2 Sheets—Sheet 1.

G. DRAPER.

Ring Spinning-Frames.

No. 195,887. **Patented Oct. 9, 1877.**

Fig. 1.

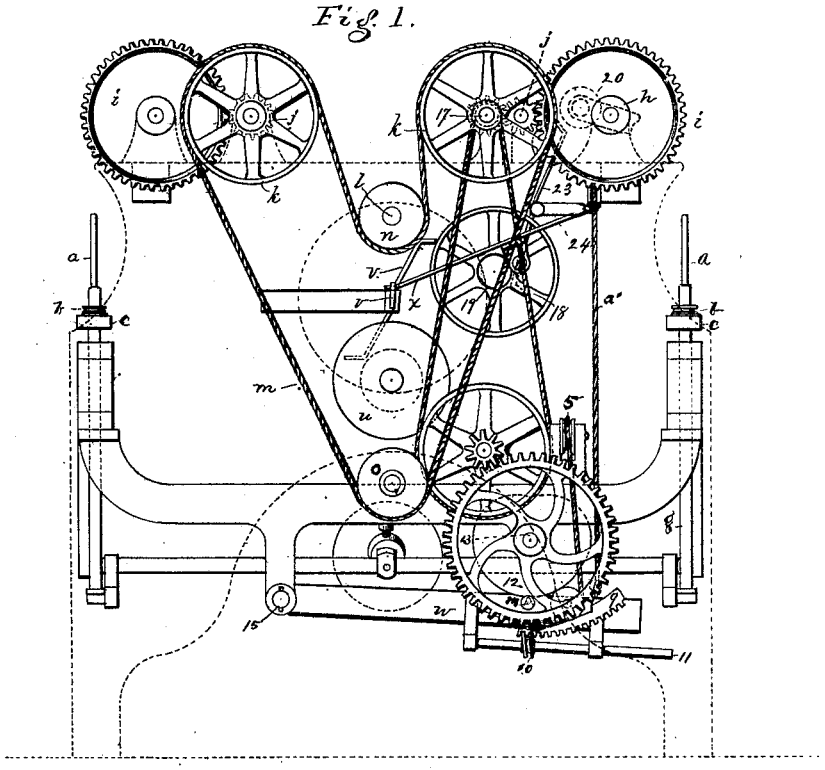
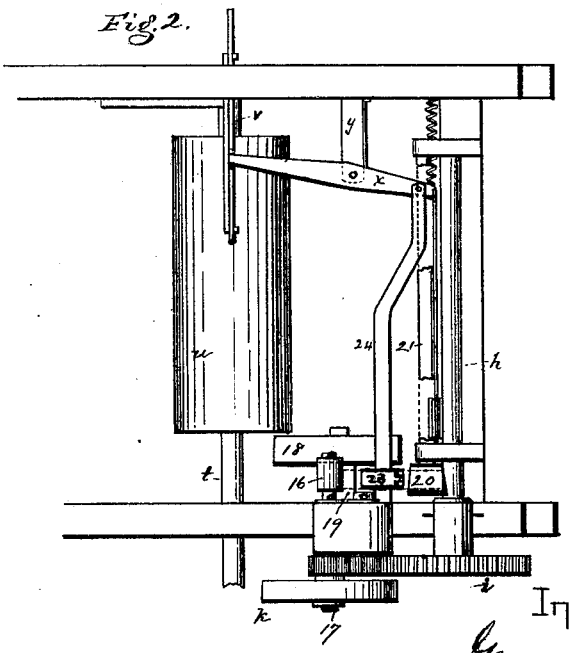


Fig. 2.



Witnesses.
L. H. Latimer.
W. J. Pratt.

Inventor.
George Draper
per Crosby & Gregory Attys.

2 Sheets—Sheet 2.

G. DRAPER.

Ring Spinning-Frames.

No. 195,887. Patented Oct. 9, 1877.

Fig. 3.

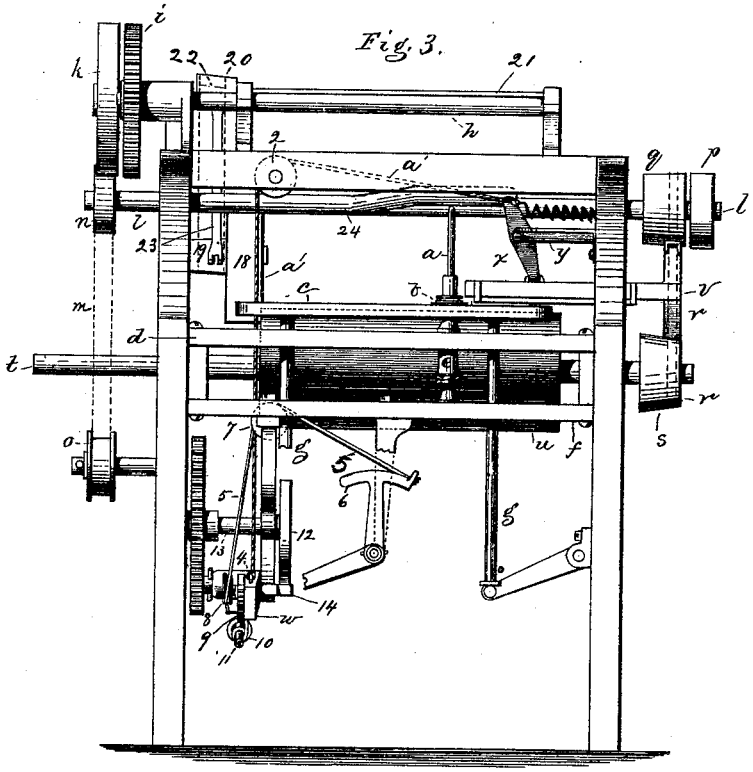
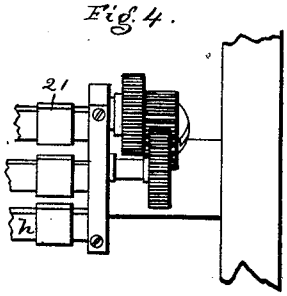


Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE DRAPER, OF HOPEDALE, MASSACHUSETTS.

IMPROVEMENT IN RING-SPINNING FRAMES.

Specification forming part of Letters Patent No. **195,887**, dated October 9, 1877; application filed March 7, 1877.

To all whom it may concern:

Be it known that I, GEORGE DRAPER, of Hopedale, in the county of Worcester and State of Massachusetts, have invented an Improvement in Ring-Spinning Frames, of which the following is a specification:

In United States Patents Nos. 186,324 and 186,325, I have described and shown means for automatically varying the speeds of the front and back rollers with relation to the movement of the spindles, between the time of commencing and completing the winding of the full bobbin, in order to produce yarn of equal size, twist, and strength; and United States Patent No. 186,322 shows and describes mechanism to automatically change the speed of all the rollers with relation to the speed of the spindles, or to change the speed of the front rollers or of the back rollers, with relation to the other rollers and to the spindles, during each complete rise and each complete fall of the traverse or ring rail, whereby, as the rail rises, there will be more stock or twist, or both, in the yarn at the rollers, and when it falls there will be less, for the purpose of equalizing the size, twist, and strength of the yarn on the bobbin, the yarn being wound in layers running from the outside of the yarn-load to the empty bobbin, and vice versa.

In this present invention the front rollers run at a uniform speed, and the speed of the spindles is varied automatically with relation to the speed of the front rollers, nither during each rise and each fall of the ring-rail, or between the commencement and completion of the winding of the bobbin, according as the bobbins are wound after the manner of the filling or warp wind.

This change in the speed of the spindles will so vary the twist according to the size of the bobbin or yarn-load as to equalize the amount of the twist in the yarn applied to the bobbin.

Besides varying the speed of the spindles with relation to the front rollers, this invention also includes varying the speed of the back or other rollers with reference to the front rollers, so as to draw the roving more or less to compensate for the drag on the twisted yarn produced by the traveler as the yarn changes its inclination between the traveler and a vertical line drawn through the center of the spindle and bobbin.

Figure 1 represents in end elevation a sufficient portion of an ordinary ring-spinning frame to illustrate the application of this invention thereto; Fig. 2, a partial top view; Fig. 3, a partial front view; and Fig. 4, a detail of front and back rolls, and connections between back and middle rollers.

It has not been considered necessary to illustrate by drawings a ring-spinning frame complete in all its details, for such frames are well understood by persons familiar with spinning. Nor has it been considered necessary to describe fully and in detail the operation of ordinary ring-spinning frames, and how the difficulties arising from inequality of drag, of traveler, and of twist may be overcome by variations in speeds of rollers and spindles at the proper times, for such matter is fully referred to in the patents before cited, to which reference may be had.

The frame of the machine, spindles *a*, rings *b*, travelers, ring or traverse rail *c*, bolster-rail *d*, bolsters *e*, footstep-rail *f*, lifting-rods *g*, and mechanism for lifting the rods and ring-rail, are all and may be of any ordinary and usual construction. The lower front roller *h* has a gear, *i*, engaged to operate the front rollers by an intermediate toothed gear, *j*, which meshes with a gear on the shaft of a pulley, *k*, driven in any suitable way from a main shaft, *l*.

In the drawing, the pulley *k* (one for each set of rollers at opposite sides of the frame) is turned by a band, *m*, driven by a pulley, *n*, on shaft *l*, the band passing about a tension-pulley, *o*, and the two pulleys *k*, as in Fig. 1. Shaft *l* derives its motion from any suitable driving shaft or pulley by means of a band or gear engaging the pulley or wheel *p* fast thereon. The shaft *l* also has fixed to it a conical pulley, *q*, which is connected by belt *r* with a reverse conical pulley, *s*, on shaft *t*, carrying the spindle-driving drum *u*, banded, as usual, with the spindle-whirls.

A belt-shipper, *v*, embracing belt *r*, and adapted to slide or move laterally, is operated, through suitable connections, by the lever *w* of the traverse mechanism, or from other suitable moving part, operating in an equivalent order of time with relation to the movement of the traverse or ring rail. The connections herein shown consist of a lever, *x*, pivoted to a stud, *y*. One end of the lever engages the

belt-shipping rod, and the other end of the lever has attached to it a cord, a', that extends over sheave 2, and is connected with a hook, 4, on the traverse-lever w. A cord or chain, 5, connected with the segment 6, or lever to move the rods g, passes over sheaves 7 8, and is attached to a rack, 9, engaged by a worm-wheel, 10, on a shaft, 11. The rack and shaft are attached to and move with the traverse-lever w. This shaft 11 is rotated, at each rise or fall of the ring-rail, by means of any usual devices, and the worm-wheel moves the rack along the traverse-lever, so as to cause it (as shown in this instance) to change the point at which the motion of the traverse-rail commences and ends, to wind the yarn after the manner of the filling-wind. Through the connections between the traverse-lever and belt-shipper v the belt r is shifted, at each rise and fall of the ring-rail, so as to drive the drum u and spindles faster when the yarn is being wound from the larger to the smaller diameter of the yarn-load, or from the outside toward the center of the spindle, as when the ring-rail rises, and slower when the ring-rail falls, or when the yarn is being wound in coils of gradually-increasing diameter toward the outside of the yarn-load.

The lower front roller is to be connected, as usual, with an upper front roller, or with the set of rollers, so as to drive such front roller or a set of front and back rollers at uniform speed. The connection is not herein shown, because it is not of itself of my invention. The cam 12 on shaft 13, operating the traverse-lever, may be driven in any usual way, or as described in United States Patent No. 186,325. The cam, bearing against a pin, 14, on the traverse-lever w, moves it on its fulcrum 15.

As so far described, the speed of the spindles may be automatically changed at each rise and each fall of the ring-rail or traverse, while the front rollers, or all the rolls, run at their initial or first speed, and the twist, not the draft, will be equalized.

To vary the speed of the back rollers in one way with relation to the front rollers, as the spindles are changed in speed, a pulley, 16, on the shaft 17, carrying the pulley k, may be banded with a pulley, 18, having on its shaft a cone-pulley, 19, banded with a reverse cone-pulley, 20, on the shaft of the back roller 21.

In the drawing I have deemed it unnecessary to show more than one back roller. It and its mate, and the middle rollers and their connection with the back rollers will be in any usual way—as, for instance, as shown in Fig. 4, or as in United States Patent No. 186,325, which illustrates one very old and common way of moving the middle from the back rollers.

The belt or connection 22, (see dotted lines,) connecting the cone-pulleys 19 20, is placed under the control of a belt-shipper, 23, at the end of a rod, 24, attached to the lever x, which controls the movement of belt-shipper v. Thus the two belt-shippers operate to change in unison the speeds of the respective parts, driven by the belts under their control. This change of speed of the back and middle rollers with reference to the front rollers and the spindles, the latter also being adapted to be changed in speed at each rise and fall of the ring-rail, enables the material between the rollers to be drawn more or less to compensate for the unequal drag of the traveler, while the twist in the yarn is equalized by changes of the speed of the spindles. The spindles are stationary live spindles, the bolsters are fixed to a stationary bolster-rail, and the ring-rail rises and falls.

It is not desired to limit this invention to the exact devices shown for imparting the alternate slow and fast speeds to the spindles and back rollers, and instead thereof any of the devices found in the patents referred to, or in United States Patent No. 186,323, may be employed so far as they are applicable and suitable.

I claim—

1. In a ring-spinning frame, the combination with front rollers adapted to run at a uniform speed, and a ring-rail, ring and traveler, of a spindle, and mechanism adapted to revolve it faster as the yarn is wound from the larger to the smaller portion of the bobbin or spindle, and slower as it is wound from the smaller to the larger portion of the bobbin or spindle, to operate substantially as and for the purpose set forth.

2. In a ring-spinning frame, the combination with front rollers adapted to be run at uniform speed, of spindles and back rollers, and mechanism to automatically change the speeds of the spindles and back rollers, with relation to the front rollers, at each rise and each fall of the ring-rail or operation of the traverse, substantially as and for the purpose set forth.

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

GEORGE DRAPER.

Witnesses:

F. J. DUTCHER,

E. D. BANCROFT.