G. S. HARRIS.

BUILDER MOTION.

APPLICATION FILED FEB. 13, 1909.

1,167,167.

Patented Jan. 4, 1916.

3 SHEETS—SHEET 1.

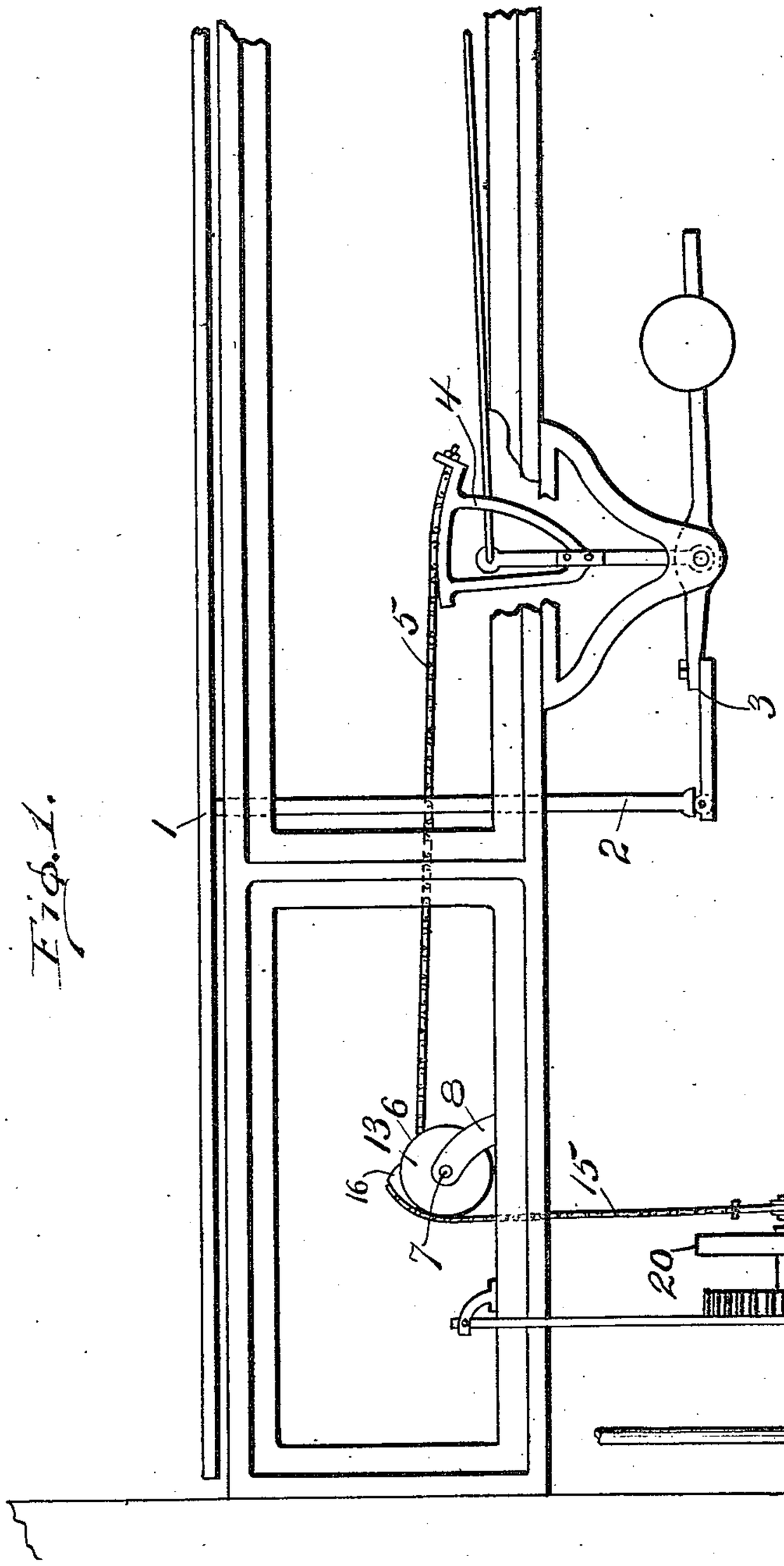

Fig. 1.

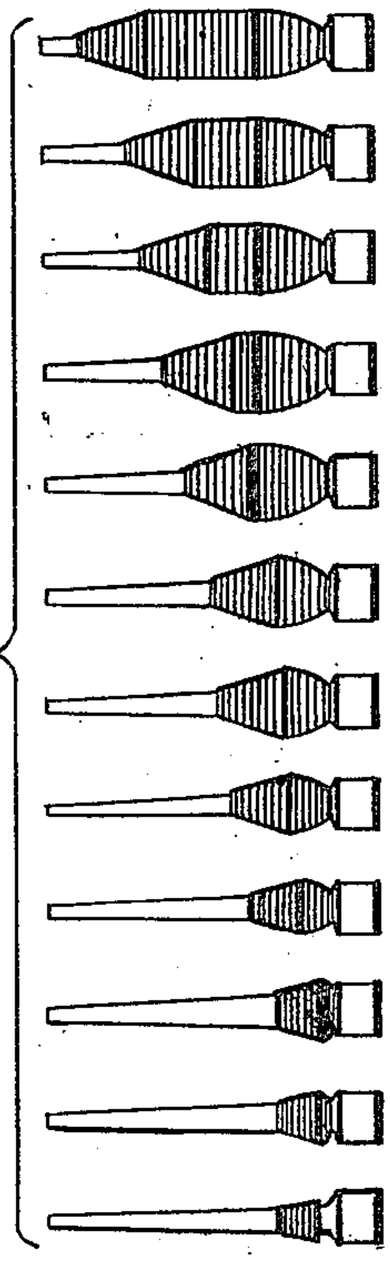

Fig. 9.

Witnesses

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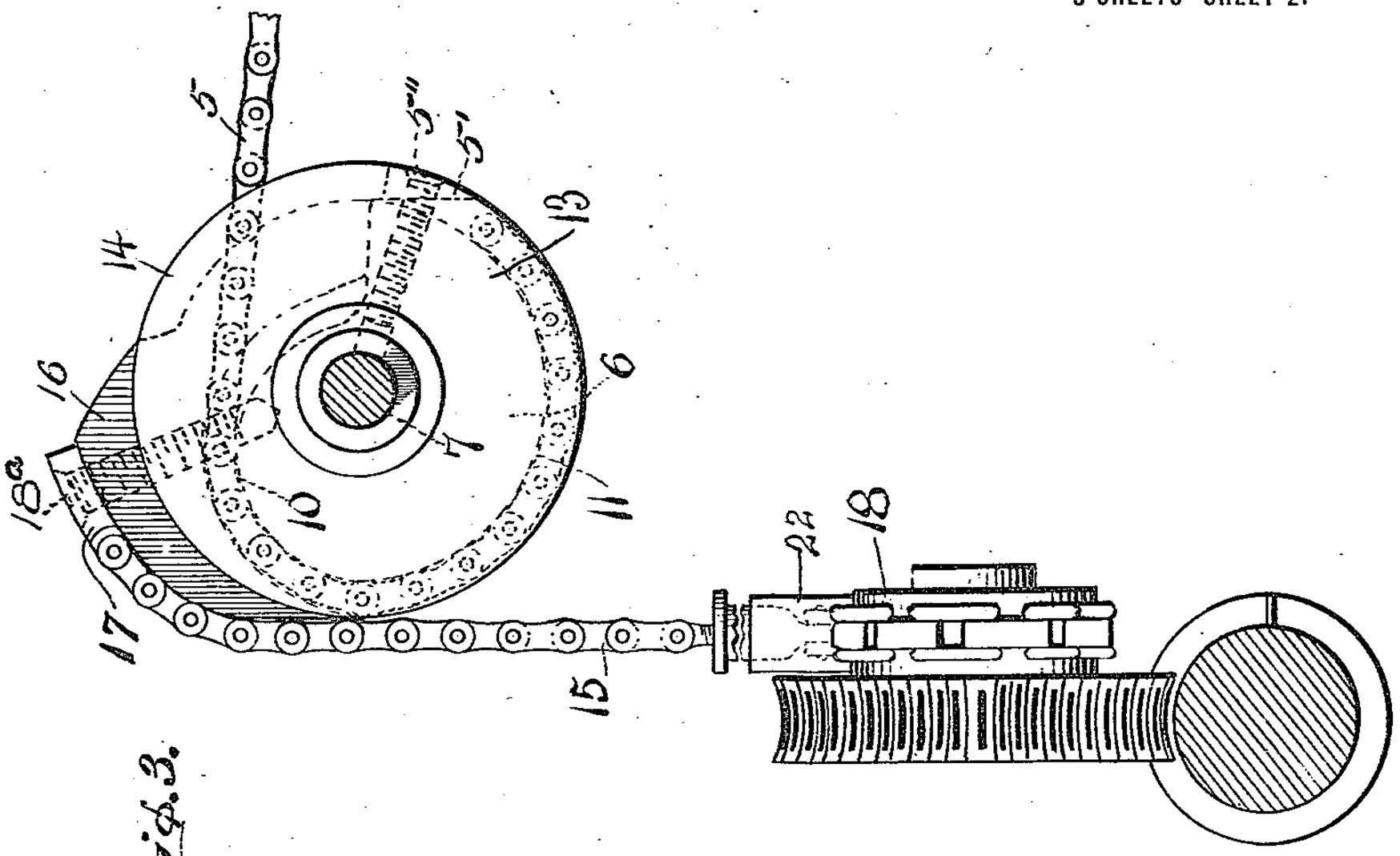

Fig. 3.

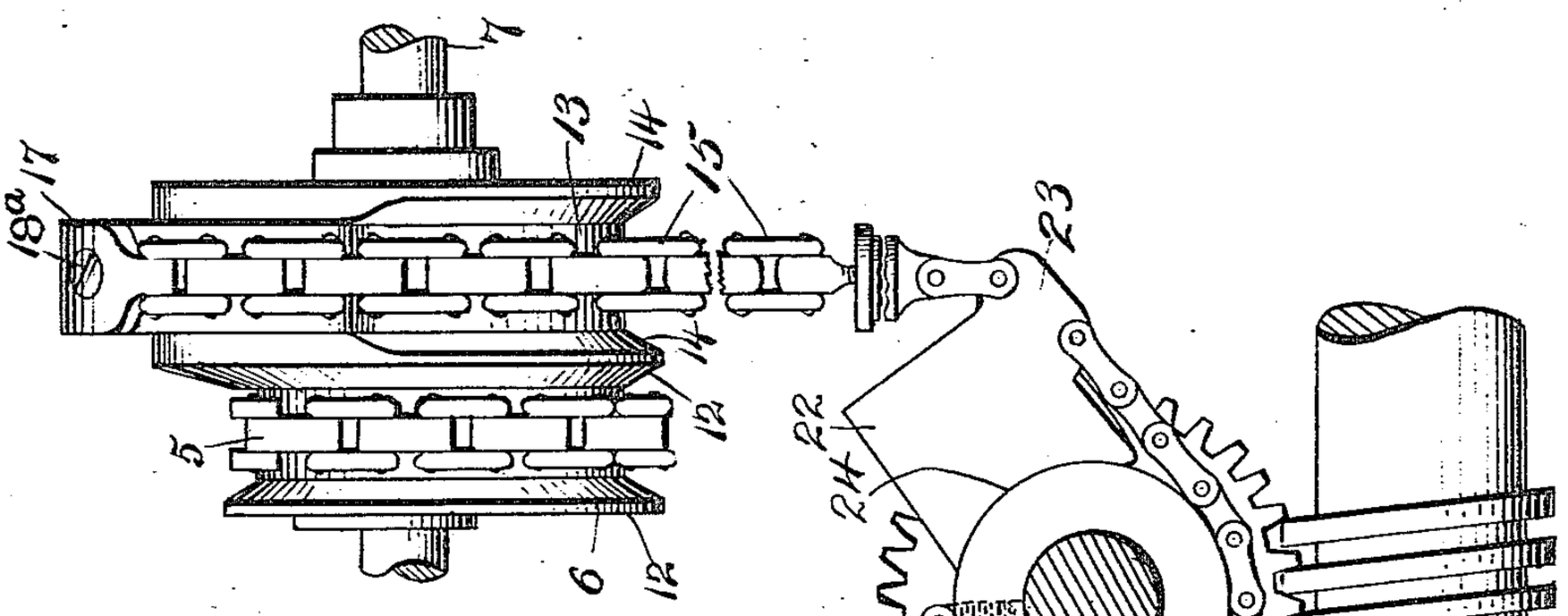

Fig. 2.

Witnesses

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3 SHEETS—SHEET 3.

Fig. 4.

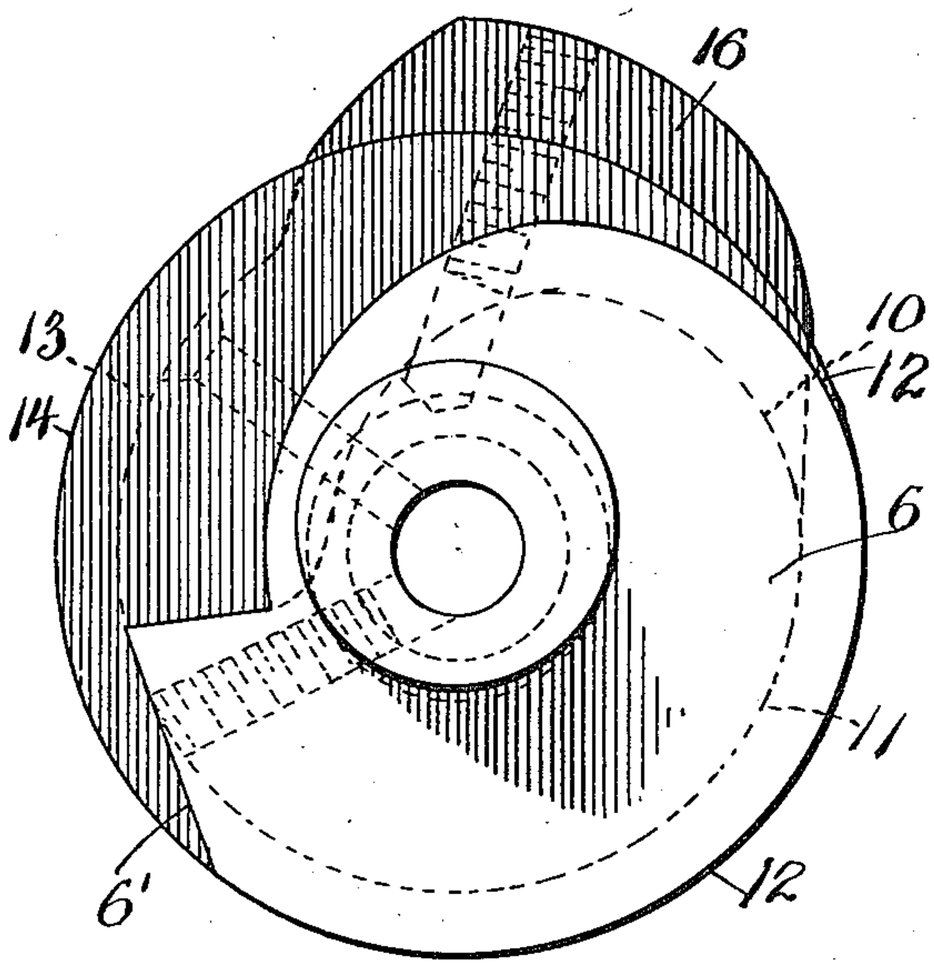


Fig. 5.

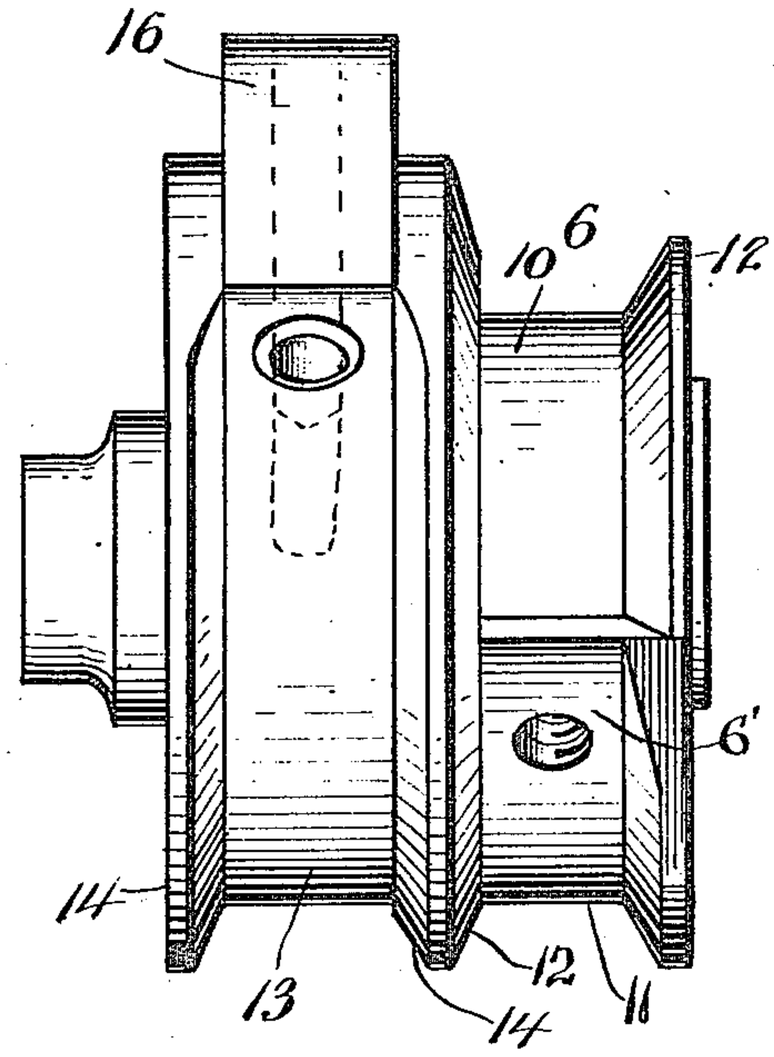
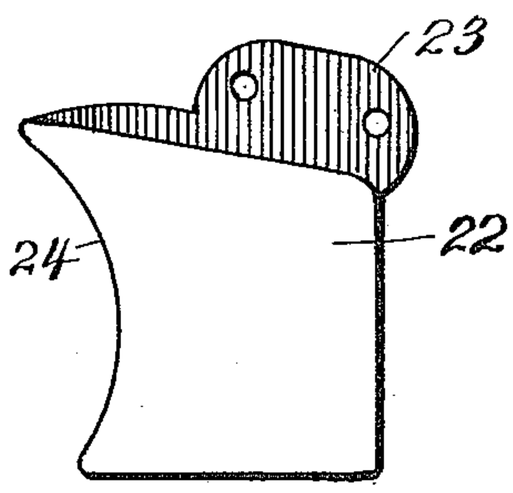
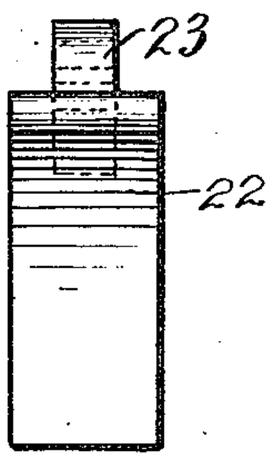


Fig. 7.

Fig. 6.

Fig. 8.





Witnesses

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UNITED STATES PATENT OFFICE.

GEORGE S. HARRIS, OF WEST POINT, GEORGIA, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

BUILDER-MOTION.

1,167,167. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed February 13, 1909. Serial No. 477,671.

To all whom it may concern:

Be it known that I, GEORGE S. HARRIS, a citizen of the United States, residing at West Point, in the county of Troup and State of Georgia, have invented certain new and useful Improvements in Builder-Motions; and I do hereby declare the following to be 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.

This invention relates to improvements in spinning or winding machines, and more particularly to the traverse motions of such machines for controlling the manner in which the yarn is wound upon the carriers or bobbins.

As well understood by those skilled in the art, some filling carriers or bobbins now largely used in automatic or filling replenishing looms, have wound thereon some preliminary or initial turns of yarn for coöperation with the feeler mechanism of such looms, so that after the regular or service windings have become practically exhausted, the feeler mechanism may set in operation a train of devices for effecting replenishment of the filling prior to its complete exhaustion. The yarn that remains upon the ejected carrier or bobbin, of course, constitutes waste and must be removed before the carrier or bobbin can be again loaded with yarn, consequently, it is desirable that the preliminary or initial windings, sometimes called the "bunch," should contain as little yarn as is consistent with the intended purpose and function.

Due regard must be had, however, to the formation of the completely wound carrier or bobbin so that on the one hand it shall contain a maximum amount of yarn and on the other hand that such yarn may be properly drawn from the carrier or bobbin during the weaving operation. It is commonly known that carriers or bobbins wound with such preliminary windings or "bunch" frequently fail in the free delivery of the yarn as it draws from near the base of the wound carrier or bobbin, and it has heretofore been proposed to overcome this objection by laying the yarn at the beginning of the winding operation substantially in the same form as at the completion of the operation, but with a shorter traverse. This has resulted in an annular thickened portion producing what is known in the art as a "pear-shaped" bobbin containing a relatively small amount of yarn.

With the above well understood facts in view, it is an object of the present invention to provide means for producing a wound filling carrier or bobbin for use in automatic feeler looms, and also well adapted for use in any style of loom.

A further important feature of the invention consists of means for running the first courses of yarn upon a bobbin or carrier with short traverses for giving the effect of a "bunch" and increasing the traverse without producing the objectionable "pear-shaped" bobbin, the mechanism for producing this result being simple, relatively cheap, and efficient. In carrying this feature of the invention into effect, the traverse at the commencement of the winding operation is reduced to a desired minimum and gradually increased until the service traverse is reached when it becomes uniform, and the "gain" of traverse is made to varv progressively from a maximum at the start to a minimum and then becomes uniform during service traverse, thus merging the windings from the "bunch" into the service traverse by what is known technically, as a "quick get-away."

With these and further objects in view, as will be hereinafter in part specified and in part become obvious, the invention comprises certain novel constructions, combinations and arrangements of parts as hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a fragmentary outline view of a portion of a spinning frame illustrating a traverse motion embodying the features of the present invention. Fig. 2 is a detail view in elevation of a portion of the cam pulley and winding drum and connected parts. Fig. 3 is a similar view of the same taken from a point of observation at right angles to that of Fig. 2. Fig. 4 is a detail view of the opposite side of the cam pulley from that seen in Fig. 3. Fig. 5 is an edge view thereof. Fig. 6 is an end view of the lug detached. Fig. 7 is an inverted plan view thereof. Fig. 8 is a side elevation thereof. Fig. 9 is a view in elevation of a set of bobbins illustrating successive steps from the minimum to the maximum traverse and then to the complete bobbin.

In the form of machine illustrated, the

ring-rail is raised by a suitable weight and lowered by means actuated through the builder motion, the usual winding mechanism of the builder motion letting off the flexible connection from the barrel to effect a change in the path of traverse of the yarn directing means or ring-rail as the yarn is wound upon the carrier or bobbin. As is well understood by those familiar with this general character of machine, the winding starts with the flexible connection between the builder motion and ring-rail wound upon the winding drum of the builder motion, and the drum is gradually turned to unwind the flexible connection as the builder arm is raised and lowered. The result is that as the flexible connection is gradually unwound from the winding drum the ring-rail will be caused to rise a little higher on each upward movement and to go not quite so low on each succeeding downward movement, thereby ordinarily to change the path of the ring-rail and lay the yarn in successive layers from the base to the top of the carrier or bobbin.

The general construction of a machine of the above character is sufficiently indicated in Fig. 1, wherein, it will be seen that the machine frame has mounted thereon the yarn directing means, such as the ring-rail 1, adapted to be actuated by the usual lifter or poker-rod 2, the lower end of which rests upon the counterweighted lever 3. Extending from the lever 3 is the usual segment 4 which in turn is connected to the builder motion by suitable flexible connections, as will further appear. Aside from features of the present invention to be described, the builder motion comprises the usual devices, including the builder arm carrying the pick shaft and winding drum, parts only being herein illustrated because they are common and well understood, the construction being such that as the builder cam 20 is rotated, the builder arm is rocked carrying with it the winding drum 18 which is rotated step-by-step by the usual ratchet and pawl mechanism, Fig. 1, to cause the flexible connection between the winding drum and ring-rail to be let off more and more to effect a "gain" in the traverse.

From the construction thus far described, it will be seen that as the builder motion is operated in the manner described, the flexible connection between the winding drum 18 and the segment or rocker arm will result in a raising and lowering movement of the ring-rail, and the action of the pick-shaft upon the drum 18 will cause the latter to give off or unwind an amount of flexible connection dependent upon the arc of rotary movement of the drum which will shift or change the path of traverse of the ring-rail upon successive traverses to lay the yarn upon the bobbin in successive layers in which is known as filling wind, and in the absence of means for modifying the action of the parts, the successive traverses of the ring-rail will be equal and uniform.

As hereinbefore noted, however, it is a purpose of the present invention to modify the action of the builder motion upon the ring-rail so that an evenly wound bobbin shall be formed to have at its lower or base portion, the effect of a bunch by short initial traverse of the ring-rail regularly increasing to the maximum traverse in connection with a great initial "gain" in the traverse of the ring-rail decreasing from a maximum. To effect the short initial traverse in the illustrated form of the invention, a flattened cam pulley is caused to act upon the flexible connection between the builder motion and ring-rail, and in connection therewith to further modify the action of the builder motion and secure maximum initial "gain" which progressively decreases, a block or deflector is connected to the flexible connection and is caused to deflect the flexible connection a maximum amount at the start and progressively decrease in its deflecting capacity until service traverse is reached, at which time both the traverse and gain in traverse become uniform, all as will now be fully explained.

Mounted on a shaft 7 supported by suitable brackets 8 is a cam pulley 6 having a cut-away or flattened portion about which passes the flexible connection or chain 5, one end whereof is secured to the segment or rocker arm 4 and the other to the cam pulley 6. The cam pulley 6 is formed with a relatively short semi-volute or spiral 10 curving in something less than one-half of the circumference of the cam from a point contiguous to the axis of the cam to the main surface 11 of the cam, which surface extends from the outer terminus of the semi-volute 10 to the terminus of the cam, and is disposed concentric with a circle having the same central axis as the cam. Cam 6 for convenience in winding the chain 5 may be flanged as at 12. The chain 5 is wrapped about the cam 6 by having its end fixed to a flattened portion 6′ at the outer terminus of the cam and passed inwardly therefrom to a point as seen in Fig. 3 contiguous the inner terminus of the semi-volute or spiral 10, and from thence the chain extends to the segment 4 and is attached as usual. The method of attachment of chain 5 is obviously immaterial, and may consist simply of having the terminal link of the chain formed of a solid block 5′ engaged by a retaining screw 5″ threaded radially into the cam 6. Preferably formed integral with, or otherwise suitably secured to the cam pulley 6 is a drum portion 13 having flanges 14 for facilitating the winding of a chain 15. The

drum portion 13 is provided with a radial lug 16 to which the terminal link 17 of chain 15 is secured by a screw 18ª threaded through the lug and into the drum, the terminal link 17 being well up on the lug 16, so that a portion of the chain 15 is wound thereon.

The chain 15 extends down to and is wound about the winding drum 18 of the usual builder motion 19 actuated by the usual cam 20. The inner end of chain 15 is fixed to the winding drum 18 as by a suitable screw 21. Intermediate the length of the chain 15 is a lug or displacing block 22, which, as it serves in connection with the winding drum 18 to deflect the flexible connection 15 under conditions to be hereinafter described, may for convenient identification or reference be termed a deflector. A portion 23 of the block or deflector 22 is shown as being arranged to serve as a link in the chain and the main portion of the lug or displacing block 22 is arranged at one side of the chain and formed with a concaved surface 24 adapted to fit snugly about a portion of the convexed surface of the drum.

In operation, the parts are in the position indicated in Fig. 3, when the bobbin is starting to build, and as the winding drum 18 is moved by the builder motion for oscillating the cam pulley through the action of chain 15, and thereby swinging the segment 4, the drum 18 will be revolved by the usual pawl and ratchet of an ordinary builder motion with a step by step motion feeding off the chain 15 which is taken up by the first drum portion 15 while the chain 5 is fed off by the smaller radius of the semi-volute or spiral 10, and thereafter from points at constantly increasing distances from the center of cam 6 until the concentric surface 11 is reached. Thus the first stroke of the segment 4 will be for the minimum distance, gradually increasing as the chain 5 is fed off until the segment reaches its maximum stroke when the chain 5 is being let off of the portion 11 of the cam, which in the illustrated form of the invention is equal in radius to the radius of the drum portion 13. Thus a relatively short traverse is imparted to the earlier strokes of the ring rail and a similarly relative great gain is imparted thereto by the mechanism hereinafter described. The variation in "gain" over the regular "gain" of ring-rail traverse and the variation in the length of the traverse are preferably so related and proportioned that when the traverse has reached its maximum the gain will have reached its minimum, and the traverse and gain will remain unchanged to the top of the bobbin. The decreasing excess of gain of the ring rail and the proportionately increasing traverse (the decrease in the excess of gain being maintained exactly proportionate to the increase of the traverse) produces the proper proportionate delivery of yarn to the shorter courses, so that the resulting bobbin is of substantially uniform, even contour. To accomplish this end and to overcome the difficulty of having the diameter of the bobbin greater when the length of traverse is short, the lug or block 22 is disposed for throwing the chain 15 away from drum 18, and when the set is started and chain 15 is being let off for allowing the ring rail to gain the usual small amount each stroke, the lug or block 22 causes an excess amount of chain 15 to be let off over that required for the regular gain, and this excess let off decreases as the length of traverse of the ring rail increases, thereby keeping the size of the bobbin the same throughout, the additional letting off of the chain by the lug or block 22 being accomplished by the lug deflecting the chain less and less or allowing the chain to approach the circumference of the drum 18. Lug 22 will engage drum 18 during the decreasing portion of each stroke and will divert chain 15 from the periphery of drum 18; in other words from the shortest distance between drums 13 and 18. Thus chain 15 is let off and retracted to a decreasing extent, the gain of the ring rail traverse decreasing proportionately as the amount of deflection of chain 15 by block 22 represents the excess over the normal gain imparted to the earlier strokes. When the chain 5 has reached the point where it is being let off of the maximum radius of cam pulley 6, the lug or block 22 will have been lifted off of the drum 18 and thus will be in a position to no longer affect the action of chain 15, and hence the remainder of the bobbin is built in the regular way to the top.

The bobbin built by the present improved mechanism is, as suggested above, especially adapted to automatic looms using the filling feelers, and the mechanism is also an improvement over the commonly known filling traverse motions for filling used in any style of loom. Among the advantages gained is the fact that the ring rail when first starting a set traverses a minimum length, enabling the ends broken in doffing to be properly wrapped at the base of the quill, instead of some greater distance above the base, as made necessary where the ring rail makes a maximum traverse in starting the set. Another advantage gained by the present invention is in the short taper from which the yarn is drawn when approaching the base of the bobbin, which allows the yarn to be drawn off with the least amount of friction, and yet, with no tendency to sluff off. The formation of this short taper is due to the increase gained by the rail at this point.

It is to be noted that the initial traverse

can be made any length desired by simply winding chain 15 on the winding drum 18 to the position desired, before starting the set, which results in causing the lug 22 to be thrown farther from the center of the drum 18, thereby, when chain 15 is let off drum 18, effecting a sufficiently greater gain of chain 15 than the regular gain thereof to offset the effect of the short traverse in the final diameter of the bobbin at this point. The shape of lug 22 is such that when the lug rises above the horizontal plane of the axis of rotation of drum 18, the chain 15 quickly approaches the periphery of drum 18, and thus the chain 15 is let off more quickly than by the regular action of drum 18.

It is obvious of course that each of the chains 5 and 15, while shown simply as chain cables, may take the form of any suitable cables, and changes in this respect as well as other changes in mechanical detail incorporating the principles disclosed may clearly be made within the spirit and scope of the invention.

In some spinning frames, the gain of the ring rail is effected, not by letting off the chain on the winding drum, but by winding it on, in which case the only change necessary for utilizing the present invention would be the reversion of the lug 22, and placing it on the end of the chain 15 instead of intermediate the length thereof, as at present, and the results would be exactly the same as secured by the structure above set forth. In this inverse type of traverse, it would be necessary for lug 22 to be made fast, as by a screw, to the winding drum 18 at one side and to chain 15 at the other side, instead of the lug being free to leave the winding drum with the chain, as at present.

What I claim is,—

1. In a device of the class described, the combination, with means for delivering yarn onto a bobbin, of means for actuating said yarn delivering means, a cable for operating said actuating means, a drum engaged by said cable, means for operating said drum for simultaneously imparting bodily reciprocation and a step by step shifting of the cable, means for varying the traverse of the yarn delivering means, and a block carried by the cable and having a concave face adapted to ride at times on the periphery of the drum in position for causing the block to produce greater longitudinal shifting of the cable than the regular shifting thereof while the block contacts with the drum, the block being adapted to be lifted free of the drum by the cable.

2. In a device of the class described, the combination with a ring rail, a segment for actuating the same, and means for transmitting movement from the segment to the ring rail, of means for variably reciprocating the segment and allowing a variable gain thereof in an inverse ratio to the increased reciprocation thereof comprising an actuating cable, a cam for variably reciprocating and variably paying out said cable, a builder motion for actuating said cam, a cable engaging a drum of said builder motion and connected with the cam for transmitting movement from the builder motion to the cam, said second mentioned cable being adapted to be paid out by said drum for the regular gain, a lug carried by said cable and engaging said drum and disposed for causing an excess paying out of the second mentioned cable over the regular paying out thereof by the drum in decreasing amounts exactly proportionate to the increasing amounts of reciprocation imparted to the segment engaging cable.

3. In a device of the class described the combination with means for delivering yarn to a bobbin, of means for actuating said yarn delivering means, a cable for operating said actuating means, a drum engaged by said cable, means for operating said drum for simultaneously imparting bodily reciprocation and a step by step shifting of the cable, means for varying the traverse of the yarn delivering means, and a block connected with the cable and engaging the drum in position for allowing a greater longitudinal shifting of the cable than the regular shift thereof while the block is in contact with the drum, the block being adapted to be lifted free of the drum by the cable.

4. In a machine for winding yarn upon a carrier or bobbin, a builder motion including a winding drum, means for directing the yarn to the carrier or bobbin as it is being wound thereon, a flexible connection between the winding drum and directing means, a deflector mounted on and movable with the flexible connection, and means for engaging said deflector and imparting a deflecting movement thereto.

5. In a machine of the character described, the combination of means for delivering yarn onto bobbins, a builder motion for traversing the yarn delivering means, a flexible connection between the yarn delivering means and builder motion, and means carried by and operating upon said flexible connection during the preliminary or initial winding for modifying the gain or traverse due to the builder motion.

6. In a machine of the character described, the combination of a ring-rail, a builder motion, a flexible connection between the ring-rail and builder motion, means mounted upon the flexible connection to deflect the same during the preliminary or initial windings, said means becoming ineffective when the windings have reached a predetermined point.

7. In a machine of the character described,

the combination of a ring-rail, a builder motion including a winding drum, a flexible connection between the ring-rail and winding drum, means carried by and acting upon one part of said flexible connection for deflecting it a maximum amount at the commencement of the winding operation and becoming progressively less effective in amounts varying from a maximum, and means acting on another part of said flexible connection progressively from a minimum to a maximum for varying the traverse of the ring-rail until the service or regular traverse of the ring-rail is reached.

8. In a machine of the character described, the combination of a ring-rail, a builder motion including a winding drum, a pulley between the ring-rail and builder motion, a flexible connection between the winding drum and pulley, a deflector carried by the flexible connection between the winding drum and pulley, a flexible connection between said pulley and ring-rail, and a cam pulley acting upon the last-named flexible connection.

9. In a machine of the charatcer described, the combination of a ring-rail, a builder motion including a winding drum, a flexible connection between the ring-rail and winding drum, a deflector carried by the flexible connection, and means for moving said deflector into different positions to deflect the flexible connection progressively different amounts during the preliminary or initial windings.

10. In a machine of the character described, the combination of a ring-rail, a builder motion including a winding drum having a uniform stroke, a flexible connection between the ring-rail and winding drum for transmitting motion between the two, a deflector movable by the winding drum and carried by said flexible connection to deflect the same during the preliminary or initial windings from a maximum to a minimum amount to cause a quick "get-away," and a second means acting on said flexible connection and modifying the rail traverse to round and build up the bottom windings of the bobbin.

11. In a machine of the character described, the combination of a ring-rail, a builder motion including a winding drum, a flexible connection between said drum and ring-rail, means carried by the flexible connection and engaging the drum to deflect the flexible connection a maximum amount at the commencement of the winding operation, said drum acting as it unwinds to cause said means to deflect said flexible connection progressively less.

12. In a machine of the character described, the combination of a ring-rail, a builder motion including a winding drum, a flexible connection between said drum and ring-rail, means carried by the flexible connection and engaging the drum to deflect the flexible connection a maximum amount at the commencement of the winding operation, said drum acting as it unwinds to cause said means to deflect said flexible connection progressively less from a maximum, and means for giving back said flexible connection in amounts progressively from a minimum to a maximum to shape the bottom of the wound bobbin.

13. In a machine of the character described, the combination of a ring-rail, a builder motion including a drum, a pulley, a flexible connection between the pulley and drum, a cam pulley, a flexible connection between the cam pulley and ring-rail, a deflector mounted on the flexible connection between the drum and pulley and adapted to be tilted by the drum when the parts are in position to commence the winding operation, said drum acting to tilt said finger or deflector progressively less as the drum is rotated.

14. In a machine of the character described, the combination of a ring-rail, a builder arm, a flexible connection between the ring-rail and builder arm, a deflector carried by said flexible connection to deflect the same, and means normally disengaged from said deflector during the regular traverse of the ring-rail and adapted to engage and move the same varying amounts during the building of a bunch.

15. In a machine of the character described, the combination of a ring-rail and builder arm, a flexible connection between the ring-rail and builder arm, a block secured to the flexible connection between its ends, and means to engage the block during the winding of a bunch to deflect the flexible connection.

16. In a machine of the character described, the combination of a ring-rail and builder motion including a builder arm, a winding drum carried by the builder arm, a flexible connection between the winding drum and ring-rail, a block secured to the flexible connection between the drum and ring-rail, said block having a drum conforming and engaging surface to engage the drum during the building of a bunch.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE S. HARRIS.

Witnesses:
F. P. SIMS,
W. G. SHAEFER.