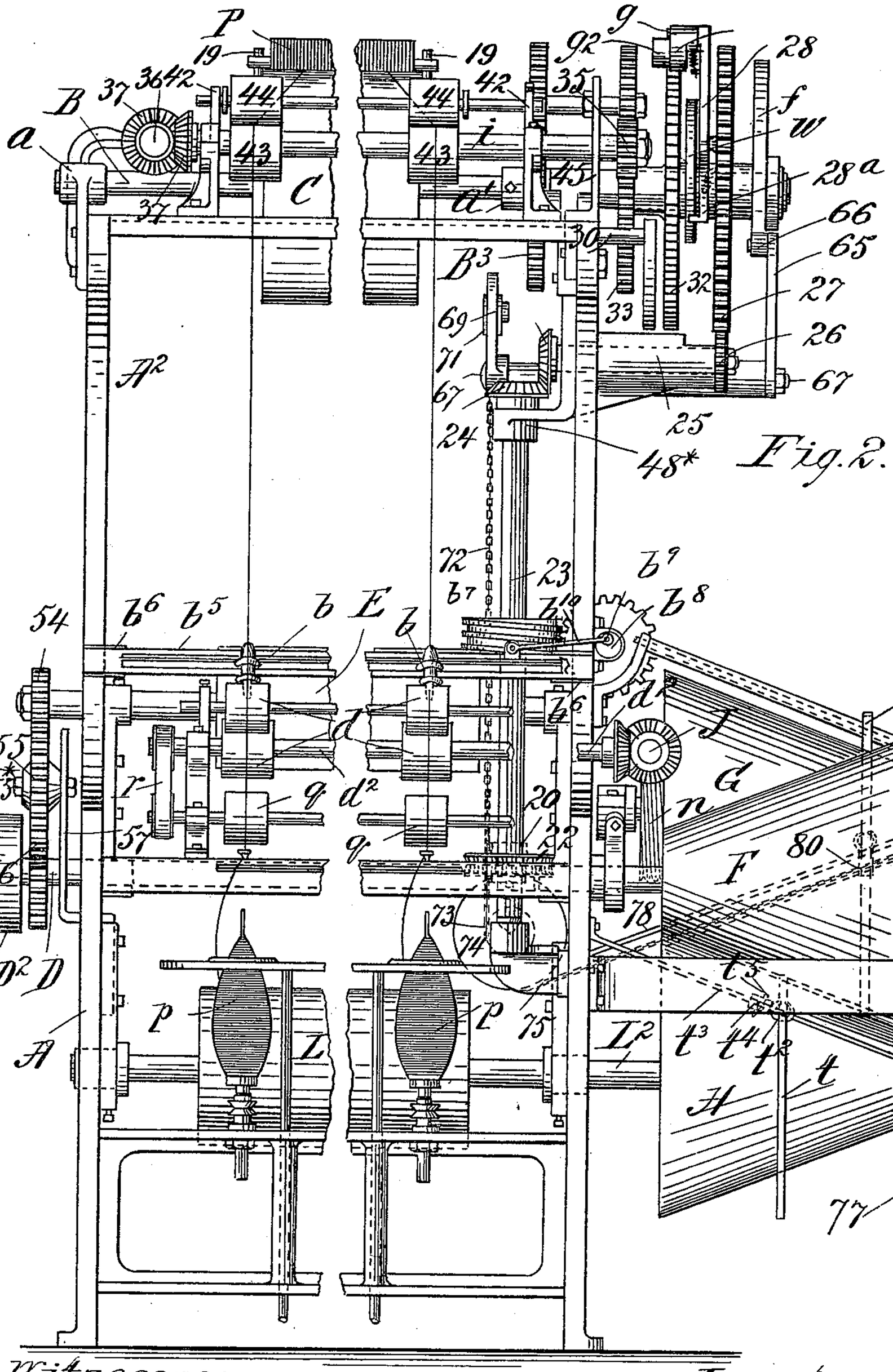

Fig. 2.

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(No Model.) 4 Sheets—Sheet 3.

Fig. 3.

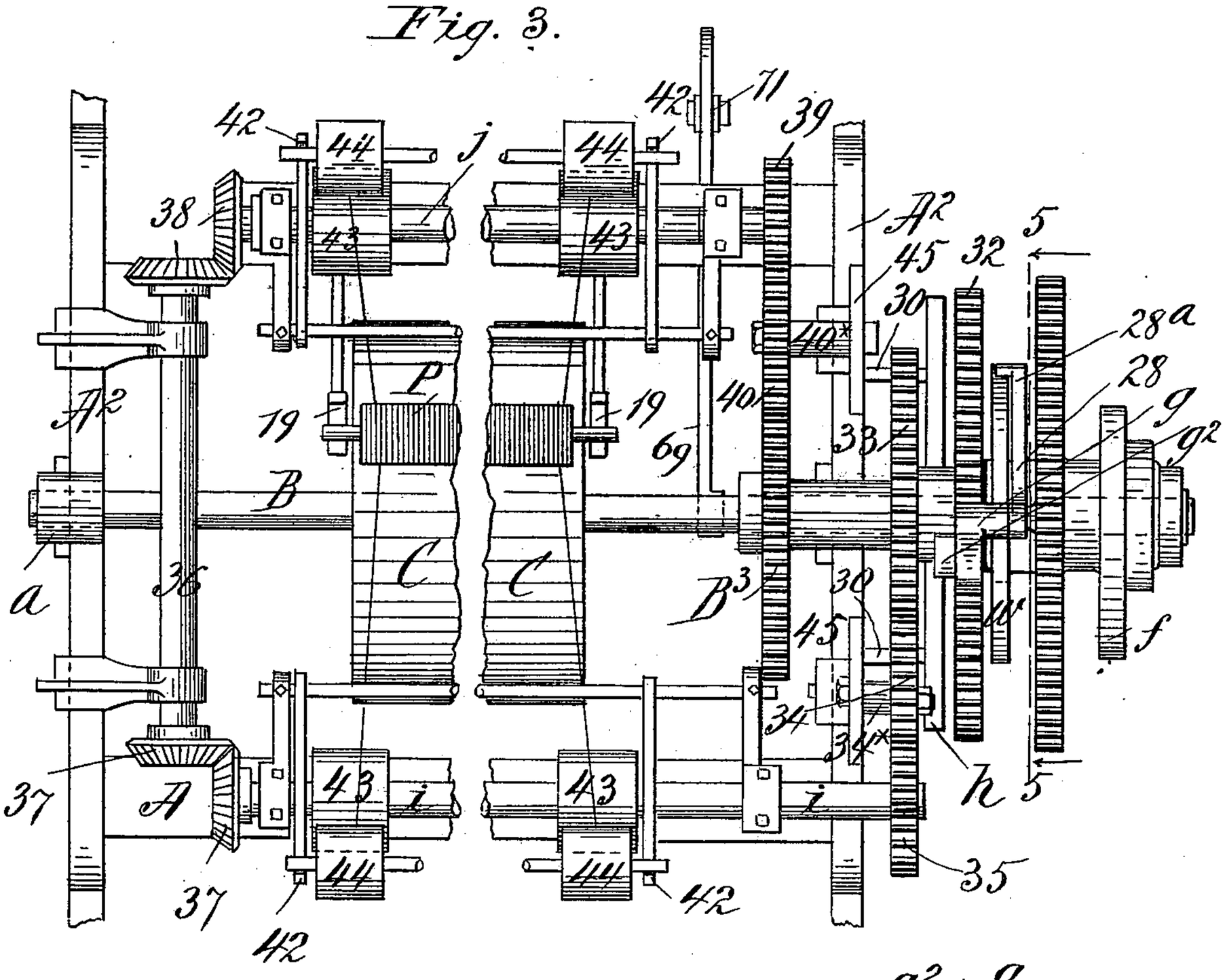
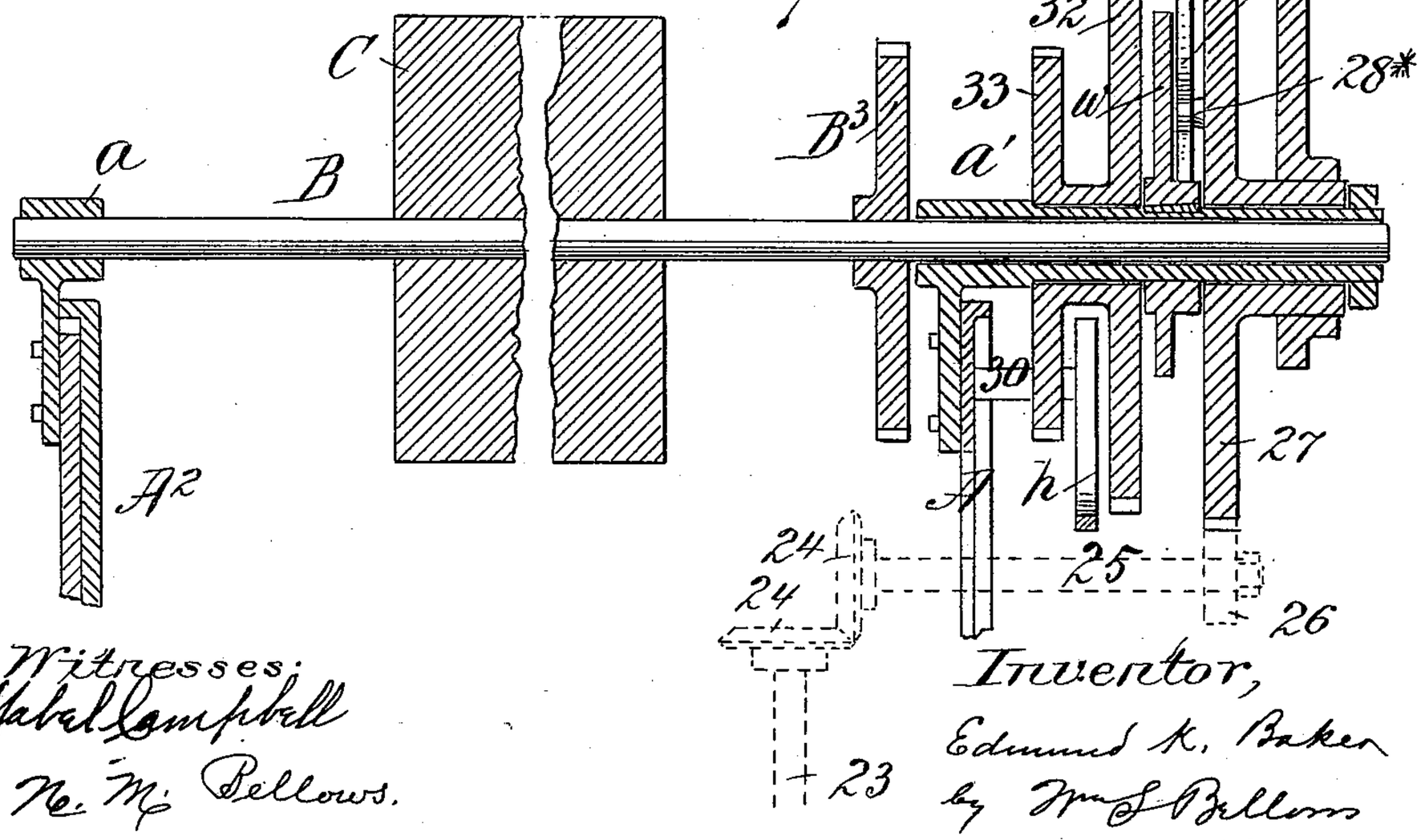


Fig. 4.



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(No Model.) 4 Sheets—Sheet 4.

Fig. 5.

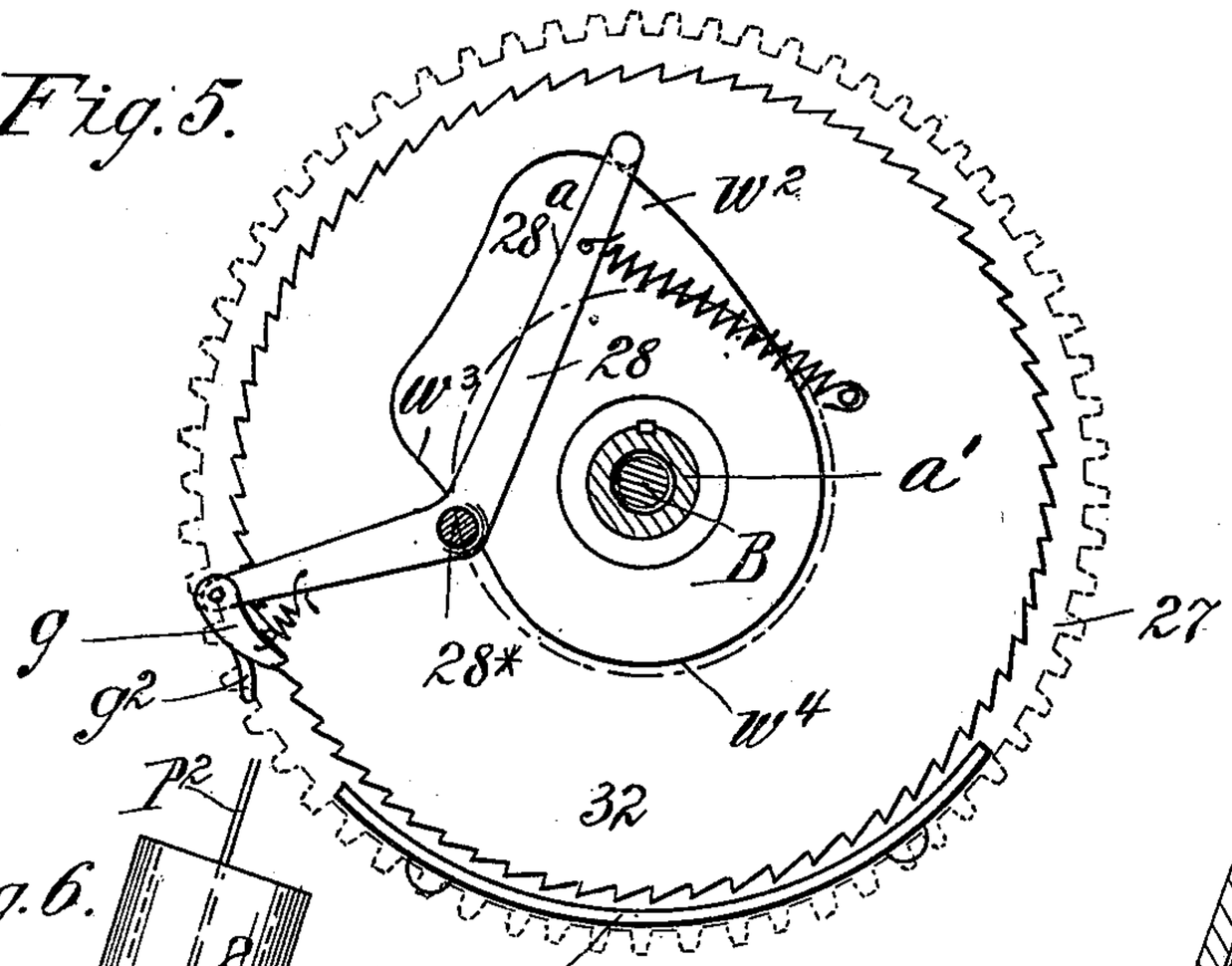


Fig. 6.

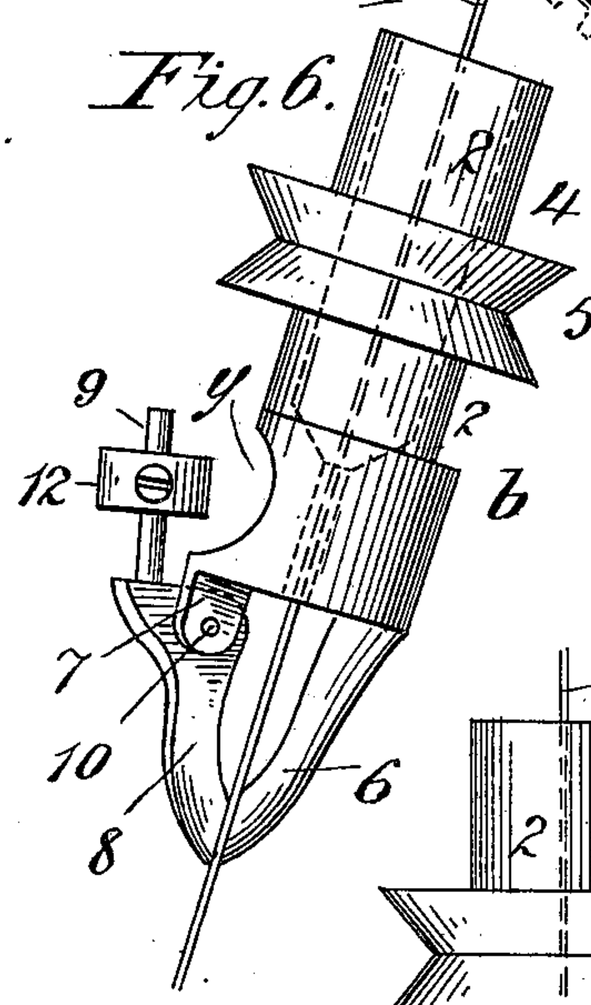


Fig. 7.

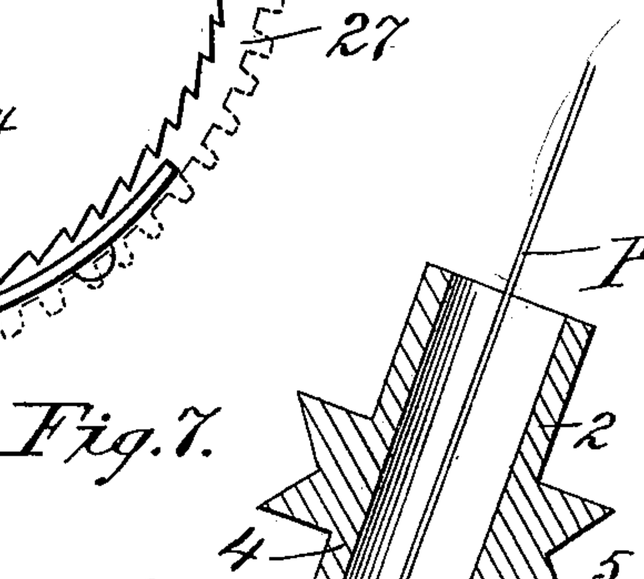


Fig. 8.

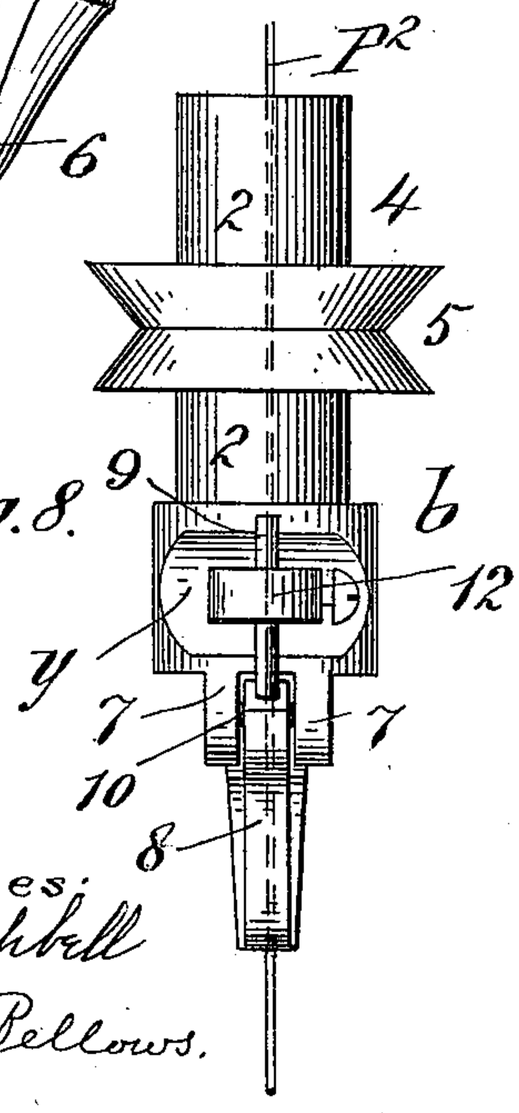
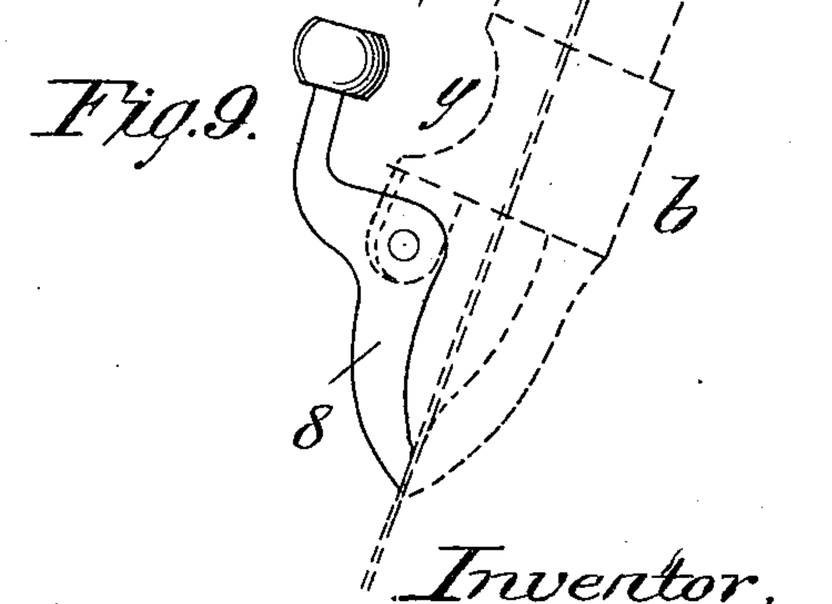


Fig. 9.



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UNITED STATES PATENT OFFICE.

EDMUND K. BAKER, OF SPRINGFIELD, MASSACHUSETTS.

SPINNING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 627,634, dated June 27, 1899.

Application filed November 21, 1896. Serial No. 612,984. (No model.)

To all whom it may concern:

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

This invention relates to improvements in a class of automatic spinning-machines for performing the same work as a mule, and a spinning-machine of the class to which this invention relates is illustrated, described, and claimed in Letters Patent of the United States granted to me May 8, 1894, No. 519,491.

The invention also relates to an improved construction of twister-heads.

The objects of the present invention are to so improve the mechanisms as to adapt the machine or render it easily adaptable for spinning various kinds, sizes, and qualities of rovings, to render the machine much improved mechanically, and to render it more efficient for production and generally more satisfactory and valuable.

The purpose of the improvements in the twister is to render it more simple, cheap, and easily balanced or adapted for the work for which it is intended.

The invention consists in the combinations of mechanisms for producing or permitting certain important results and in the constructions and combinations of parts, all substantially as will hereinafter fully appear and be set forth in the claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is an end elevation of the machine. Fig. 2 is a front elevation of the same. Fig. 3 is a plan view of the top works of the machine on a somewhat larger scale. Fig. 4 is a central vertical section of the part of the mechanism shown in Fig. 3. Fig. 5 is an elevation and cross-section as seen looking to the left of the plane indicated by the line 5 5, Fig. 3. Figs. 6 to 9, inclusive, illustrate the improved twister, Fig. 6 being a side view, Fig. 7 a central longitudinal section, Fig. 8 a front view, and Fig. 9 a side view showing a modification.

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

The present improved machine, like the machine of the aforementioned patent, embodies an intermittently-operating let-off mechanism or rotatable controller governing the delivery of the roving, (seen at the top of the machine,) practically uniformly rotating twisters for the roving, (seen at *b*,) drawing-rolls *d d* for the roving, having a continuous rotary motion, and, combined therewith, mechanism for accelerating the motion of the drawing-rolls concurrently with the let-off of the roving.

The machine shown, which may be termed a "double" machine because of having duplicated sets of several of the mechanisms at both front and rear, as will become readily apparent from the drawings and the following descriptions of the mechanisms, comprises a suitable framing A of rectangular form, the end standards of which are upwardly extended, as seen at A^2, the latter being provided with journal-bearings *a a'* for the horizontal shaft B, on which the large roll or cylinder C is fixed.

D is the driving-shaft of the machine, having thereon the pulley D^2 for rotating it through means of a belt applied thereon.

P represents the beam or roll of roving, which is mounted on the upper periphery of the cylinder C, it being restrained from displacement by the arms 19 19, against which its end journals lie. The rovings pass from the beam, between and subject to the feeding action of the feed-rolls 43 44, to the twisters *b* and drawing-rolls *d*, and thence to the bobbins *p*.

The actuating or driving mechanisms for the intermittent let-off or roving-supplying devices, for the substantially uniformly rotating twister-heads, for the variably-rotatable drawing-rolls, and for the bobbins will now be described in succession, and with reference to the mechanism for actuating the let-off and the delivery of the roving to the twister-heads and drawing-rolls it will be pointed out that the main shaft has, by the worm 20 and worm-gear 22, a connection with the vertical shaft 23, which is, by bevel-gears 24 24, in driving connection with the short horizontal shaft 25, which has the spur-gear 26 in mesh with the larger spur-gear 27, which is loose on the elongated hub *a'*, which consti-

tutes the journal-bearing for the aforesaid cylinder-shaft B. This spur-gear 27 has on its own elongated hub at one side, which hub is loose on the journal-bearing *a*, the cam *f*. This said spur-gear also has at its opposite side the offset lever 28, which carries a pivoted pawl *g*, the latter being provided with the laterally-extended lip g^2, which has its path of revolution in a circle, around a portion of which lies the arc-shaped shield or guard *h*, which is supported by the rods or arms 30, which extend laterally from the upright A^2.

There is a ratchet and gear wheel 32 33, connected by the common hub, which is loose also upon the aforesaid journal-bearing sleeve *a'*, and with the larger ratchet 32 of this double wheel engages the aforementioned pawl *g* at such portion of its revolution as it remains free and disengaged from the said shield *h*, and when the lip of the pawl comes into engagement with such shield the pawl is thrown out of engagement with the said ratchet-wheel and the same remains stationary while the gear-wheel 27 has a portion of its movement of rotation.

The cylinder-shaft B has the spur gear-wheel B^3 fixed thereon. With the other gear-wheel 33 of the aforesaid two-part wheel meshes the intermediate gear-wheel 34, which is also in mesh with the gear-wheel 35 on the shaft *i*, which is parallel with the said cylinder-shaft B. At the opposite side of the top of the machine and parallel with the shaft *i* is another horizontal shaft *j*, having, through the shaft 36, which is right-angularly arranged, and the two pairs of bevel-gears 37 37 and 38 38, a driving connection with said shaft *j*, and said shaft is, through its spur-gear 39 and the intermediate gear 40, in driving connection with the aforesaid gear-wheel B^3 on the cylinder-shaft B.

Shafts *i* and *j*, which are the feed-roll shafts, rotate in opposite directions, the direction of rotation of the cylinder-shaft being always the same, and the rovings are drawn off from the beams, some rearwardly from the top and others forwardly from the bottom thereof, as said beam has its rotational movement always in the same direction.

The feed-rolls 43 43 are fixed on their respective shafts *i* and *j*, and their fellow rolls 44 44 bear by gravity on the upper sides of the said feed-rolls, which are on the shafts *i* and *j*, they being restrained against accidental displacement by the angular arms 42 42, on which the journals of the said upper feed-rolls have their abutments.

The cylinder-shaft B and cylinder C will have at each complete rotation of the gear-wheel 27 such part of a whole rotation thereof as corresponds to the portion of the whole circumference of the wheel 32, which is uncovered by the shield *h*. Thus, for instance, if the shield is of such a length as to lie around two-fifths of the circumference of gear-wheel 32 the constantly-revolving pawl *g* will engage this gear during three-fifths of the revolution of the pawl, and during this three-fifths of the revolution of the pawl the cylinder C will be rotated, it having a three-fifths of a rotation in the mechanism illustrated where the train of gearing between gear-wheels 33 and B^3 is designed to that end; but by providing increasing or multiplying or reducing gearing in the train the extent of rotation of the cylinder C may be more or less for the delivery of more or less roving in the period of let-off—that is, while the pawl *g* is in engagement with the ratchet-wheel 32, and the feed-rolls are through the gearing connections shown driven to have a surface speed approximately equal to and concurrent with the let-off of the roving by the frictional engagement of the cylinder upon the beam, and provision for the interchange of gears in said train is made, so that the delivery of the roving may be, as predetermined, rendered conveniently more or less at each "draw," as each complete operation of the spinning-machine is termed—that is to say, the gear 35 is interchangeable and the intermediate gear 34 is adjustable; also, the gear 39 is interchangeable and the intermediate gear 40 is adjustable. The said intermediate gears have the studs or arbors 34* 40*, on which they are mounted, secured in brackets or supports 45, which have arc-slots 46, that are concentric with the axes of the gear-wheels 33 and B^2, all so that as larger or smaller interchanged gears 35 or 39 are placed upon shafts *i* and *j* the adjustable gears 34 or 40 may be moved around in the slotted brackets to be placed nearer to or farther from the axes of the said shafts *i* or *j* as required to accord with any interchanged gear, while remaining also always in mesh with the gears 33 or B^3; and, furthermore, it may be arranged that the regular speed of the pawl-carrying gear-wheel 27 may be at a greater or less rate by having the gear-wheel 26 interchangeable on the shaft 25. The shaft 25 is set in a vertically-adjustable bearing 48, which has the adjustable means—bolt and slot (seen at 49)—for confining it in its proper vertical position. The said bearing-support 48 has at its lower end the bracket 48*, through which the shaft passes and upon which rests one of the bevel gear-wheels 24. This one bevel gear-wheel 24 is splined on its shaft 23, so that as the support 48 is moved vertically, and with it the horizontal shaft 25 and the gears thereon, the bevel-gear on the shaft 23 may correspondingly be moved. Therefore in the actuating mechanism for the let-off cylinder C and the feed-rolls 43 and 44 these parts may have, as the machine may be differently arranged, first, faster or slower movements, according to the size of the gear 26; secondly, greater or less rotational movements of the cylinder and feed-rolls during one rotation of the gear-wheel 27 by the interchange for a larger or smaller one of the gear 35, and, thirdly, still further variability in the degree or extent of the rotational

movement of the cylinder and roving-beam during one rotation of the gear-wheel 27 by the interchange of the gear 39.

The drive mechanism for the twisters is very simple and comprises the several driving-bands 50, running around the common twister-drum E and whirls of the twisters. The shaft of the twister-drum E is geared to the main shaft D of the spinning-machine by the gears 54, 55, and 56, 55 being an intermediate gear. The gear 54 on the end of the twister-drum shaft is interchangeable, while the intermediate gear 55 is adjustable, its stud or arbor 55* being set and detachably confined in the bracket 57, having the arc-slot 58, which is concentric with the main-shaft gear 56. The regular continuous speed at which the twisters may be run can be determined and effected by placing on the twister-drum shaft a spur-gear of the proper diameter and correspondingly adjusting the intermediate gear.

Each of the improved twisting-heads *b* consists of a hollow or tubular cylindrical body 4, having said whirl 5 thereon, and the narrow yarn-gripping finger 6, extending longitudinally from one end thereof, as shown. Said body, whirl, and finger 6 may be integrally constructed from suitable metal, with the journals or bearing parts 2 2 thereon. Short ear-pieces 7 7 are provided integrally or otherwise on the end of said body 4 opposite said finger 6. A portion of the metal comprising said body 4 is removed from one side thereof at *y*, or said head is given such a form thereat in order to balance the head when in completed condition for rapid rotation whereby all vibration or "chattering" is prevented. A second yarn-gripping finger 8 is pivotally connected to the body 4 between said ear-pieces 7 or in other suitable manner. Said pivoted finger 8 has a slight and free vibratory motion opposite said fixed finger 6, due to the passing of the roving or yarn between said two fingers, and has an extension above its pivot 10, on which a weight 12 is carried. Said extension may be, by an arm 9, fixed to said finger, on which is attached a weight by a screw, as shown, whereby said weight is made adjustable toward and from said pivot, or said extension above said pivot 10 may be provided as shown in Fig. 9, wherein said arm and weight are integrally formed with the finger 8. The pivot 10 of said finger 8 constitutes its fulcrum, and for the purpose hereinafter set forth said finger 8 necessarily has said free vibratory movement thereon, whereby the free end of said last-named finger may press uniformly and with a certain force against the opposite fixed finger 6 while the head rotates, and to the end that such pressing action may be properly effected said weight 12 is attached to or made a part of said arm 9, as shown and described. If the twisting-heads are to run constantly in twisting a uniform grade of yarn, said weight may be fixed; but if the size of the yarn varies the weight may be adjustably attached to said arm 9, as shown, wherein a screw is employed for securing the weight thereon. The operation of said twisting-head is as follows: The roving P^2 to be twisted passes into the head *b*, as shown, and is drawn between said fingers 6 and 8. The yarn is gripped between the extremities of said fingers in the manner shown in Fig. 6 by the tendency of the said weight 12 to move radially away from the axis of the head D, actuated by the centrifugal force due to the rapid rotary movement of said head. Under the action of said centrifugal force said finger 8 swings more or less upon its pivot 10, and the extremity thereof is caused to so press upon the yarn as it passes between said two fingers as to cause it to receive a twist corresponding to the speed of the rotary movement of the twister-head. It is obvious that when the said twisting-head is not revolving the finger 8 exerts little or no pressure upon the opposite finger 6.

Proceeding to describe the improved mechanism for effecting the variably-speeded rotary movements of the drawing-rolls reference is to be particularly had to Figs. 1 and 2. Upon the end of the main shaft D of the machine, opposite the driving-pulley thereof, is the cone F, alongside of which is the reversed cone G, the peripheries of the two cones being separated only by a space equal to the thickness of the interposed endless strap *m*. The rotary cone G has at its end the worm *n*, which is in mesh with the worm gear-wheel *o*, that is fast upon the cross-shaft J. This cross-shaft has at its ends, which reach to the front and rear sides of the machine, the beveled pinions 60 60, which mesh with the bevel-pinions 62 62 upon the ends of each of the shafts d^2 for the lower and positively-driven drawing-rolls of the several sets of such rolls. The aforesaid strap *m* has a movement automatically imparted thereto bodily in the line of the axes of the cones F and *g* by the mechanism which will be now described, the aforementioned cam *f* being the primary actuator and controller thereof. The lever-arm 65, having the cam-roller 66 thereon, is mounted upon the rock-shaft 67. Upon the said rock-shaft is affixed the lever-arm 69, the extremity of which is slotted, as seen at 70. A block 71 is adjustably secured upon the slotted extremity of the lever 69, to which a chain 72 or equivalent flexible connection is secured, this chain running downwardly around and in a winding engagement with the elongated hub 73 of the pulley 74. There is also in winding engagement with this pulley 74 another flexible connection 75, which thence runs to and over a sheave 76, and has at its depending end the weight 77. The course of the chain or flexible connection 75 from the pulley 74 to the sheave 76 is alongside a bar 78, on which is movable the sliding strap-shifter 80. The aforesaid cam *f* is so timed that concurrently with the commencement of the rotational movement of the intermittently-

operating cylinder C, which controls the let-off of the roving, the connections between this cam and the strap *m* will be operated to bring the strap toward the larger end of the cone F, whereupon the rotational speed of the cone G, and consequently of the drawing-rolls, will be increased, this increased or accelerated speed being diminished at about the termination of the let-off of the roving, all to the end of imparting the greatest proportionate amount of draw to the roving relatively to the twist which it receives at the time the roving is being freshly delivered and when it is in a condition to be most rapidly elongated because of its then being in its least attenuated form, the maximum "drawing-twist" being imparted as necessary when the roving is in its most attenuated condition, when it is most needed, and when the drawing action is proportionately lessened very much.

It has been found in practice that improved and more successful results are attained in the employment of this machine by giving to the intermittent delivery of the roving the final portion of such delivery at a considerably greater speed than that of the initial delivery, and this final accelerated roving delivery at each of the intermittent deliveries is accomplished by having the pawl-carrying lever 28, which at 28[x] is pivoted on the side of the aforesaid continuously-rotating gear-wheel 27, rest by its arm 28[a] on the stationary cam *w*, which is fixed on the aforesaid sleeve-bearing. This cam has the rise w^2, Fig. 5, so located that as the pawl *g* in engagement in the ratchet-wheel 32 approaches the shield *h* (whereupon the pawl will be disengaged from the ratchet-wheel, the rotation of the latter then stopping) the pawl-lever has a swinging movement in addition to its movement of revolution on the gear-wheel 27 and in the direction of such revolution, whereupon the ratchet-wheel 32 at this particular stage is caused to move considerably faster than the wheel 27, increasing the speed of the train of gearing between the ratchet-wheel and the cylinder and increasing the speed of the let-off of the roving. The edge of the aforesaid cam at a certain distance in advance of the rise w^2 falls away or has the receding portion w^3, so that as the lever-arm 28[a] trails along on the cam the lever will have a retarding swing, it losing now instead of gaining relative to the speed of travel of its carrying gear-wheel 27, and it is to be specially noted that this retardation of the travel of the pawl occurs at the time when the pawl-lip g^2 passes clear of the shield *h*, allowing the pawl to reëngage the ratchet for the fresh delivery of roving, and the result thus acquired is that the positively-carried pawl in engaging the ratchet-wheel itself moves, and correspondingly moves the ratchet-wheel slowly at first and with a gradually-increasing speed until the prominent part w^2 of the cam has been passed by the trailing end of the pawl-carrying lever, thus obviating the tendency of the pawl to break out the teeth of the ratchet-wheel or otherwise break or strain the parts in train with the gearing, which in a highly-speeded machine of this class would ensue were the pawl to enter its engagement with the ratchet-wheel at its maximum speed. Thus the cam in combination with the pivoted pawl-carrying lever both accomplishes in a desirable way the variable intermittent delivery of the roving and eases the violence of the shock when the pawl takes into the ratchet.

It will be understood that by the provision of the cam *w* to coöperate with the pawl-carrying lever the quantity of the roving delivered at each draw need not be different from what would be delivered were the pawl pivotally mounted directly on the wheel 27 instead of on the lever 28, pivotally mounted on said wheel, for while it is seen that by reason of the peculiar grade of the cam the lever at the final portion of its driving of the ratchet-wheel has its speed faster than the carrying-wheel 27 its extent of driving movement of the let-off mechanism is no greater, and again because the initial driving motion of the pawl on the ratchet-wheel is retarded, it now moving slower than the carrying-wheel, its extent of movement before it reaches the shield *h* to be thrown off thereby is the same as if the pawl had a regular movement instead of first a retarded and finally a quickened movement.

The rovings which run from the twisters and drawing-rolls to the bobbins *p p*, being suitably guided to the latter by any of the well-known or appropriate guiding devices, pass over rollers *q q*, which are driven through means of the belt and pulley seen at *r*, applied in relation to the common shaft for each set of the rollers *q*. The purpose of these rollers *q q* is to avoid the tangling of any of the rovings should they become broken between the drawing-rolls and the bobbins, the ends of the rovings which may be severed from the course running to the bobbins being wound around the rollers *q*, the winding continuing until the attendant discovers the break and unites the roving being delivered from the drawing-rolls with the yarn which is on the bobbin.

I have provided in this machine what is regarded as an important improvement in the mode of driving the bobbins, as well also as a measure to simplify the machine as a whole, and this consists in providing directly upon the shaft L[2] of the bobbin-driving drum L the cone H, which is directly under or in operative proximity to the aforementioned cone F—that is, on the main shaft, interposing an endless driving-band *t* between the cones F and H and providing the usual driving-bands *u* between the drum L and the whirls of the bobbins. The driving-band *t* is embraced by a yoke or band-shifter t^2, which may be adjustably confined along the length of the rod t^3, Fig. 2, by reason of its being carried on the sliding collar t^4, which has the set-screw t^5. By changing the position of the band *t*

longitudinally relative to the cone H, preparatory to running upon any given class of spinning, the proper speed of the bobbins which impart the final yarn-twist to the drawn roving may be acquired.

It has become apparent hereinabove that the grade of the cam *f* and throw of the lever 65, operated thereby, regulate the degree and extent of continuity of the accelerated speeding of the drawing-rolls, and that it is according to the changes which may be made in the gearing between gear 33 and the cylinder C or rotary controller for the roving by the interchange or substitution and adjustment of gearing that the speed and quantity of the roving to be delivered are nicely governed, it being understood that the period or time in which the roving is delivered at each complete operation of the machine being regulated by the pawl-shield *h*. In a woolen-mill where it is demanded that many sizes, grades, and qualities of yarn be spun on the machine it becomes of the utmost importance that the machine may be easily and quickly rendered adapted to the class of work in hand, and hence the importance of providing mechanism capable of meeting the changed conditions will be recognized. For a change of work it will be often necessary to change the cam *f* and substitute larger or smaller gears for those 35 39, one or both, correspondingly changing the adjustable positions of the adjustable gears 34 40.

The variable cams and sizes of interchangeable gears are determined by experiment and observation in the running of the machine on different yarns.

In order that the roving may not wear grooves in the drawing-rolls *d d*, I have mounted the rails b^5 for the twisters to move longitudinally in the end slides b^6 therefor, and the slight longitudinal reciprocatory movements of the rails are imparted through the provision of the shaft T, worm-gearing at b^7, whereby said shaft T derives slow rotary motion from the upright shaft 23, the face-plates b^8 on the ends of the shaft T with eccentric-pins b^9 and the connecting-rods b^{10} between and secured to said eccentric-pins and the twister-supporting rails. Thus the twisters cause the roving to emerge therefrom to the drawing-rolls at constantly-varying places on the peripheries of the latter.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a spinning-machine, in combination, the cylinder C, for controlling the let-off of the roving, having a gear B^3, connected thereto, the shafts *i* and *j*, with feed-rolls thereon, the angular shaft 36 bevel-geared to said shafts *i* and *j*, an interchangeable gear 35, on shaft *i*, the gear 33 and means for imparting intermittently thereto rotational movements, and the adjustable intermediate gear 34; and the interchangeable gear 39, on shaft *j*, and the adjustable intermediate gear between it and the said cylinder-gear B^3, substantially as described.

2. In a spinning-machine, in combination, the cylinder having upon the shaft thereof the fixed gear-wheel B^3, the loose gear-wheel 27, carrying the pawl, and the gear-wheel 33, having a toothed wheel 32 rotatable in unison therewith, and independently of the cylinder-shaft, the guard *h*, means for imparting a continuous rotation to the wheel 27, and gearing between the said wheel 33 and the cylinder-shaft gear-wheel B^3, substantially as described.

3. In a spinning-machine, in combination, the cylinder for controlling the let-off of the roving and its shaft having the gear B^3 fixed thereon, and the journal-bearings in which said shaft is mounted, one of which comprises the elongated hub *a*, the gear-wheel, 27, loosely mounted on said hub and carrying the pawl *g*, the combined gear-wheel 33, and ratchet-wheel 32, also loosely mounted on said hub, the shield *h*, arranged adjacent the toothed edge of the ratchet-wheel with which the pawl contacts, means for rotating the gear-wheel 27, and gear-wheel connections between the said wheel 33, and the cylinder-shaft gear B^3, substantially as described.

4. In a let-off mechanism in a spinning-machine, in combination, a cylinder for controlling the let-off of the roving, feed-rolls for delivering the let-off roving, a wheel having a continuous rotary movement, and mechanism for imparting from the rotations of said wheel intermittent rotational movements to the feed-rolls, the same comprising interchangeable gearing, a driving connection between the feed-rolls and the cylinder also comprising interchangeable gearing, and interchangeable driving mechanism for imparting faster or slower continuous rotary movement to the aforesaid wheel, substantially as described.

5. In a spinning-machine, the combination with a device for controlling the delivery of the roving and means for intermittently operating said let-off-controlling device which imparts, in the let-off, a final accelerated speed, of a rotary twister and rotary drawing-rolls, and means for accelerating the rotation of the drawing-rolls during the time of the let-off, substantially as described.

6. In a spinning-machine of the character described, the combination with the let-off cylinder, the ratchet-wheel and its shield *h*, of a wheel carrying a pivotally-mounted lever having the pawl thereon, and the cam on which an arm of the lever trails, formed to impart a swinging movement to the lever whereby the pawl may gain on the speed of the wheel with which it revolves for imparting a final accelerated movement to the rotation of the let-off cylinder, substantially as described.

7. In a spinning-machine of the character described, the combination with the let-off cylinder and the ratchet-wheel in driving connection therewith, of a continuously-rotating

wheel having a pawl movably mounted thereon, the pawl-shield and the cam for imparting to the pawl a retarding movement relative to the travel of the wheel on which it is mounted at about the time said pawl passes free from the shield, substantially as described.

8. In a spinning-machine of the character described, in combination, a cone F, and driving means therefor, a cone G, a band for driving cone G from cone F, means for automatically and periodically shifting said band along and between the cones, a worm *n* on said cone G, a shaft J having a worm-wheel in mesh with said worm, and a shaft d^2, having a plurality of drawing-rolls thereon, which is geared to said shaft J, substantially as described.

9. In a spinning-machine, in combination, the cones F and G, a band for driving said cone G from said cone F, a drawing-roll and driving connections between the cone and said drawing-roll, the cam *f*, and the lever actuated by the cam, the pulley 74, a flexible connection secured to the lever and having a winding engagement with a part of said pulley, the weighted flexible connection 75, also having a winding engagement with the pulley and having a connection with the said band, substantially as described.

10. In a spinning-machine, in combination, an intermittently-operating let-off mechanism and the continuously-rotating cam *f*, the rock-shaft 67, having the levers 65 and 69, the pulley 74, the flexible winding connections 72 and 75, the driving-cone F, the cone G and the friction-band *m*, which is engaged by the flexible connection 75, substantially as described.

11. In a spinning-machine, in combination, an intermittently-operating let-off mechanism, and drawing-rolls, and a continuously-rotating cam, a lever having imparted thereto a swinging movement by said cam, a cone having a driving connection with the drawing-rolls, a shiftable band for driving the cone, and a connection having an engagement with the driving-band and adjustably connected to be moved along the length of the cam-actuated lever, substantially as described.

12. A twisting-head for spinning and analogous machines consisting of a revoluble tubular body having a fixed, longitudinally-extending yarn-gripping finger thereon, combined with a second similar finger pivoted on said head, the lower end of which swings opposite, and against the side of said fixed finger, and a weighted extension on the upper end of said pivoted finger above the fulcrum thereof, substantially as set forth.

13. A twisting-head for spinning and analogous machines, consisting of a revoluble tubular body having a fixed longitudinally-extending yarn-gripping finger thereon, combined with a second similar finger pivoted on said head, the lower end of which swings opposite and against the side of said fixed finger, an arm on said pivoted finger extending above the fulcrum thereof, and a weight adjustably secured on said arm, substantially as set forth.

14. A twisting-head for spinning and analogous machines consisting of a revoluble tubular body having a fixed longitudinally-extending yarn-gripping finger 6, and the studs 7 7 thereon, and having a concavity, J, thereon adjoining said studs, combined with a second yarn-gripping finger 8, pivoted between said studs, the lower end of which swings opposite, and against said fixed finger, and a weighted extension on the upper end of said pivoted lever above the fulcrum thereof, and opposite said concavity, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 16th day of November, 1896.

EDMUND K. BAKER.

Witnesses:
WM. S. BELLOWS,
MABEL A. CAMPBELL.