3 Sheets--Sheet 1.

# E. HARRIS.

## Spinning Rings and Frames.

No. 232,818. Patented Oct. 5, 1880.

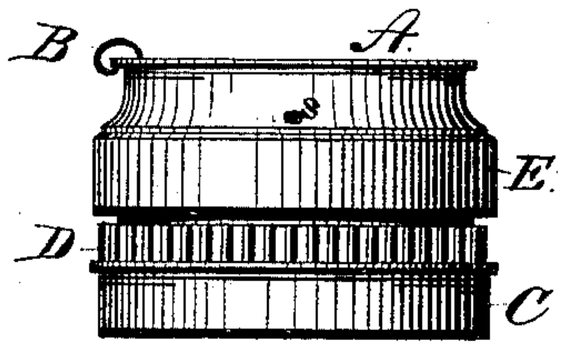



FIG. 1.

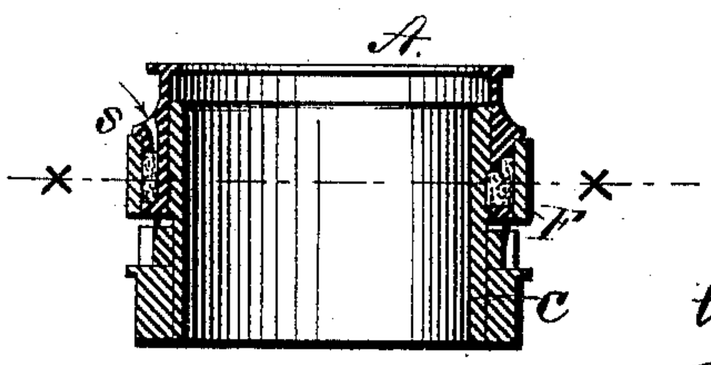



FIG. 2.

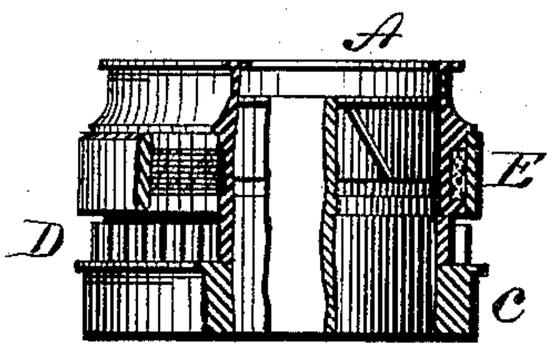



FIG. 3.

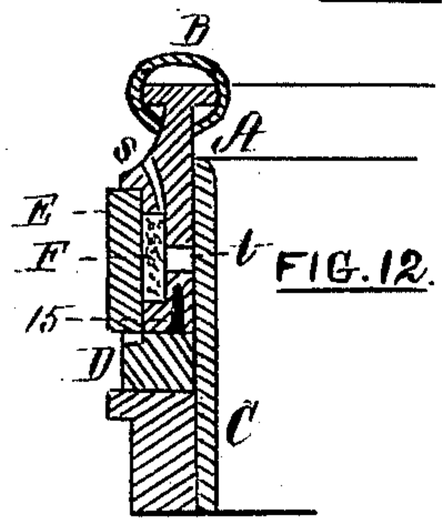



FIG. 12.

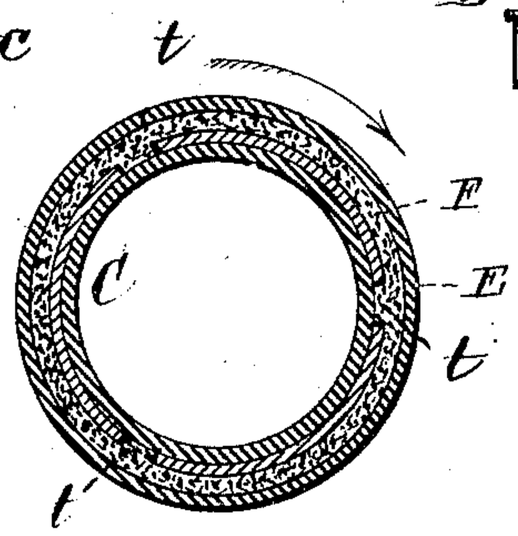



FIG 4

WITNESSES.

E. F. Warner,

G. M. Carpenter Jr

INVENTOR.

Elisha Harris

By his Atty. Willard B. Vincent

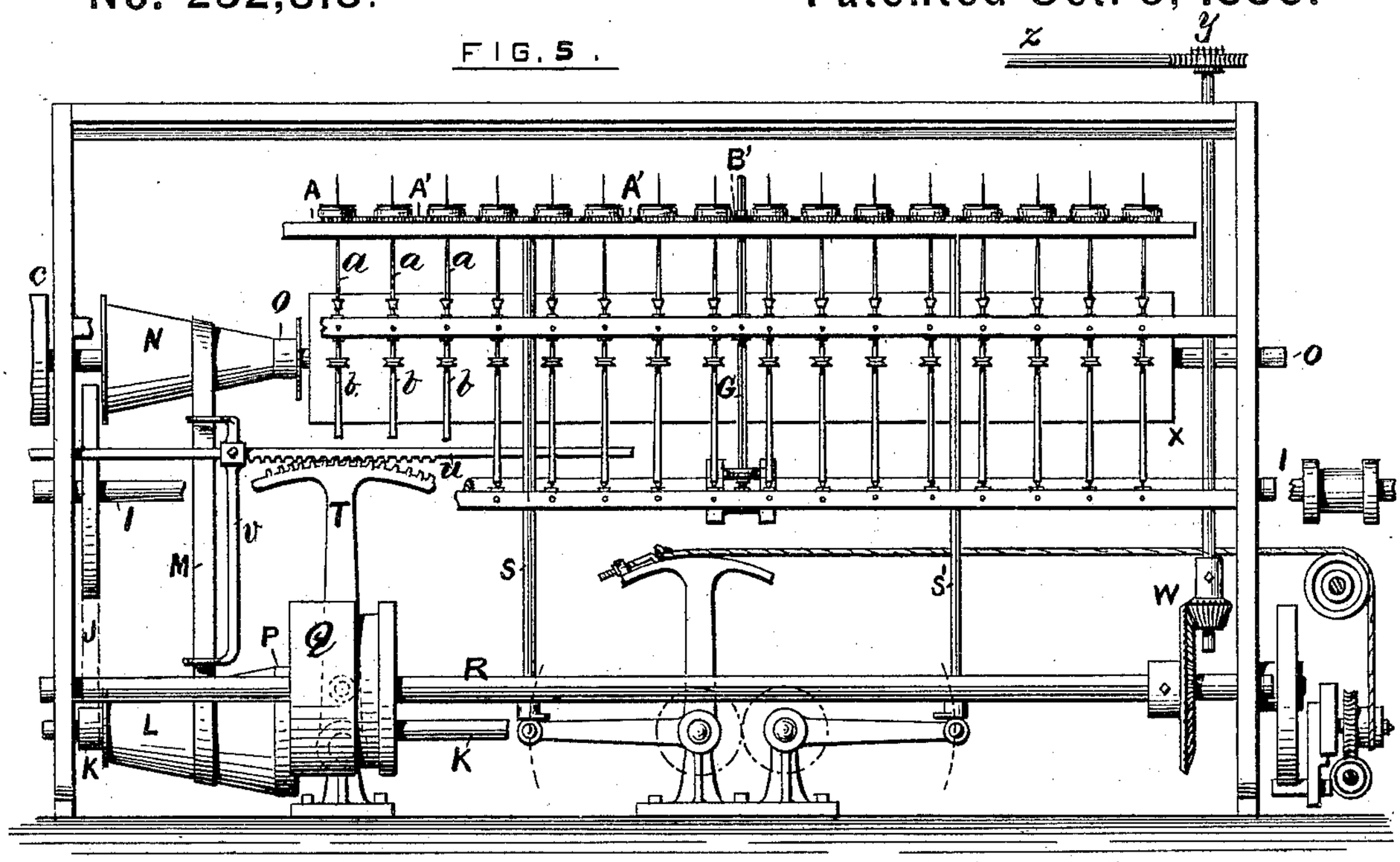
3 Sheets--Sheet 2.

# E. HARRIS.

## Spinning Rings and Frames.

**No. 232,818.** **Patented Oct. 5, 1880.**

FIG. 5.



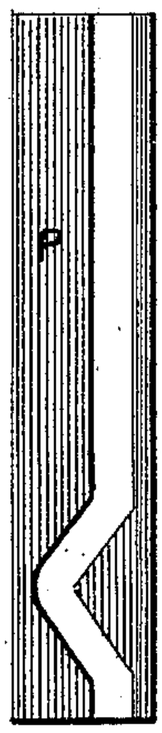



FIG. 7.

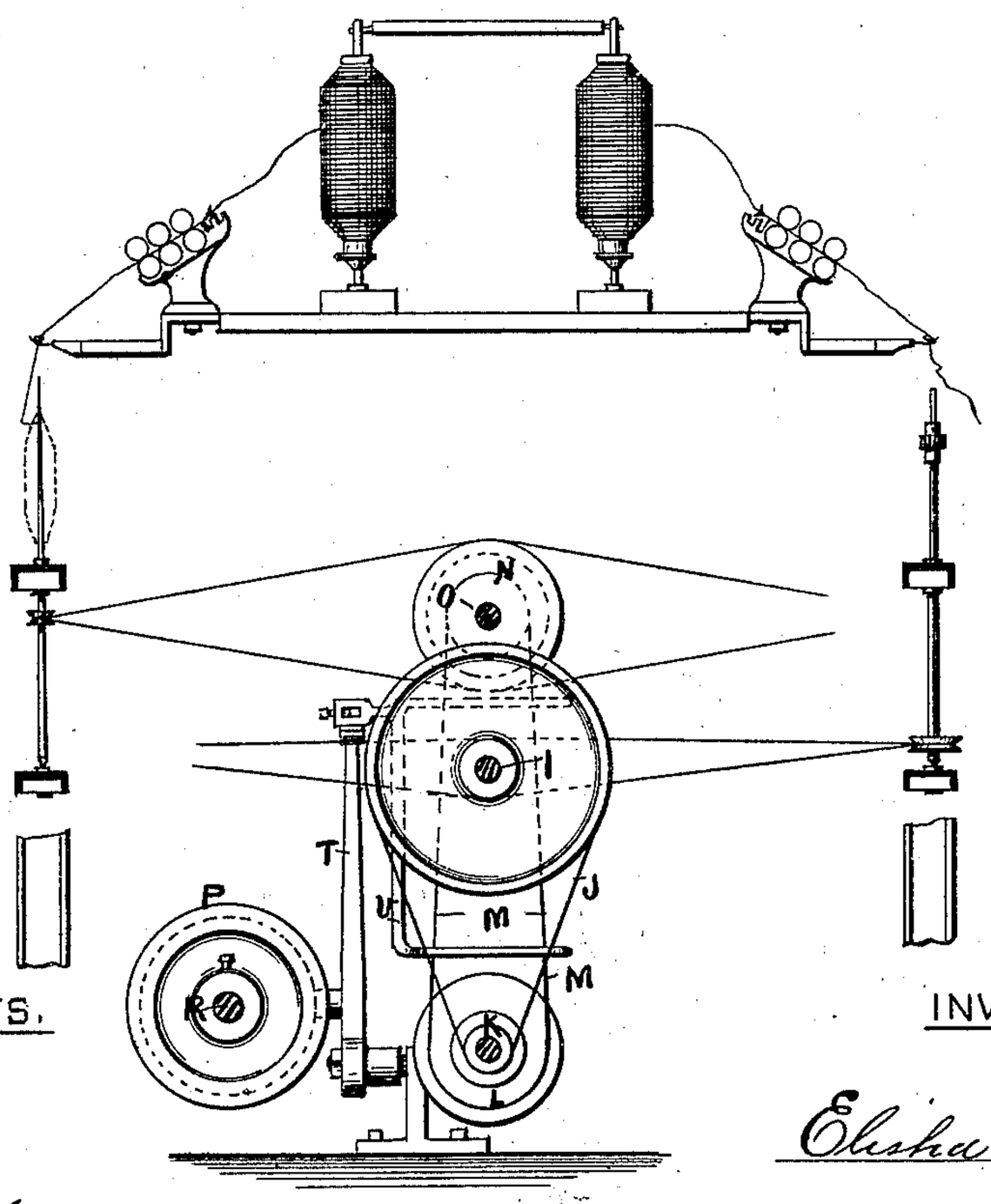



FIG. 6.

WITNESSES.

J. M. Andrews

Geo. Dubois

INVENTOR.

Elisha Harris

By his Atty. Wilkes B. Vincent

3 Sheets--Sheet 3.

# E. HARRIS.

## Spinning Rings and Frames.

No. 232,818. Patented Oct. 5, 1880.

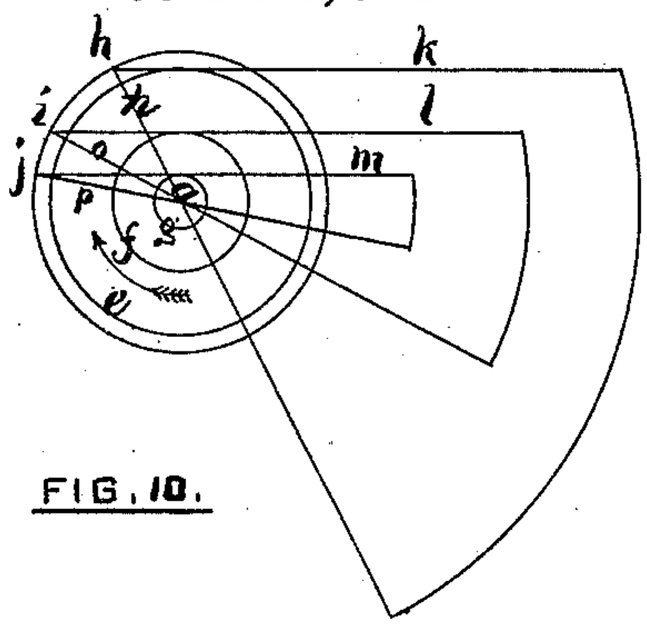



FIG. 10.

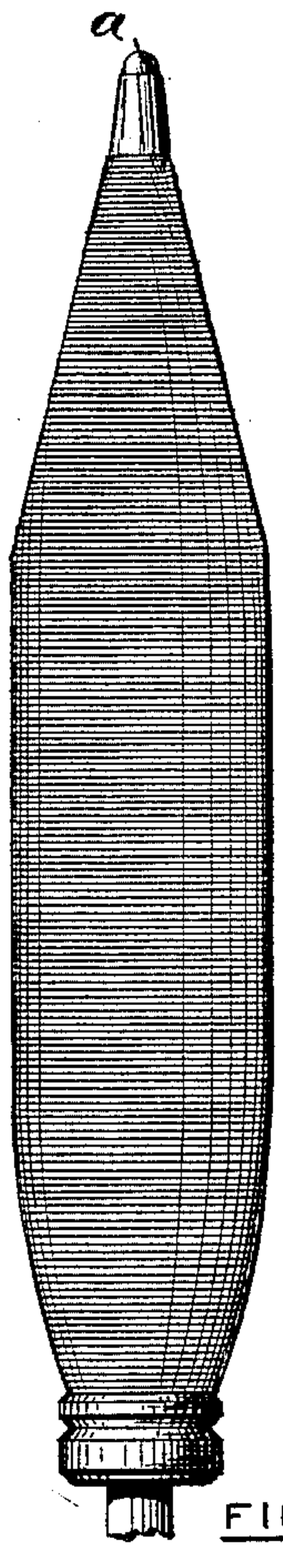



FIG. 11.

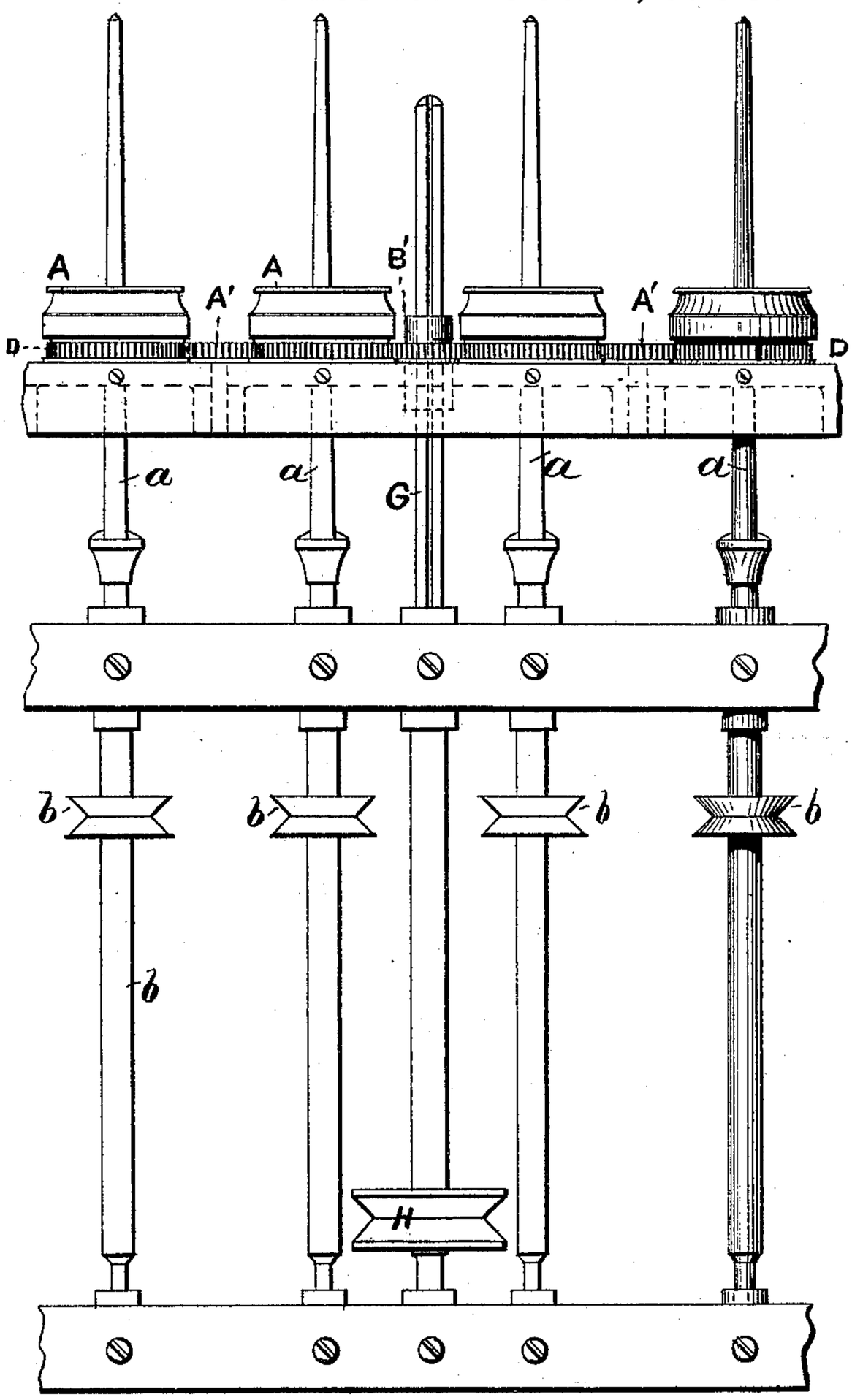



FIG. B.

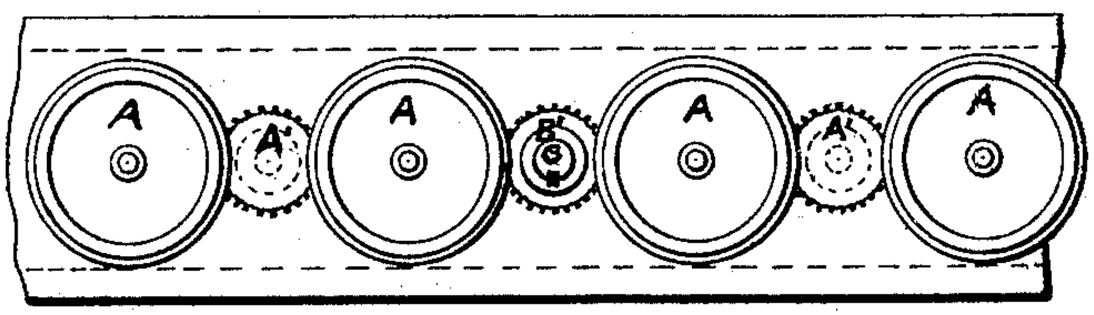



FIG. 9.

WITNESSES.

J. M. Andrus

Geo. Dulaney

INVENTOR.

Elisha Harris

By his Atty. Walter B. Vincent

# UNITED STATES PATENT OFFICE.

ELISHA HARRIS, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO ABRAHAM W. HARRIS, OF SAME PLACE.

## SPINNING RING AND FRAME.

SPECIFICATION forming part of Letters Patent No. 232,818, dated October 5, 1880.

Application filed August 6, 1879.

*To all whom it may concern:*

Be it known that I, ELISHA HARRIS, of Providence, in the State of Rhode Island, have made certain new and useful Improvements in Spinning Rings and Frames; and I do hereby declare that the following specification, taken in connection with the drawings, making a part of the same, is a full, clear, and exact description thereof.

Figure 1 is a view of a spinning ring and traveler with gear for driving the same. Fig. 2 is a section of same, showing the manner of lubricating. Fig. 3 is a side view of the ring with a part broken away, to show the construction and adjustment of the different parts. Fig. 4 is a cross-section on the line *x x* of Fig. 2. Fig. 5 is a side elevation of a spinning-frame, showing the mechanism for driving the spindles and rings. Fig. 6 is an end elevation of the same. Fig. 7 shows the surface of the cam-pulley. Fig. 8 is an enlarged view of the spindles and rings, showing particularly the means by which the latter are rotated. Fig. 9 is a top view of the ring-rail, showing the geared connection for rotating the rings. Fig. 10 is a diagram, showing a top view of the bobbin and the angle or leverage of the yarn in passing through the traveler during the process of winding the bobbin. Fig. 11 shows a full bobbin of yarn. Fig. 12 is a sectional detail, to be referred to.

The object of my invention is to spin a continuous thread, and lay the same upon a bobbin or quill of small or large diameter in a compact, sound, and even condition, and to render the spinning-frame capable of being stopped and started at any point of the wind without breaking the thread; and it consists in the improvements in the spinning-ring and in the means of rotating the same at proper intervals, as hereinafter described.

The yarn is laid upon the bobbin in conical form, commencing at the bottom thereof, and by a graduated movement passes up and down until the bobbin is wound full, as shown in Fig. 11.

The yarn passing from the front rolls through the traveler to the bobbin sustains the least amount of strain, while it has the greatest leverage upon the traveler—that is to say, while it is being wound upon the greatest diameter of the bobbin—the angles of leverage being shown in Fig. 10. The strain of the yarn is increased as the wind moves upward from the large to the smaller diameter of the bobbin, such increase resulting from the decrease of the leverage of the yarn upon the traveler. The yarn passing through the traveler while being wound upon the smaller diameters of the bobbin also increases the friction of the traveler in contact with the ring in proportion to the leverage of the yarn upon the traveler. The friction of the traveler, produced in the manner described, brings a great and unusual strain upon that portion of the yarn which is wound upon the smaller diameters of the bobbin, which often results in breaking the yarn and always in straining and weakening it.

In stopping the ordinary spinning-frame care must be taken to stop it at that point in the wind where the tension is slightest; otherwise the threads are liable to break by the sudden starting of the machine.

To obviate the difficulties which I have described, and to counteract the increase in the friction of the traveler upon the ring and of the yarn through the traveler, both of which tend to increase the tension of the yarn as the wind of the yarn upon the bobbin moves from the larger to the smaller diameter, is the object of my invention.

I find by experiment that the difficulties described may be overcome by rotating the ring at proper intervals at a varying rate of speed and in the direction of the rotation of the bobbin, the duration of such rotation and the speed thereof being adjusted to the natural increase of tension upon the yarn attendant upon the upward movement of the wind upon the bobbin.

In my invention, A, Fig. 1, is the ring, and B the traveler. The ring A, instead of being set in the rail, is placed upon the hollow axis C, which is stationary in the ring-rail. Upon the axis C, and attached to the ring A, is a gear, D. The ring A and the gear D are both constructed and arranged to rotate upon the axis C, as shown in Figs. 1, 2, 3, and 12, the upper surface of the gear D being provided with two pins, 15, diametrically opposite, which

enter corresponding holes (see Fig. 12) in the under side of the ring A, to insure their simultaneous revolution. The rings A, for the purpose of receiving motion, may be grouped into sets of two or more, the rings of each set being connected by intermediate gears A′, Fig. 8, and having a driving-gear, as hereinafter described.

In my invention I make use of one driving-gear, B′, for sixteen rings, as shown in Fig. 5. The driving-gear is connected by feather-keying the gear B′ to the grooved spindle G, as shown in Figs. 5, 8, and 9, the lower end of which is a fixed whirl, H.

The spindles G, to which the several driving-gears are attached, are connected by suitable bands to a shaft, I, Fig. 5, which is connected by a belt, J, to a shaft, K. The shaft K is provided with a conical drum, L, which is connected by a belt, M, with a conical drum, N, upon the driving-cylinder shaft O, which drives the spindles *a a a*, &c., by means of suitable bands passing around the fixed whirls *b b b*.

P is a loose pulley upon the shaft K, at the base of the conical drum L.

Q is a cam-pulley upon a shaft, R, which shifts the belt M through the lever T, rack *u*, and guide *v*. The shaft R has a uniform movement, and is rotated by the bevel-gear W through the shaft X, gear and worm Y, and shaft Z, which is rotated by means of any suitable mechanism from the main driving-pulley *c* or front rolls.

The rods S S′, for raising and lowering the rail, are constructed and operated in the same manner as in the machines now in use, and do not, therefore, require particular description.

Having described the several parts of the machine, I will now proceed to describe its operation.

The yarn moves upward in its wind, the same as in the machines now in use, until it reaches that point where the strain becomes injurious. This point is determined by the judgment of the operator, and the mechanism adjusted in accordance therewith, so that upon the attainment of that point the cam-pulley Q operates the lever T, which is provided with a curved transverse toothed bar operating in the rack *u*, and through the guide *v* slides the belt M from the loose pulley P. As soon as the belt M leaves the loose pulley P it passes onto the conical drums L N, and the rings A begin to rotate at a slow rate of speed through the mechanism already specified and shown in Figs. 5, 8, and 9. As the wind continues to move upward from the point where the rings begin to rotate the strain naturally increases, and is met by the corresponding increase in the speed of the rings consequent upon the continued outward movement of the belt M upon the conical drums L N until the highest point is reached. As the wind now descends the speed of the rings gradually decreases as the belt M moves inward, operated, as before, by the cam-pulley Q and the mechanism already described, until the belt is again upon the loose pulley P and the rings are still, where it remains until the point in the upward movement is again reached, when the same operation is repeated.

The ring is at all times rotated in the same direction as the bobbin, but at a much less rate of speed, and it will be evident that the varying strain upon the yarn will be met by the varying speed of the ring.

In Fig. 10 *e* is the outside diameter of the bobbin, *f* the diameter at the point in the wind where the tension becomes too great, and *g* is the quill or spindle.

*h i j* indicate the respective positions of the traveler through which the yarn passes while it is being wound upon the diameters *e f g*, and the lines *k l m*, together with the lines *n o p*, running through the center of the spindle, show the degrees of the different angles corresponding to the different diameters of the bobbin.

The mechanism for rotating the rings at the proper intervals and at the proper speed is susceptible of various changes, as the taste or preferences of different mechanics may dictate.

To provide for the lubrication of the axis C, upon which the ring A rotates, I construct the ring proper in two parts with a band, E. Underneath the band E is an annular groove, F, in the ring, which is filled with fibrous material to take up the oil which is received through the channels *s*, leading from the outside of the ring, and distributed and discharged upon the axis through holes *t*, made for that purpose.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The ring A, provided with the annular groove F, in combination with the band E, traveler B, gear D, and hollow axis C, the whole constructed in the manner substantially as described, for the purpose of enabling the ring to be rotated on its axis, as specified.

2. The ring A, in combination with the hollow axis C, gear D, traveler B, and mechanism for rotating the gear D, consisting of the gear B′, spindle G, shaft I, belt J, shaft K, loose pulley P, cone-drum L, belt M, cone-drum N, shaft O, guide V, rack U, lever T, cam-pulley Q, shaft R, gear W, shaft X, worm Y, and shaft Z, constructed and operating together, for the purpose of giving the ring an automatic intermittent rotary motion and accelerating and retarding the speed of the same during the continuance of such rotary motion, as and for the purposes specified.

ELISHA HARRIS.

Witnesses:
WALTER B. VINCENT,
JOS. T. RICH.