No. 774,742. PATENTED NOV. 15, 1904.

G. O. DRAPER.

SPINNING APPARATUS.

APPLICATION FILED DEC. 26, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

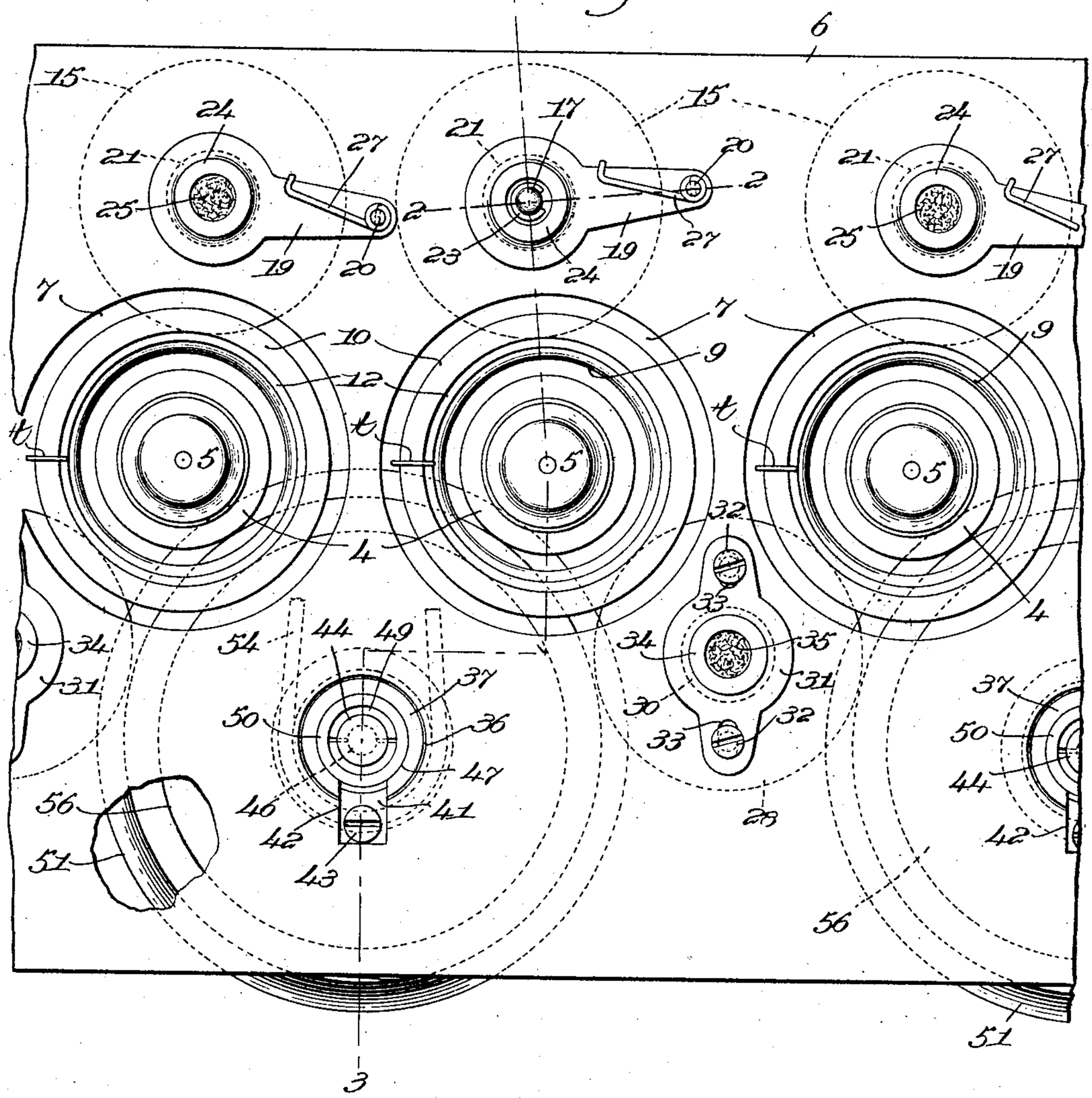
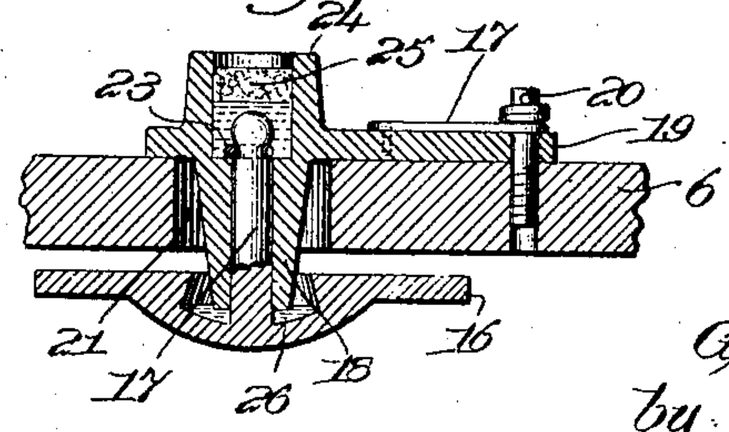


Fig. 2.



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NO MODEL. 3 SHEETS—SHEET 2.

Fig: 4.

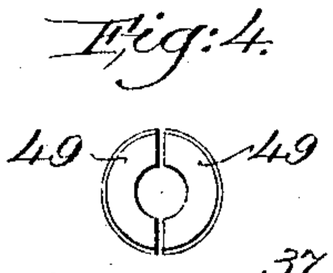
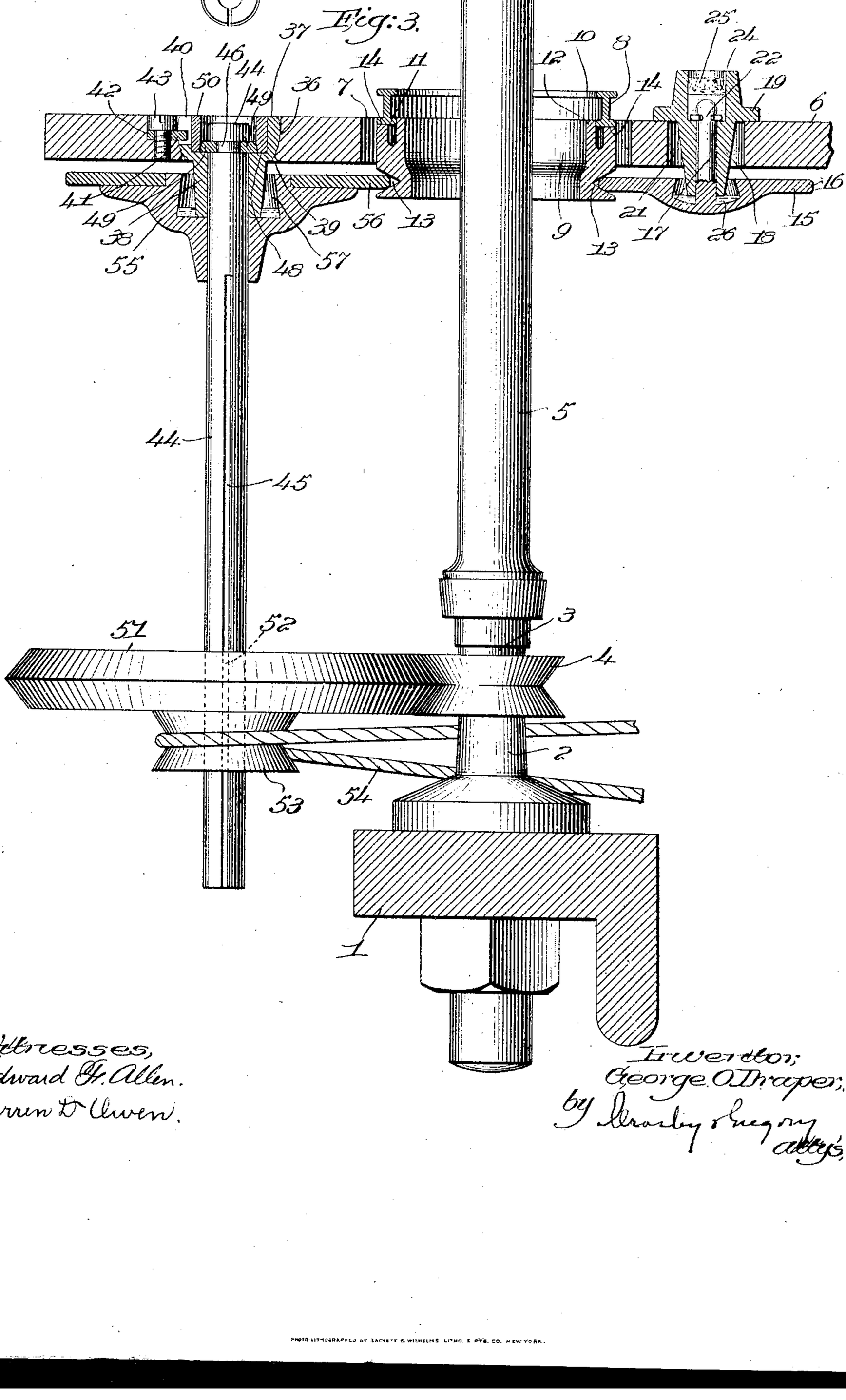


Fig: 3.



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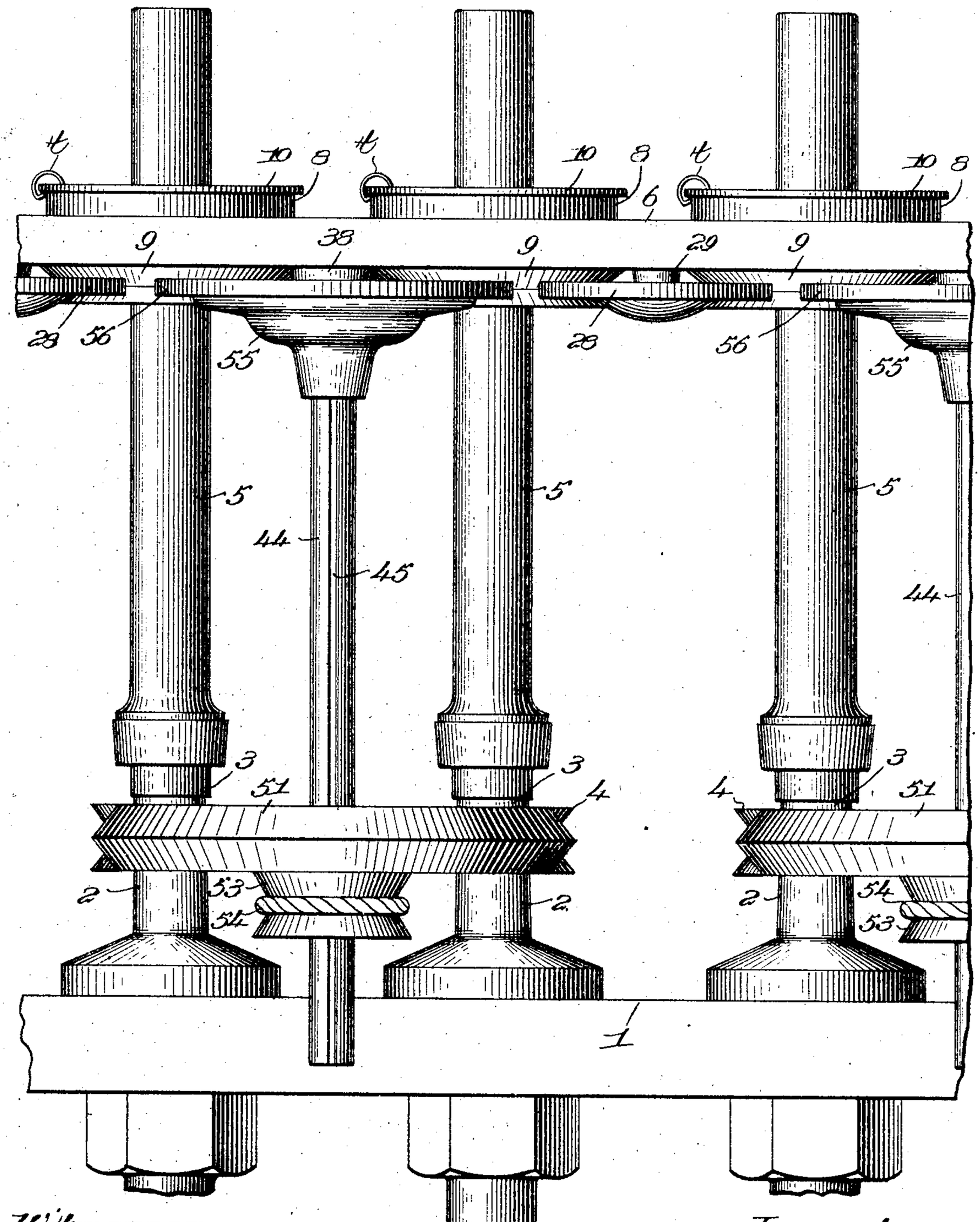
NO MODEL. 3 SHEETS—SHEET 3.

Fig. 5.



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No. 774,742. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

GEORGE OTIS DRAPER, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

SPINNING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 774,742, dated November 15, 1904.

Application filed December 26, 1903. Serial No. 186,553. (No model.)

To all whom it may concern:

Be it known that I, GEORGE OTIS DRAPER, a citizen of the United States, and a resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Spinning Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to spinning apparatus wherein rings are employed to sustain the travelers, and it has to do more particularly with that type of ring spinning apparatus in which the rings are driven by means independent of the traveler or the pull of the yarn. Broadly stated, in such apparatus the spindles are rotated at a higher speed than the rings by friction driving mechanism which coöperates with the spindle-whirls, such mechanism also positively driving the rings, so that by a suitable adjustment of the parts the spindles and rings are driven at a given ratio determined by circumstances.

In my present invention I have simplified the driving mechanism by reducing the number of parts and have made various other improvements having in view a more perfect operation, such novel features being fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a top or plan view of a portion of the ring-rail, spindles, and rings of a spinning apparatus with one embodiment of my invention applied thereto. Fig. 2 is a longitudinal sectional detail on the line 2 2, Fig. 1, showing the movable bearing for one of the idler members, to be described. Fig. 3 is a section on the irregular line 3 3, Fig. 1, looking toward the left, the spindle and its whirl, and the yarn-receiver or bobbin being shown in elevation, as is also the spindle-driver. Fig. 4 is a plan view of a portion of the locking means, to be described, which retains the main shaft of the driving mechanism in its bearing and takes up end thrust of the shaft; and Fig. 5 is a front elevation of the apparatus illustrated in Fig. 1.

The spindle-rail 1 and bolsters 2 thereon for the rotatable spindles 3, each provided with a whirl 4 and adapted to receive a bobbin 5, may be and are of well-known construction, and the ring-rail 6 will in practice be reciprocated vertically by usual means (not shown) to traverse the yarn upon the bobbins. Spindle-openings 7 are formed in the rail; but in the present instance these openings are large enough to freely receive the ring 8, shown as double-flanged and having a depending extension or holder 9 projecting below the rail, the upper flange 10 of the ring coöperating with the traveler *t*, while the bottom flange 11 frictionally engages an upturned annular lip 12 on the holder 9. The latter has a rather deep peripheral groove 13 near its lower end, for a purpose to be described.

A well-known form of ring is shown, the same being made of tempered steel, and inasmuch as such rings are usually not absolutely circular it is of great importance to have the holder or extension 9 detachable, inasmuch as the driving surface or portion of the latter should be practically circular, for reasons which will appear hereinafter. The holder may be made of cast-iron or untempered steel and accurately turned to present an absolutely-circular groove 13. Outside of the lip 12 the top of the holder presents a flat seat 14, on which the lower flange of the ring rests when pushed down around the retaining-lip 12, the friction between the latter and the ring-flange causing the ring and holder to rotate in unison.

As will be described in detail, a series of revolving driving members are supported by the ring-rail, each member driving two adjacent rings, and a series of idlers alternate with the driving members, each idler coöperating with one of the rings driven by the two driving members on opposite sides of the idler. One idler therefore coöperates with two rings, and a second series of idlers are arranged to coöperate each with a ring, an idler of one series coöperating with a ring at a distance of about one hundred and twenty degrees from the point of coöperation of an idler of the other series. This arrangement I believe to be novel, and I am thereby enabled to use three idlers for every two rings

instead of two idlers for each ring, resulting in a material simplification of construction and reduction of parts.

The series of idlers located behind the row of rings is indicated at 15, each idler consisting of a metallic disk having a transversely-rounded periphery 16, Fig. 3, and an upturned axial pin 17, which rotatably enters a sleeve-like bearing 18, depending from an arm 19, resting on the top of the ring-rail and fulcrumed thereon by a stud 20. The bearing 18 projects through a hole 21 in the rail, the idler 15 being thus suspended beneath it and entering the groove 13 of the ring-holder.

As clearly shown in Fig. 3, the pin 17 is annularly grooved at its upper end at 22 to receive a split ring or collar 23, which rests on the top of the bearing 18 and sustains the disk 15 vertically.

The arm 19 is shaped to form a cylindrical chamber 24 above the bearing, constituting an oil-reservoir, and preferably a piece of felt 25 is inserted therein to keep out dust and retain the lubricant.

If desired, oil may be applied at the top of the felt, draining through it to the bearing and lubricating it, a recess 26 in the disk 15 catching any drip.

It will be observed that the idlers 15 contact with the ring holders or extensions 9 below the ring-holder and they aid in vertically supporting the rings.

The idlers 15 can swing on the fulcrum-studs 20 toward and from the rings, and in order to press the idlers inward each stud 20 has coiled around it a spring 27, fastened at one end to the stud and at its other end acting against the arm 19. The winding of the spring is such that the idler is always pressed yieldingly against the holder 9, maintaining a proper frictional engagement therewith and also coöperating in maintaining the driving member and the other idler pressed against the ring, the pressure being determined by the tension of the spring 27.

As shown in Fig. 1, the idlers 15 are arranged in a series at one side of the series of spindles, each idler coöperating with one ring-holder 9, and the second series of idlers 28 are located at the opposite side of the spindles, said idlers being made as disks in peripheral engagement with the holders or extensions of two rings.

Referring to Fig. 1, the idlers 28 are shown as alternating with the revolving driving members, to be described, and the arrangement is such that the distance between points of contact of an idler 15 and an idler 28 with a ring is substantially one hundred and twenty degrees.

The idlers 28 are constructed substantially as are the idlers 15 and are held in bearings 29, depending below the ring-rail and passed through holes 30 therein. (See dotted lines, Fig. 1.) Each bearing forms a part of a plate 31, which rests upon the rail and is secured thereto by screws 32, passed through elongated slots 33, Fig. 1, whereby the bearings may be adjusted toward or from the line of rings and fixedly held in adjusted position. An oil-chamber 34 is erected on the plate above the bearing, similar to the chambers 24, described hereinbefore, and a piece of felt 35 can be inserted therein to retain the lubricant and prevent entrance of dust to the bearing.

By means of an idler 15 of one series and an idler 28 of the other series a ring-holder is supported at two points one hundred and twenty degrees apart, the third point of support being provided by a driving member.

A series of driving mechanisms are employed, each mechanism driving two adjacent spindles and their coöperating rings, and one of said mechanisms will now be described in detail.

The ring-rail is provided with a series of cup-like sockets 36, each of which receives the partly ball-shaped head 37 of a depending bearing 38, (see Fig. 3,) which projects through the open lower end 39 of the socket and extends below the rail. The head 37 is radially notched at 40 to receive a retaining-key 41, which is let into a socket 42 in the rail and held securely therein by a screw 43, said key preventing rotation of the bearing 38, while permitting a rocking movement thereof toward and from the line of spindles. Said key also prevents any lifting tendency of the bearing when the rail descends, though the weight of the parts suspended from the bearing is in itself usually sufficient for the purpose. A driving-shaft 44 is rotatably mounted in the bearing and has a longitudinal keyway 45 and an annular locking-groove 46 in its head, the head or upper end entering a recess or socket 47 in the rocking bearing-head 37, the bottom of the socket forming a shoulder 48. (All clearly shown in Fig. 3.) In order to lock the shaft from longitudinal movement in the bearing 38 and also to take up end thrust, a two-part ring 49 (shown separately in plan, Fig. 4) is inserted in the socket 47 and seated on the shoulder 48, the halves of the ring embracing the neck or groove 46 of the shaft. The periphery of the locking-ring is slightly beveled, as shown in Fig. 1, and a cylindrical downhold or bushing 50 is driven into the socket 47, the lower end of the bushing being interiorly beveled to coöperate with the periphery of the locking-ring, forcing the halves thereof toward each other and securely holding them in position around the head of the driving-shaft. A lubricant can be introduced into the downhold to pass down into the bearing and lubricating the latter and the shaft. If desired, waste or a felt plug can be inserted similar to the plugs 25 to prevent entrance of foreign matter.

By the construction described the driving-shaft is suspended by a single bearing mount-

ed on the ring-rail, and said shaft and the parts carried thereby have a rocking movement with relation to the spindles. A large spindle-driving member is shown as a friction-disk 51, having its periphery shaped to form an effective driving contact with the whirls 4 of two adjacent spindles to rotate the same, the driving-disk being symmetrically disposed with relation to the spindles. A key 52 (see dotted lines, Fig. 3) enters the keyway 45 and connects the disk with the driving-shaft, while permitting the latter to slide through the disk as the ring-rail rises and falls. A band-whirl 53 is secured to or forms a part of the driving-disk, and a driving-band 54 is passed around said whirl to rotate it and the shaft 44, said driving-band being actuated from a cylinder or drum (not shown) or by any other usual or suitable means. The pull of the driving-band at all times secures a definite pressure of the disk 51 against the spindle-whirls with which it coöperates, and thereby a good and efficient driving contact is secured.

Inasmuch as the driving mechanism is suspended from a single bearing above the line of band-pull and as said bearing can rock, it will be manifest that the driving mechanism can accommodate itself automatically to slight variations in the positions of the several cooperating parts and also compensates for wear. By the construction described automatic self-adjustment is attained, obviating the employment of delicately and finely adjusted bearings which must be changed manually from time to time.

The driving-disk may be made of metal, wood, or any other suitable material, and its periphery may, if desired, be faced with leather or some other non-metallic contact material to insure a firm driving engagement with the spindle-whirls. As the disk and whirls peripherally fit into each other, the edge of one fitting into an annular groove of the other, the tendency of the driving-disk to rise or fall with the ring-rail is overcome, the pull of the driving-band assisting to attain the same end.

The driving-shaft 44 has rigidly secured to it below and near the ring-rail a disk 55, which preferably has attached to it an annular contact portion 56, of stiff leather, rawhide, or other suitable material, the periphery thereof entering the groove 13 of the ring-holders of two adjacent rings and driving said holders by frictional contact therewith. The ring-driver also forms the third support for each ring, it now being manifest that each ring-holder is vertically supported by a revolving driving member and two idlers 15 and 28. The band pull causes each ring-driver to press against the two ring-holders and against the resistance of the controlling-springs 27 of the pair of movably-sustained idlers 15, one for each ring, the spring-controlled idlers serving to maintain the proper frictional engagement between the driving member and ring-holders in a measure independently of the rocking movement of the driving-shaft 44, which may be due to variations in the spindle-whirls and their driver. I am thereby enabled to use a combined spindle and ring driving mechanism notwithstanding the peculiar manner of supporting and positioning the rings herein shown.

The disks 55 may be recessed on their upper faces, as at 57, to receive any lubricant which may drip from the shaft-bearings above them.

By making the spindle-drivers large in diameter and the spindle-whirls of small diameter the spindles are driven at a much higher speed than the driving-shafts 44, and the ratio between spindle and ring speeds is governed by the relative diameters of the ring-holders and ring-driving members.

Each driving mechanism drives two spindles and their coöperating rings at the desired speeds, and the idlers 28, which alternate with the driving mechanisms, coöperate each with a ring-holder driven by the two mechanisms between which the idler is mounted.

The construction shown and described is simple and efficient, the parts are reduced in number by the novel arrangement, and the apparatus is self-adjusting to accommodate slight variations which may arise during the operation of the apparatus.

My invention is not restricted to the single practical embodiment thereof herein shown, as various changes or modifications may be made by those skilled in the art without departing from the spirit and scope of my invention.

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

1. In spinning apparatus comprehending a rotating spindle and a rotating ring, a ring-rail, a bearing mounted to rock thereon and extended through the ring-rail, a driving-shaft rotatable in and suspended from said bearing, ring and spindle drivers operatively connected with the shaft, and means to rotate the latter.

2. In spinning apparatus comprehending a rotating spindle and a rotating ring, a ring-rail, a depending bearing having a rocking connection with the ring-rail and provided with an annular seat, a driving-shaft rotatably mounted in the bearing, and a locking device coöperating with the seat and the shaft to vertically sustain the latter and cause it to rise and fall with the ring-rail.

3. In spinning apparatus, a rotatable spindle, spindle-driving mechanism, a driving-band to actuate the same and by its pull maintain said mechanism in driving relation with the spindle, and a rocking bearing for and from which said mechanism is suspended, said bearing being located above the band.

4. In spinning apparatus, a rotatable spindle having an attached whirl, a reciprocating ring-rail, a driving-shaft, a rocking suspension-bearing connecting said shaft with the ring-rail, an annular driver rotating with the shaft and slidably connected therewith, a whirl attached to the driver, and a driving-band coöperating with the whirl, the pull of the driving-band maintaining the driver and spindle-whirl in driving contact.

5. A reciprocating ring-rail, a rotatable ring, driving mechanism therefor operating to rotate the ring by frictional contact, and a single bearing for and from which said mechanism is suspended, said bearing being mounted on the ring-rail.

6. A reciprocating ring-rail, a ring, a rotatable holder having means to firmly grasp the ring, ring-driving mechanism, including a driver in frictional contact with the ring-holder, and a single bearing for and by which said mechanism is suspended from the ring-rail.

7. A ring-rail, ring-driving mechanism including a friction driving-disk below the ring-rail, and a bearing for said mechanism, above the disk and mounted in the rail, in combination with a ring driven by said disk, and rotatable supporting-idlers for the ring.

8. A ring-rail having an opening, a ring, a rotatable holder connected therewith and projecting through said opening below the ring-rail, ring-driving mechanism suspended from the ring-rail and including a driving-disk in frictional contact with the projecting part of the holder, and rotatable idlers peripherally engaging the holder and coöperating with the driving-disk to vertically support said holder and ring.

9. In spinning apparatus, the combination with a driven ring, of friction-driving means therefor, and a plurality of rotatable supporting-idlers for the ring, one of said idlers being maintained in yielding coöperation with the ring.

10. In spinning apparatus, the combination with a driven ring, of driving means, including a rotating friction-disk, a plurality of rotatable supporting-disks, one of which is mounted on a fixed bearing, and a yieldingly-controlled bearing for the other of said disks.

11. In spinning apparatus, the combination with a driven ring, and a holder therefor, of three rotatable disks in frictional engagement with the holder, to support vertically and rotate the same, means to rotate one of said disks, and means to yieldingly maintain a second disk in engagement with the holder.

12. The combination, with a ring-rail, of a driven ring, its holder having a peripheral groove, a driving-disk and a plurality of supporting idler-disks mounted on the ring-rail and in frictional engagement with the grooved portion of the holder, a movable bearing for one of the idler-disks, and means acting through such bearing to maintain proper frictional engagement between the disks and the holder.

13. In spinning apparatus, a driven ring, supporting means therefor including a rotatable idler-disk, and a yieldingly-mounted bearing for said disk.

14. In spinning apparatus, a driven ring, supporting means therefor including a rotatable idler-disk, a swinging bearing for said disk, and yielding controlling means for said bearing.

15. In spinning apparatus, in combination, a ring-rail, having a spindle-opening, a driven ring having an annular extension projecting through the opening below the rail, driving and idler disks in friction engagement with said extension, to vertically support and drive the ring, suspension-bearings for said disks, depending below the ring-rail, and means to yieldingly move one of said bearings to maintain all the disks in proper frictional engagement with the ring extension.

16. In spinning apparatus, a ring-rail having a spindle-opening, a flanged ring, a holder extended through said opening and having an upturned annular lip to frictionally engage the ring and cause it to rotate with the holder, the latter having a peripheral groove at its lower end below the rail, and means to sustain and rotate the holder, comprising a driving-disk and two idler-disks to coöperate with the peripheral groove, a fixed bearing for one of said idler-disks, and a spring-controlled bearing for the other idler-disk.

17. In spinning apparatus, a series of driven rings, a series of rotary driving members, each arranged to drive two adjacent rings, a substantially fixed bearing for each of said members, two rotatable idlers coöperating with each driven ring on opposite sides of the center thereof, a fixed bearing for one of said idlers, a spring-controlled swinging bearing for the other idler, and a ring-rail on which all the bearings are mounted.

18. A ring-rail, a rotatable ring above it, a detachable holder therefor depending below the rail, a friction-disk driving member in contact with and to drive said holder, and located below the rail, a rotatable idler against which the ring-holder bears at another portion of its circumference, and yielding means to maintain said holder in continuous engagement with the friction-disk and the idler.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE OTIS DRAPER.

Witnesses:

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