Sheet 1. 2 Sheets.

G. Draper.

Spinning Mach.

No. 27,434. Patented Mar. 13, 1860.

Fig. 1.

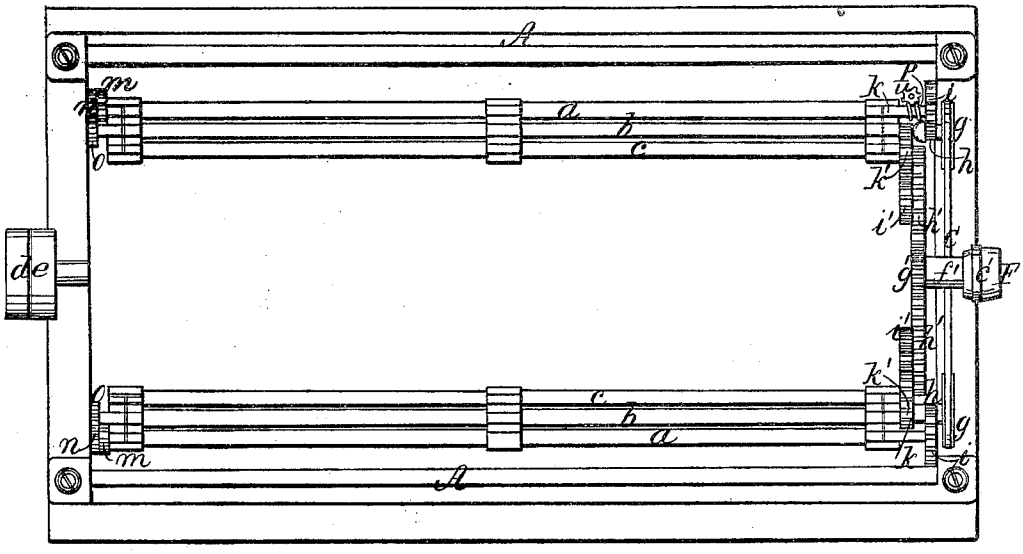
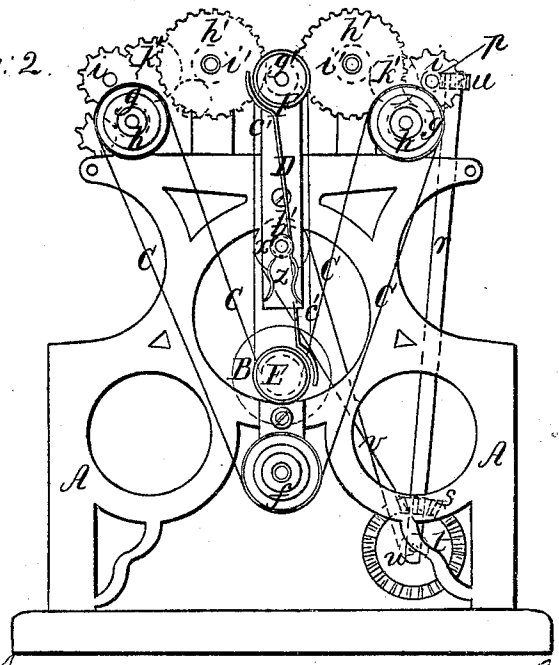


Fig. 2.



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Sheet 2. 2 Sheets.

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Spinning Mach.

No. 27,434. Patented Mar. 13, 1860.

Fig: 3.

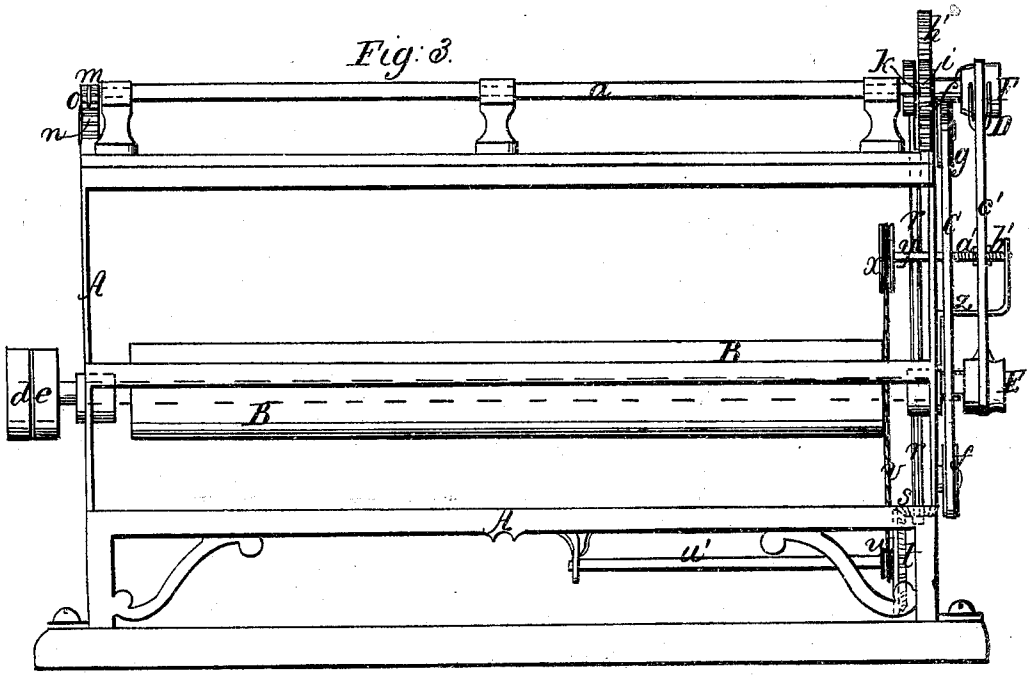
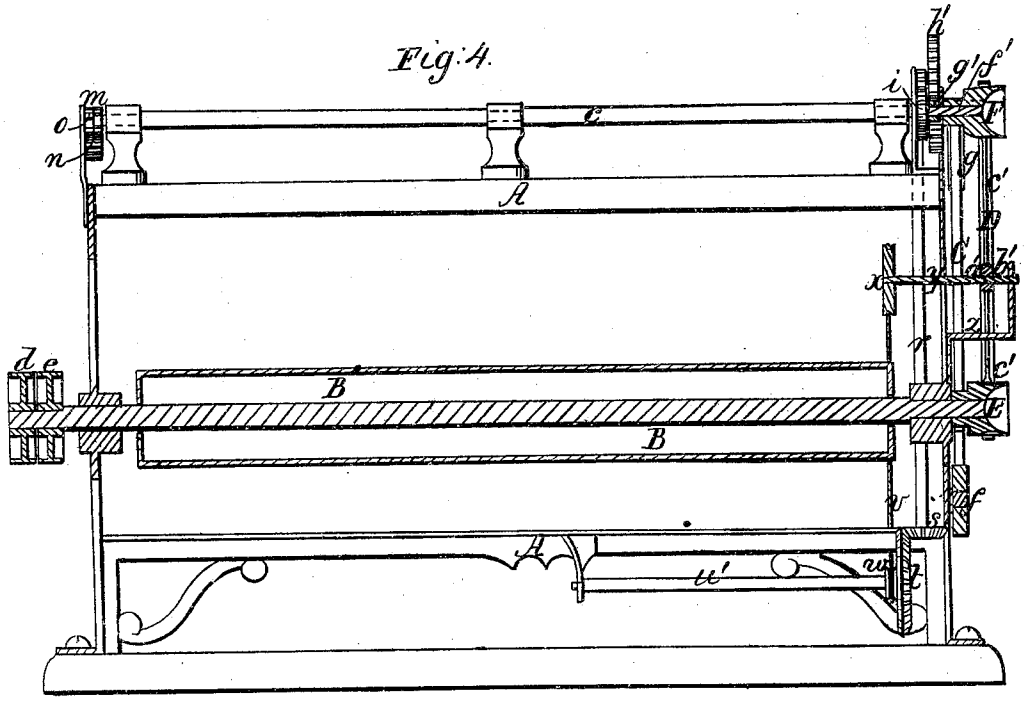


Fig: 4.



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UNITED STATES PATENT OFFICE.

GEORGE DRAPER, OF MILFORD, MASSACHUSETTS.

MACHINERY FOR SPINNING.

Specification of Letters Patent No. 27,434, dated March 13, 1860.

To all whom it may concern:

Be it known that I, GEORGE DRAPER, of Milford, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Machinery for Spinning; and I do hereby declare that the same is fully described and represented in the following specification and the accompanying drawings, of which—

Figure 1, represents a top view. Fig. 2, an end elevation, and Fig. 3, a side elevation of part of a spinning frame with my invention applied thereto; what are termed the top rollers, or twisting mechanism not being exhibited by such drawings, although they are to be employed in the ordinary manner with the bottom rollers, when the machine is in use. Fig. 4, is a longitudinal section of such machine.

In spinning upon an ordinary spinning frame, the yarn as it is spun is wound either upon the bobbin or directly upon the spindle itself. In most cases a set of bobbins, either with or without heads, is employed. As the yarn accumulates on such, the surface upon which it is wound, is constantly, although irregularly increased in size until the operation may be considered as finished, in which case the bobbins or caps are taken off the spindles.

In ring spinning, as well as in various other kinds of spinning, the draft on the yarn between the front or delivering roller and such bobbin or spindle is the greatest, when the surface upon which the yarn is wound is the smallest in diameter; and, furthermore, such draft is constantly decreased as the yarn may accumulate upon the bobbin or spindle. This is caused by the angle formed by the yarn in passing from the traveler to the bobbin or spindle, such angle varying as the bobbin or spindle is being wound with yarn. This variable draft upon the yarn, while it is being twisted, has the effect to make it uneven in size and more uneven in strength, because fine yarn requires more twist, per inch, than coarse yarn does, to make it proportionally strong, but when the yarn is stretched in going from the front or delivery roller to the bobbin it is not twisted so much per inch, because more length of yarn is made, to a given number of revolutions of the spindle. In consequence of this, the yarn, when the wind on the bobbin or spindle is at or about its commencement, is likely to break or draw down and thus not only waste time and stock, but lessen the quantity and injure the quality of the yarn produced. So when the bobbin is full or about so, the yarn, from want of draft is liable to become kinked. The yarn which is first made is fine, slack twisted and tender, but afterward, and as the winding progresses, the yarn becomes coarse with too much twist. This difference in the yarn not only produces bad effects in spinning, but in all the after processes, viz, in spooling, warping, dressing and weaving it.

In throstle spinning or spinning with the flier, such flier is usually driven with a uniform speed, while the bobbin is made to drag by friction; and as the friction is the same, whether the bobbin is empty or full, except the difference caused by the weight of the yarn, the yarn is, of course, drawn the tightest at the commencement of filling the bobbin, the draft decreasing as the bobbin fills up. Various attempts have been made to avoid this difficulty, to two of which I will refer, viz, one by Henry Luther, of Providence, Rhode Island, patented October 30th, 1855, his Letters Patent being numbered 13726. He proposed to equalize the draft by increasing the speed of the frame as the bobbin increased in size. Such a plan I believe to be objectionable as it must essentially diminish the production of yarn, because, when the draft is light and the bobbin is about empty, a frame is run at its maximum speed consistent with safety to the spindles. If the speed be increased, the frame must be started at a slower rate of speed.

Another attempt was made by Joel Smith of Northbridge. His machine was patented Nov. 4, 1856. By means of it, in proportion as the bobbin filled up, the twist was decreased, by increasing the speed of all the draft rollers, the spindles being revolved at a uniform speed. This last plan or invention is an improvement in the common spinning frame, because the yarn being finer at the start requires more twist than it does when the bobbin is about full.

I propose to make the yarn of equal size and equal twist whether the bobbin is about full or about empty and I accomplish this by running the spindles and the front or delivery rollers at the same uniform speed, and I compensate for the stretch in the yarn by gradually decreasing the draft between the set of front rollers and all or some of the others in rear in correspondence with the

gradual accumulation of yarn upon the bobbin and the amount of stretch given to the yarn, while being twisted. In other words, I diminish the draft of the roving before it reaches the front or delivery rollers in proportion as the stretching of the yarn may increase after the yarn may have passed the front set or delivery rollers.

Therefore the nature of my invention consists in a mechanism or combination in which there is combined with the drawing mechanism of a spinning machine, a mechanism, which, as the quantity of yarn wound on a bobbin or a spindle of such machine may increase and the front set of drawing rollers may be moved at a uniform or given speed, shall so decrease the motion of one or more of the remaining sets of drawing rollers relatively to that which such may have at the start, as to cause the yarn spun and wound on the bobbin to have a uniform size.

In the above mentioned drawings, A, exhibits the frame of a spinning machine, of which *a*, *b*, *c*, are the lower rollers of the drawing rollers, these latter rollers, when the machine is in working order being supplied with the usual top rollers. The figures represent the drawing rollers as applied to opposite sides of the frame A. The spindles or twisting mechanism are to be arranged along the sides of the frame A, and below the top rollers as in other spinning machines.

B is the drum for driving the spindles, the power for operating the spinning frame being applied by means of a belt to the fast one of the pulleys, *d*, *e*, (which are fast and loose pulleys) fixed upon one end of the said drum, B. An endless band, C, not only passes around a pulley carried by the said shaft, but also about a guide pulley, *f*, and two driving pulleys, *g*, *g*. Each of the said pulleys is fixed on a tubular shaft, which carries a pinion, *h*, and engages with a gear, *i*, carried by the shaft, *k*, of the front drawing roller, *a*, of each system of drawing rollers.

From the above, it will be perceived that when rotary motion is imparted to the shaft of the drum, B, the front rollers, *a*, *a*, will be put in movement and with a uniform speed so long as the speed of the drum, B, may be uniform. The middle draft roller, *b*, (situated on each side of the spinning frame) receives its motion by means of a train of gears, *m*, *n*, *o*, applied to it and the front roller as shown in the drawings. Furthermore, on the shaft, *k*, of the front drawing roller, there is an endless screw, *p*, that engages with a worm gear *w*, applied to the upper end of a long shaft, *r*, arranged within the frame, A, as shown in Figs. 2, and 3. The said shaft, *r*, carries a bevel pinion, *s*, which works into a bevel gear, *t*, carried by a horizontal shaft, *u'*. An endless band, *v*, works around two pulleys, *w*, and, *x*, one of which, viz. *w*, is carried by the shaft, *u'*, while the other is sustained by another shaft, *y*, the whole being arranged as shown in the drawings. The shaft, *y*, is supported by a bracket, *z*, affixed to one end of the frame, A, such shaft, *y*, being constructed with a long screw, *a'*, which screws through a block or nut, *b'*, which carries a fulcrum or support pin of a furcated lever or shipper, D. The said lever is bifurcated at each of its ends and receives between its forks, an endless band *c'*, which works upon two conical or tapering pulleys, E, F, arranged as shown in Figs. 1, 2, and, 4. The lowermost of said pulleys, E, is fixed upon the shaft of the drum, B, and so as to be rotated thereby, and, in consequence thereof, impart rotary motion to the belt, *o'*, and cause the same to revolve the cone pulley, F. This latter cone pulley is fixed upon a shaft, *f'*, duly supported and carrying on its inner end a pinion *g'*, working into two spur gears *h'*, *h'*, arranged as shown in Figs. 1, and 2. Each of the said gears, *h'*, has a pinion, *i'*, affixed to its inner side and made to engage with a gear, *k'*, that is fixed upon the shaft of the next adjacent draft roller, *c*. This draft roller, *c*, receives its rotary motion by means of the cone pulleys, E, F, the band, *c'*, the shaft, *f'*, the pinion, *g'*, the gear, *h'*, the pinion, *i'*, and the gear, *k'*, and such rotary motion will be varied in proportion as the belt, *c'*, is slipped laterally on the two cone pulleys, they being arranged with respect to one another as shown in Fig. 4. These cone pulleys are to be so shaped as to produce the requisite decrease of motion of the drawing roller, *c*, while the yarn is being spun and wound upon a bobbin or spindle, the movement of the endless band, *c'*, laterally upon the said cone pulleys being effected by means of a forked shipper or lever, D, the block or nut, *b'*, the shaft, *y*, the pulley, *w*, the band, *v*, the pulley, *x*, the shaft, *w*, the gears, *s*, *t*, the shaft, *r*, the worm gear, *u*, and the endless screw, *p*, the latter being revolved with and by the shaft of the front drawing roller.

When the machinery above described and employed to impart motion to the back drawing roller and to properly regulate or decrease the said motion during the operation of spinning and winding the yarn, has its parts duly proportioned, the effect sought to be attained by my invention, viz., that of making yarn of uniform size, may be produced with little or no difficulty.

I do not confine my invention to the precise forms, constructions or arrangements of operative mechanism as hereinbefore described, as other devices, well known as, or understood to be, mechanical equivalents may be substituted for effecting the de-

creased motion of any one or more of the drawing rollers, as described, other than the front one, while this latter is to have a uniform or given speed.

I claim—

In combination with the drawing mechanism of a spinning machine, a mechanism which as the quantity of yarn wound on a bobbin or a spindle of such machine may increase, and the front set of drawing rollers may be moved with a uniform or given speed, shall so decrease the motion of one or more of the remaining sets of drawing rollers relatively to the motion such may have on being started, as to cause the yarn, spun and wound upon the bobbin to have a uniform size.

GEORGE DRAPER.

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