No. 711,756. Patented Oct. 21, 1902.

F. A. BREEZE.

SPINNING FRAME.

(Application filed Nov. 7, 1900.)

(No Model.) 4 Sheets—Sheet 1.

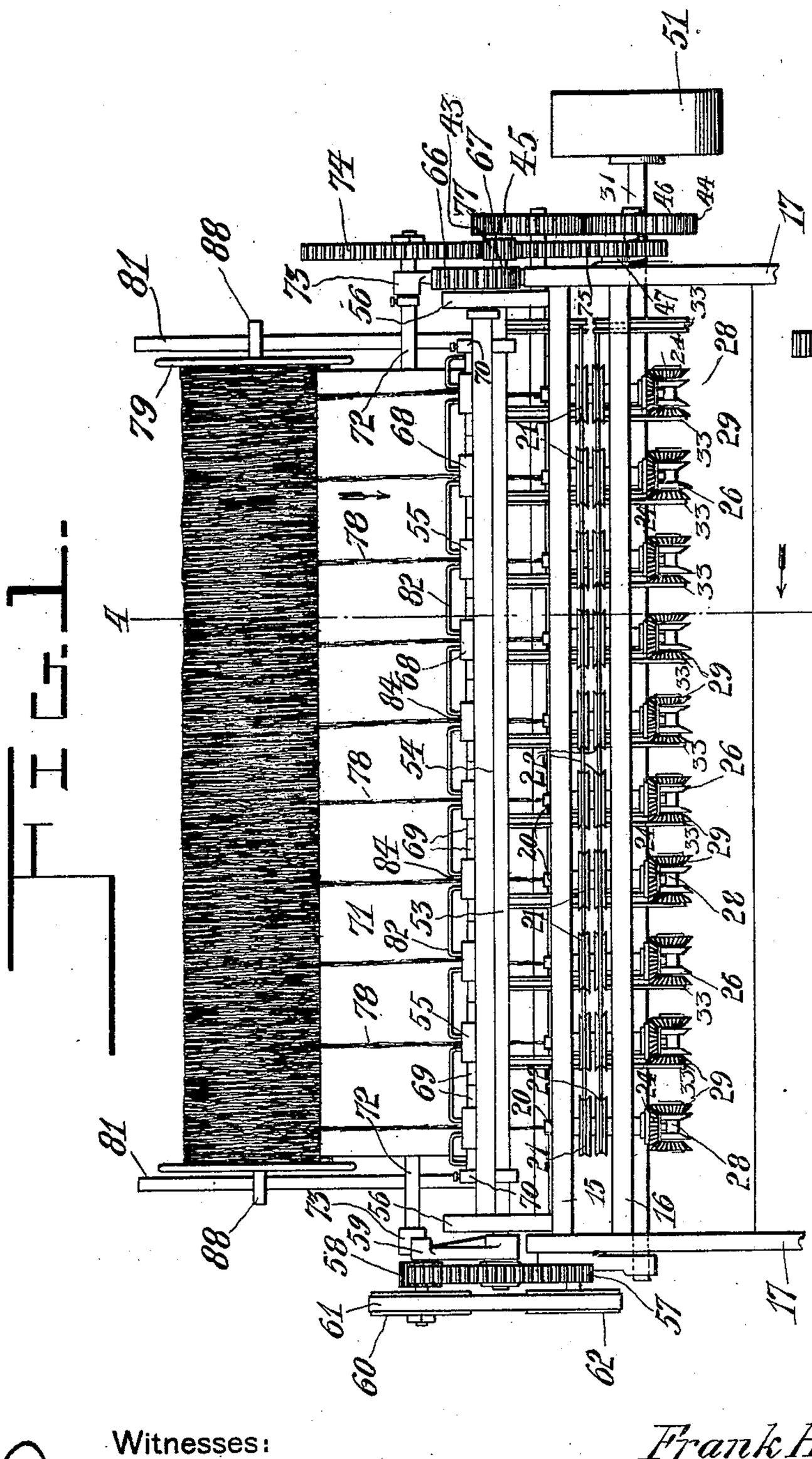

FIG. 1.

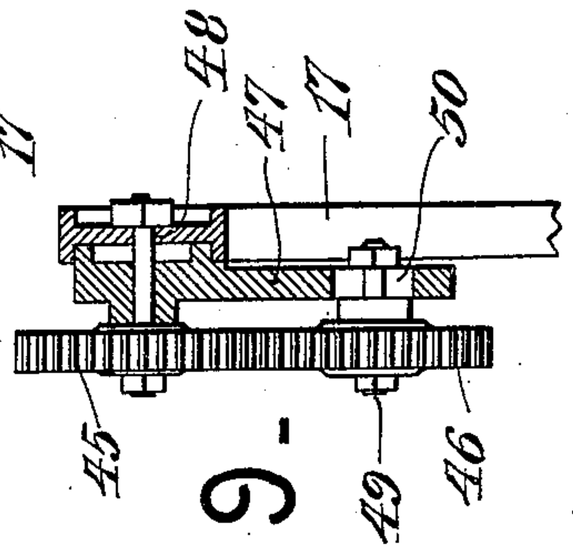

FIG. 9.

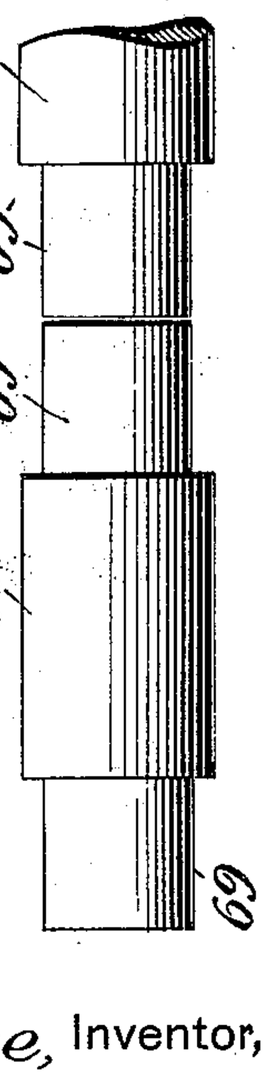

FIG. 8.

Witnesses:
John F. Dufferwiel
J. Ed. Page

Frank A. Breeze, Inventor,
By Marion & Marion
Attorneys

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(No Model.) 4 Sheets—Sheet 2.

FIG. 3.

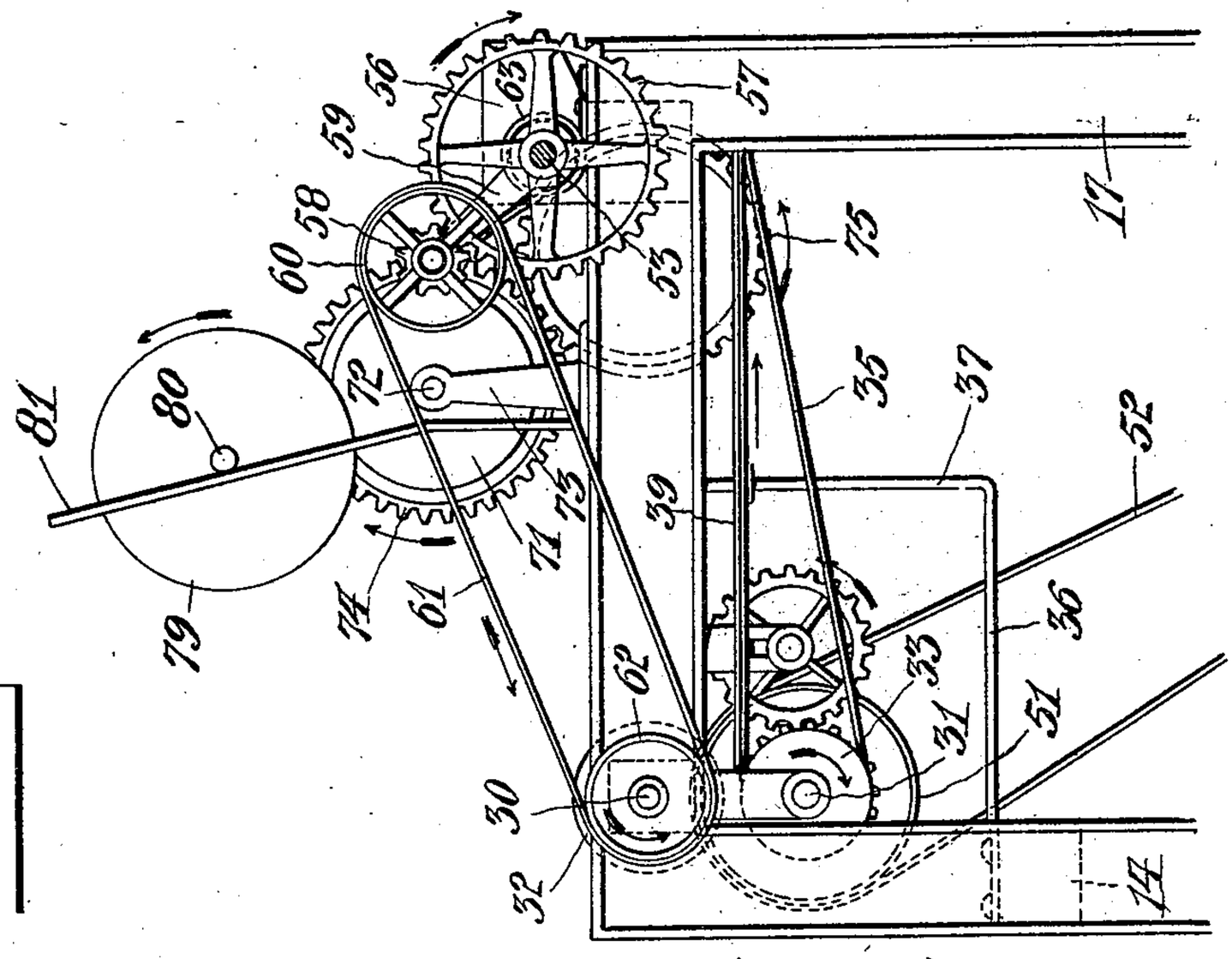
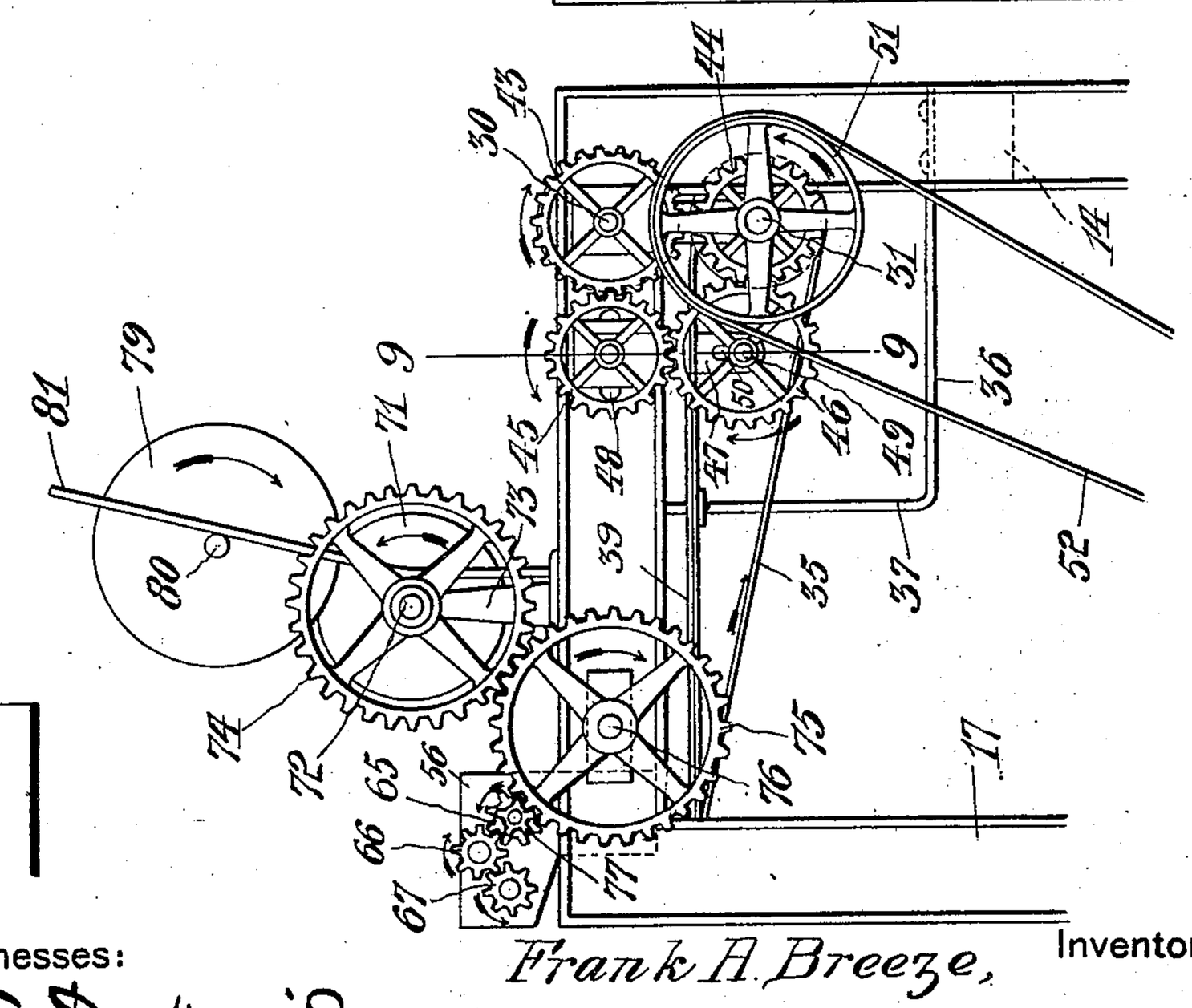


FIG. 2.



Witnesses:
John T. Dewterwild
J. Ed. Page

Inventor,
Frank A. Breeze,
By Marion & Marion
Attorneys

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F. A. BREEZE.

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(No Model.) 4 Sheets—Sheet 3.

FIG. 6.

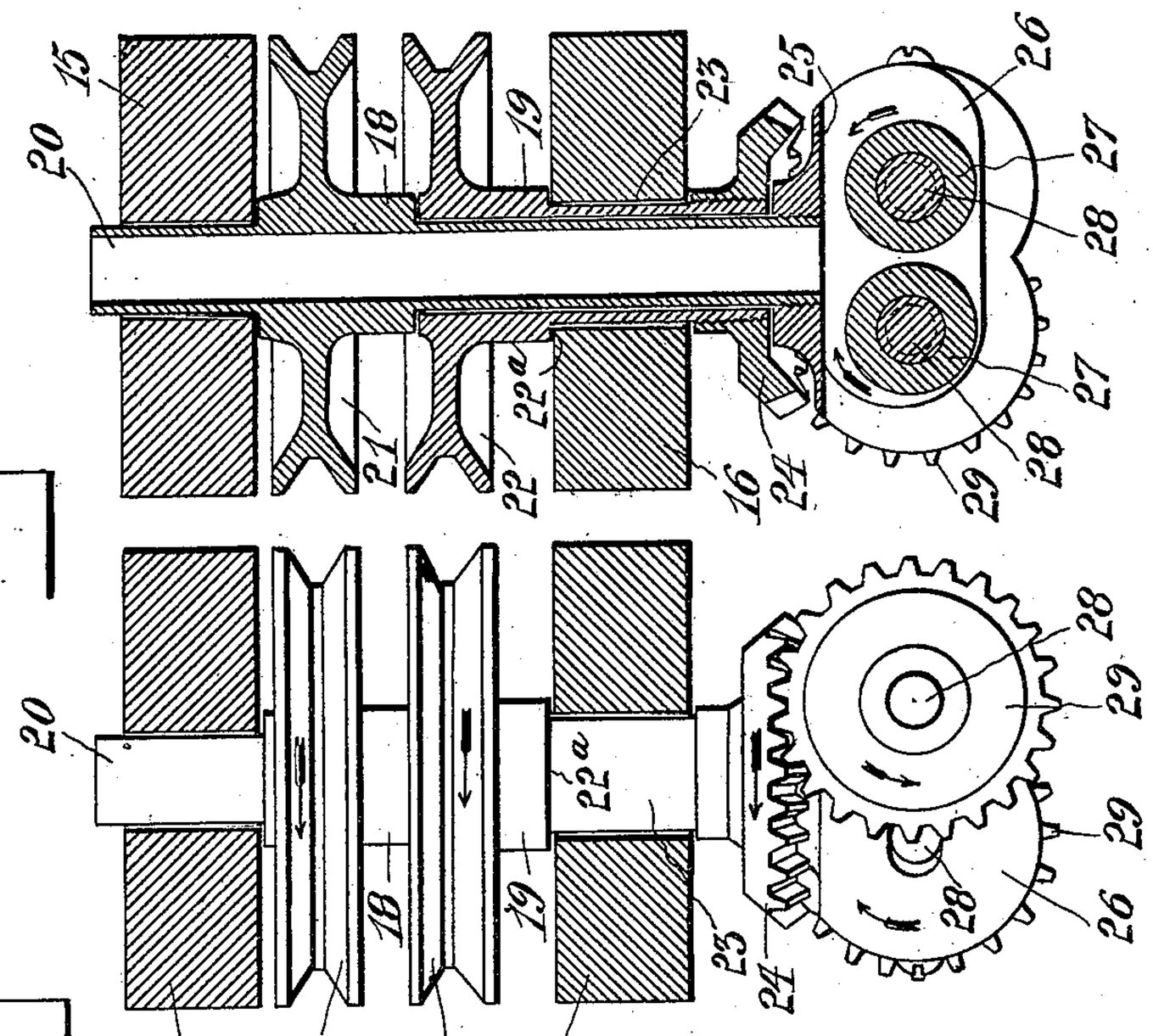
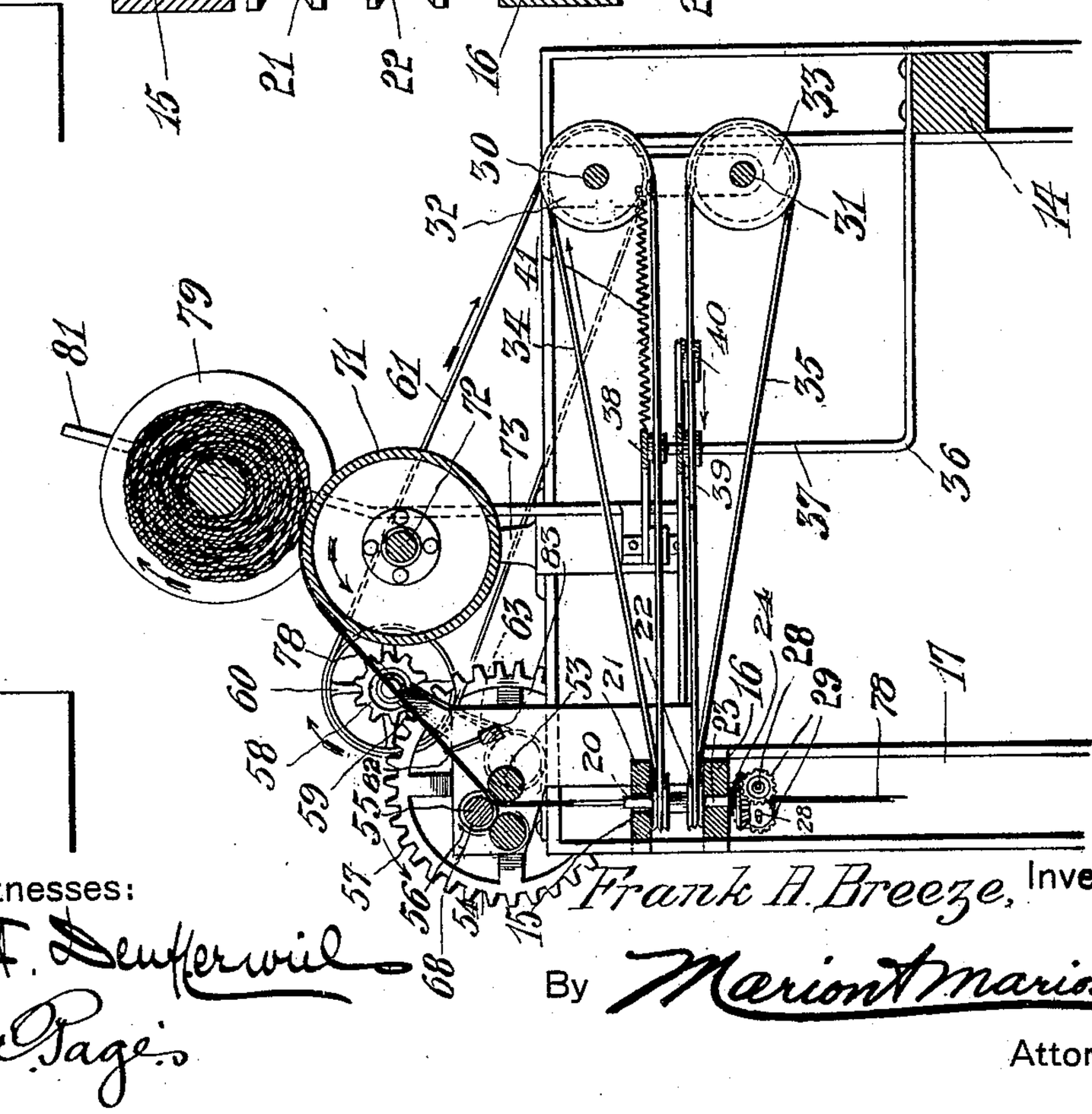


FIG. 4.



Witnesses:

John F. Dewkerwil

J. Lea Page.

Frank A. Breeze, Inventor,

By Marion & Marion

Attorneys

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F. A. BREEZE.

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(Application filed Nov. 7, 1900.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 5.

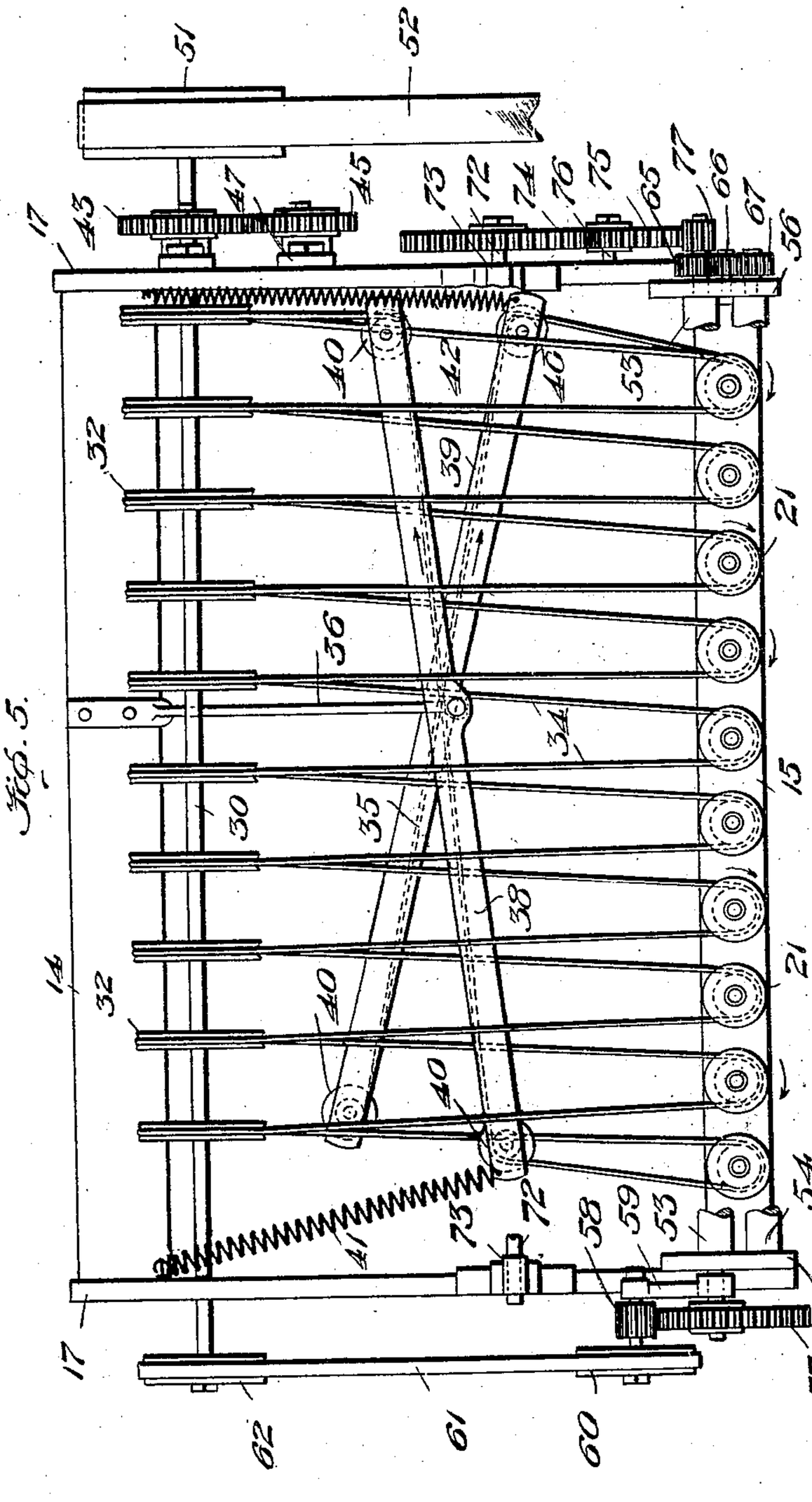


Fig. 10.

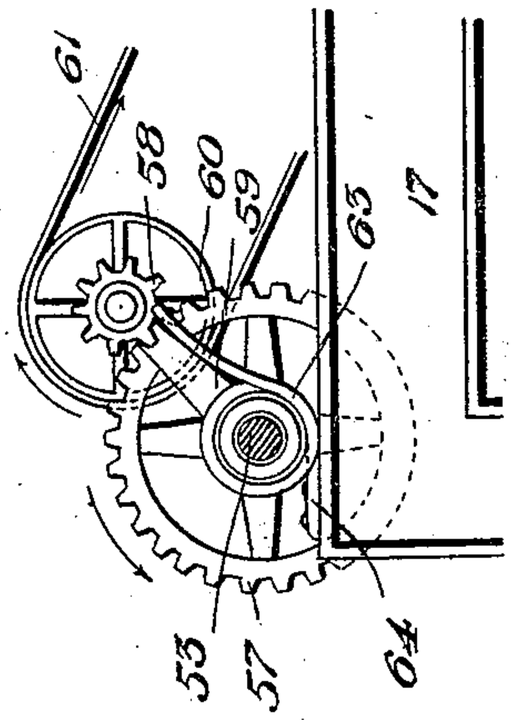
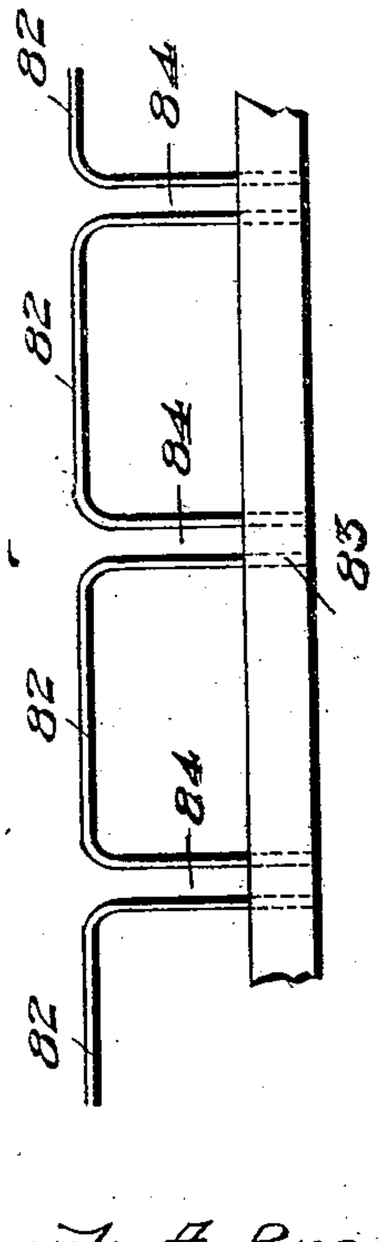


Fig. 11.



Witnesses.
[illegible]
Fenton S. Bell

Frank A. Breeze
Inventor.
By Marion & Marion
Atty's.

UNITED STATES PATENT OFFICE.

FRANK ALEXANDER BREEZE, OF FOREST MILLS, CANADA, ASSIGNOR OF ONE-HALF TO JAMES WILSON, OF RICHMOND, ONTARIO, CANADA.

SPINNING-FRAME.

SPECIFICATION forming part of Letters Patent No. 711,756, dated October 21, 1902.

Application filed November 7, 1900. Serial No. 35,777. (No model.)

To all whom it may concern:

Be it known that I, FRANK ALEXANDER BREEZE, a subject of Her Majesty the Queen of Great Britain, residing at Forest Mills, in the county of Lennox, Province of Ontario, Canada, have invented certain new and useful Improvements in Spinning-Frames; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in spinning-frames, by which I aim to simplify the construction of ordinary frames by dispensing with certain mechanisms and at the same time to produce a mechanism by which the spinning operation may be carried on continuously, and my present improvements are directed especially to the mechanism adapted to drive the spinning-heads, so as to draw out and twist the sliver or roving simultaneously.

The mechanism which forms the subject of the present application is directed especially to a combination with the special form of concentric drawing and twisting head which has been described and claimed by me in a divisional application, Serial No. 88,479, filed January 6, 1902, although it will be understood that my improvements are also applicable to other forms of twisting-heads.

My invention contemplates the provision of novel means by which the two concentric rotary members of each of a series of spinning-heads may be driven at differential rates of speed by means of two continuous belts, each of which operates one set of the concentric parts, together with means for varying the relative speed of the belts as may be found necessary.

My invention also contemplates the provision of a set of drawing-rolls between the spinning-heads and the sliver-spool, which set of rolls include a removable member adapted to frictionally engage with positively-driven members, so as to be rotated thereby, said removable roll member being held against endwise displacement by engagement with suitable collars, and said roll member being, furthermore, divided into a number of sections of corresponding size, which form the active surfaces adapted to engage and feed the slivers running from the sliver-spool to the series of spinning-heads.

Further objects and advantages of the invention will appear in the course of the subjoined description.

In the drawings forming a part of this specification, Figure 1 is a front elevation of the upper portion of a spinning-frame arranged according to my invention. Fig. 2 is an end elevation thereof looking from the right. Fig. 3 is an end elevation thereof looking from the left. Fig. 4 is a transverse front-to-rear section thereof, taken on the line 4 4 of Fig. 1. Fig. 5 is a plan view of the same. Fig. 6 is a side elevation of my improved drawing and twisting head which forms the subject of my said divisional application, the journal-rails being shown in cross-section. Fig. 7 is a central longitudinal section through the twisting-head. Fig. 8 is a fragmentary side elevation of a portion of the compound drawing-roll. Fig. 9 is a vertical section of a portion of the machine, taken on the line 9 9 of Fig. 2. Figs. 10 and 11 are fragmentary views of details to be hereinafter explained.

The same numerals of reference denote like parts in each of the several figures of the drawings.

The lower portion of the spinning-frame is not herein shown, because it may be of any ordinary or approved type, and it does not embrace parts relating to the mechanism claimed herein.

The frame of the spinning-frame herein shown comprises a pair of end frame-pieces 17, which are joined together at the front by a pair of journal-rails 15 and 16 and at the back by a transverse beam 14. The two journal-rails 15 and 16 are parallel at the upper front side of the machine, and they carry mounted therein twisting-heads, which are shown on an enlarged scale in Figs. 8 and 9. As these twisting-heads have been fully explained in my former application hereinabove referred to, they need not be here described at length; but a brief description of them will be here given sufficient to enable their general mode of operation to be understood. Each twisting-head consists of two

concentric members 18 and 19, which are both tubular, and the latter is disposed around the former. The inner tubular member 18 has a bearing extension 20, which is journaled in the upper journal-rail 15, and it passes through the bearing-aperture in the lower journal-rail and has between the two rails at a point adjacent to the upper rail a pulley-sheave 21. The tubular member 19 is journaled on the reduced lower end of the member 18, as shown, and has a pulley-sheave 22, mounted on its upper end, and a shoulder 22^a, which rests on the lower rail, and a reduced portion 23, which passes through and has a bearing in the aperture of the rail. On the lower end of this outer member is secured the skew-gear 24, and, as shown, the inner member 18 extends a short distance below the gear 24 and has screwed thereon the flanged footpiece 25. This footpiece has a pair of oppositely-disposed flanges 26, in which are mounted two drawing and twisting rolls 27, whose point of tangency is directly beneath the center of the tube of the twisting-head. These two drawing-rolls are mounted on shafts 28, and each shaft extends through one of the two flanges 26 and has mounted on its outer side a skew-pinion 29, which meshes with the gear 24. It will be observed that the two pinions 29 are diametrically opposite to one another, so that a rotation of one of the concentric members with respect to the other causes an equal and opposite rotation of the two drawing-rolls, and at the proper relative rotation the drawing-rolls are caused to draw the sliver through the inner tube of the twisting-head, and at the same time the rotation of the twisting-head gives the sliver the required twist. With this understanding I will now pass to the mechanism by which the two pulley-sheaves 21 and 22, belonging to the respective members of the twisting-head, are given a high velocity of rotation with respect to the stationary parts and at the same time a proper differential rotation with respect to each other. The primary mechanism by which this is accomplished consists of two parallel transverse shafts 30 and 31 at the rear of the frame, each of which carries a series of large pulley-sheaves 32 and 33, keyed thereto, these pulley-sheaves being of course the same in number as that of the twisting-heads and being spaced at equal distances upon the two shafts and directly beneath one another. Around the upper set of pulley-sheaves 32 and the pulley-sheaves 21 on the inner concentric member 18 passes a single continuous belt or cord 34, whose ends, passing around the last pulley-sheave 21 on the left and the first pulley-sheave 32 on the right, are brought together by the means which will be presently described. Similarly the lower set of pulley-sheaves 33 and the sheaves 22 on the outer concentric member 19 are likewise joined by a single continuous belt or cord 35, which is in like manner passed alternately around the successive sheaves 33 and 22 and the diagonally opposite ends brought together in a manner to be presently described. For this latter purpose I mount on the rear beam 14 a bracket-arm 36, which extends inwardly to a point approximately opposite the center of the space between the shafts 30 and 31 and the twisting-heads and has an upright portion 37 rising therefrom, on whose upper end are pivotally mounted a pair of swinging tightener-bars 38 and 39, which are adapted to have an oscillation in horizontal planes opposite the sheaves 21 and 22, respectively. Each tightener-bar has journaled at each end a pulley 40, and the two belts 34 and 35 are passed on opposite sides of the two pulleys carried by the respective tightener-bars in the manner shown in the plan view, Fig. 5, so that by twisting the bars around their pivots the slack in the belts is taken up. In order to keep the belts continuously taut, I attach a pair of tension-springs 41 42 to opposite ends of the respective bars—that is to say, the spring 41, as shown, connects the left-hand end of the bar 38 with the rear of the frame, and the spring 42 similarly connects the right-hand end of the bar 39 to the rear of the frame. It will be seen that this arrangement serves to keep all the pulleys in each set running at the same rate of speed.

As it is essential that the differential speeds between the two pulleys 21 and 22 should be constant, the two shafts 30 and 31 are geared together at a fixed relative speed by the mechanism shown best in Fig. 2. As it is often desirable to change the amount of twist in the sliver, and therefore to change the relative speed of the two shafts 30 and 31, I provide a variable-speed gearing, which comprises the four gears 43, 44, 45, and 46. The relative rate of speed between the two shafts is regulated by the proportionate size of the two gears 43 and 44, which are mounted on the ends of the shafts 30 and 31, respectively, while the other gears 45 and 46 are merely idle gears, and the object of having two of these gears is to cause the two shafts 30 and 31 to turn in opposite directions. The gears 45 and 46 are mounted on an adjustable journal-bar 47, which is mounted to have a certain amount of reciprocation horizontally in the slot 48, formed in the end piece 17 of the frame, to which the journal-bar 47 is arranged to be clamped. The journal-bar has, therefore, a sidewise adjustment toward and from the gears 43 and 44, and the lower gear-wheel 46 has also a vertical adjustment by reason of the stub-shaft 49, on which it is mounted, being clamped in a short vertical slot 50 of the journal-bar. The idle gears 45 and 46 mesh together and with the gears 43 and 44, respectively; but these latter do not, of course, mesh together. It will thus be seen that, having fixed the proper-sized gears on the two shafts and journal-bar, by rotating one of the

shafts at a given speed the other shaft is also caused to rotate at a predetermined relative speed.

Any suitable means may be taken to rotate the shafts driving the twisting-heads, that herein shown being in the form of a belt-pulley 51, which is mounted on the projecting end of the lower shaft 31 and is adapted to be driven by a belt 52 from any suitable source of power—as, for instance, the main shaft of the spinning-frame.

I will now describe the parts mounted above the twisting-heads, by which the sliver is partially drawn out and delivered to the heads. Mounted directly over the heads is a set of three drawing-rolls 53, 54, and 55, the first two of which are positively driven from the shaft 30, while the third is driven frictionally by rolling upon and between the other two. The rolls 53 and 54 are both of cylindrical form and separated from one another by an intermediate space, and they are journaled in the respective end pieces 17 of the frame, or rather in vertically-extending bearing-plates 56, as shown. The first roll 53 has on its left-hand end, as shown in Figs. 1 and 5, a gear 57, with which meshes a gear-pinion 58, carried on the end of a rocker-arm 59, loosely journaled on the shaft of the roll 53 between the gear 57 and the frame, as illustrated best in Fig. 10. The pinion 58 has fixed thereto and rotating therewith a pulley 60, which serves to keep it operatively engaged by means of a belt 61 with a pulley 62, mounted on the left-hand end of the shaft 30. It will be seen that by the intermediary of these connections the shaft of the roll 53 is driven from the shaft 30. In order, however, to support the pulley 60 and keep the belt 61 tight, I provide a strong torsion-spring 63, which is coiled around the shaft of the roll 53 and presses upwardly against the under side of the rocker-arm 59, and at its other end is fixed to the frame-piece 17, as shown at 64. The roll 53 thus driven serves in turn to drive the other rolls of the series by means of gear-wheels 65, 66, and 67, the first and last of which are mounted, respectively, on the two rolls 53 and 54, while the intermediate gear-wheel 66 is an idle gear serving merely to connect these two and cause them to be driven in the same direction. Between the two rolls 53 and 54 rests the roll 55, as shown, and it is frictionally rotated thereby. This roll 55 is of a compound nature, being made up of a series of roll-blocks 68, which have enlarged peripheries opposite the upper ends of the twisting-heads and reduced ends 69, which serve for end-thrust pieces to abut against each other and keep the rolls from being displaced endwise, and the roll-blocks 68 are prevented from displacement by a pair of collars 70, which are clamped or keyed or otherwise secured to the roll 53 at the ends thereof.

Besides the drawing-roll mechanism just described the roll 53 also serves to drive the feed mechanism, which comprises a drum 71, mounted above and to the rear of the drawing-rolls on a shaft 72, which is journaled in the frame of the machine or in upstanding bearing-brackets 73 thereof, and the right-hand end of the shaft 72 is extended beyond the bearing 73 and has mounted thereon a large gear 74, which meshes with an idle gear 75, journaled on a stub-shaft 76, adjustably fitted in the frame, and this last is driven from a small pinion 77, carried on the roll 53 beyond the gear 65. It will be seen that while the two feed-rolls 53 and 55 are driven in a direction to advance the sliver 78 downwardly between them the feed-drum 71 will be driven in the same direction by means of the intermediate gearing 75 and 74. On this feed-drum rests the sliver-spool 79, which has as many slivers wound thereon as there are twisting-heads in the spinning-frame, and this spool has at its ends a pair of gudgeons 80, which rest against a pair of sloping bars 81, serving for supports in order to permit the spool to rest as nearly as possible over the center of the feed-drum 71. The friction between the feed-drum and the sliver-spool causes the sliver to be frictionlessly unwound without any tension thereon and at the same rate at which it is passed through the drawing-rolls 53 and 55.

In order to guide the slivers in their proper positions between the two feed-rolls and prevent them from chafing against the upper edges of the twisting-heads, I provide, further, a series of staple-shaped finger-bars 82, which are fixed in a horizontal beam 83, extending across between the two end pieces 17 of the frame, and these finger-bars 82, as shown in Figs. 1 and 4, are arranged to extend across the path of the slivers just above and to the rear of the drawing-rolls 53 and 55. The finger-bars 82 have their ends driven into the beam 83 at a short distance from each other, so as to leave a series of slots 84, which are each sufficiently wide to allow a sliver to pass easily through the same and located directly in line with the twisting-heads, and it is by these finger-bars that the sliver is guided laterally into its proper place, while at the same time it is enabled to be easily inserted into and withdrawn therefrom in case it is necessary to join a broken sliver or for other purposes.

In the operation of the machine a spool 79, containing slivers to be drawn, is laid in place upon the feed-drum 71, and the sliver ends are passed successively between the finger-bars 82, between the drawing-rolls 53 and 54, and subsequently through the tubular twisting-heads and between the drawing-rolls 28 thereof. When the machine is set in motion, the rotation of the rolls 28 on their axes being faster than that of the upper rolls 53 and 55, the sliver is drawn out into a roving or the roving to a yarn, as the case may be, being at the same time twisted to the proper extent, and from the rolls 28 the roving or yarn passes to any suitable bobbin and cop-building mech-

anism or such other mechanisms as may be found desirable. During the drawing process it will be observed that the loose frictional mounting of the rolls 55 enables them to give individually and rise sufficiently when a knot or other enlargement in the sliver or roving is encountered without breaking the sliver or roving, and similar mechanism has been described in connection with the other set of drawing-rolls in my divisional application heretofore referred to. At the same time the weight of the individual roll-blocks is sufficient when conjoined with the wedging action by which they are supported between the two rolls 53 and 54 to hold the sliver or roving against the pull exerted by the rolls of the twisting-head.

Changes within the scope of the appended claims may be made in the form and proportion of some of the parts, while their essential features are retained and the spirit of the invention is embodied. Hence I do not desire to be limited to the precise form of all the parts as shown, reserving the right to vary therefrom.

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

1. In a spinning-head, the combination of a series of drawing and twisting heads each having independently-revoluble concentric elements provided with pulleys and carrying a set of coöperative rolls, of the independent head-driving shafts each having a series of pulleys, means for rotating said shafts, two endless driving-bands each connected operatively with the series of pulleys on one of said shafts and with a series of pulleys on corresponding elements of the series of heads, a fixed supporting-arm, tightener-bars mounted separately on said supporting-arm and arranged in the horizontal planes of the driving-bands and each bar equipped at its end portions with pulleys having operative engagement with one of the driving-bands, and means for impelling each tightener-bar in a contrary direction to that in which it is forced by frictional engagement of the driving-band therewith, substantially as described.

2. In a spinning-frame, the combination of a series of individually-mounted twisting and drawing heads each having concentric members and a set of coacting rolls, independent head-driving shafts each having operative connection with corresponding members of the series of said heads, means for driving one of said shafts, gears of different sizes secured to said shafts and separate one from the other, a hanger mounted adjacent to said gears on the shafts, and intermeshing idler-gears mounted on the hanger and having intermeshing engagement with the respective gears on said shafts, substantially as described.

3. In a spinning-frame, the combination of a series of individually-mounted twisting and drawing heads each having concentric members and a set of coacting rolls, independent head-driving shafts each having operative connection with corresponding members of said series of heads, means for driving one of said shafts, gears secured to said shafts and independent of one another, a hanger adjustably mounted with relation to the gears, another gear mounted on the hanger for adjustment therewith and meshing with a gear on one of said shafts, and another gear adjustably mounted on the adjustable hanger and having engagement with the gear on the other shaft and with the gear on the hanger, said gears on the hanger adapted to be dismounted individually and interchanged with other gears of different sizes, substantially as described.

4. In a spinning-frame, the combination with a series of spinning-heads and a sliver-spool, of a set of drawing-rolls arranged in an intermediate position between the spinning-heads and said sliver-spool and comprising three rolls, means for positively rotating one of said rolls, gear connections from the positively-driven roll to another roll of said set of drawing-rolls for rotating the said last-mentioned roll in the same direction as the positively-driven roll, a third roll consisting of individual separate members each having reduced portions disposed in abutting relation and said members of the third roll resting upon and driven frictionally by the two rolls which rotate in one and the same direction, and means for restraining the divided third roll from endwise displacement with respect to said pair of driven rolls, substantially as described.

5. In a spinning-frame, the combination with a series of spinning-heads, of a set of drawing-rolls having two of the rolls thereof connected by a train of intermediate gears to rotate in corresponding directions, and a transversely-divided third roll having its members formed with reduced ends which are in abutting relation and form the intervening grooves, said third roll having its members engaged with the pair of driven rolls and removable individually therefrom, and means on one of the driven rolls engaging with end members of the third divided roll to hold the members of said divided roll against endwise displacement, substantially as described.

6. In a spinning-frame, the combination with a series of spinning-heads, of a set of drawing-rolls including two driven rolls intergeared by a train of gears to rotate in the same direction, and a third roll divided into a series of members having the reduced end portions disposed in abutting relation and forming a series of annular grooves, said members of the third roll engaging with and rotating frictionally by the intergeared rolls, a series of guide-fingers arranged to form a series of sliver-spaces which lie opposite to the enlarged portions of said third roll, and a sup-

porting-bar mounted in rear of the rolls and having the guide-fingers attached thereto, substantially as described.

7. In a spinning-frame, the combination with a series of spinning-heads, of a set of drawing-rolls two of which are connected by a train of intermediate gears to rotate in one direction, a pair of collars fixed to one of said driven rolls near the ends thereof, and the third roll of said set being divided transversely into a series of members which are held against endwise displacement between said collars and are removable at will from frictional engagement with the driven roll, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

FRANK ALEXANDER BREEZE.

Witnesses:
JAS. T. WILSON,
JOHN ENGLISH.