2 Sheets, Sheet 1.

G. H. Dodge.

Spinning and Winding Yarn.

No. 8,997. Patented June 8. 1852.

Fig. 8.

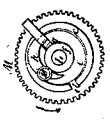


Fig. 7.

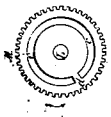


Fig. 5.

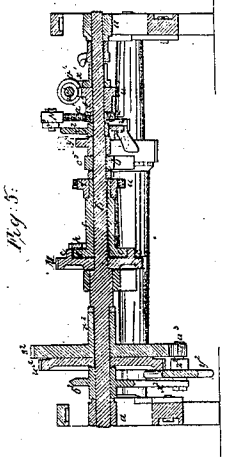


Fig. 2.

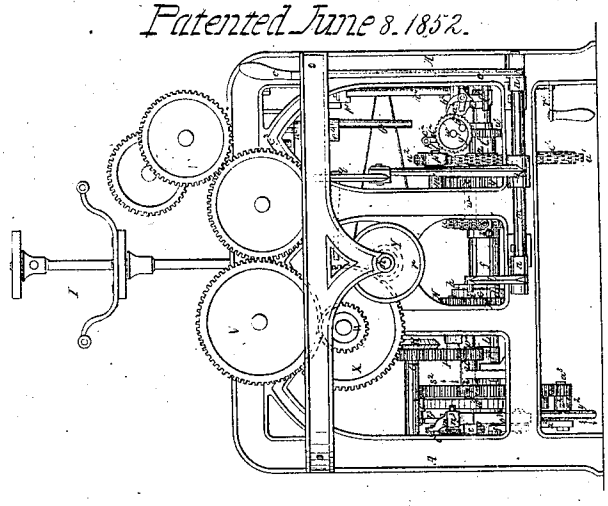


Fig. 3.

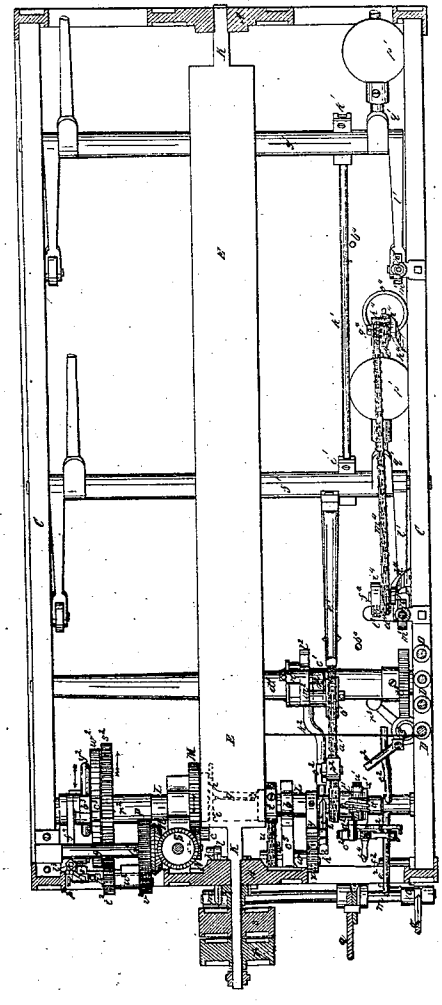
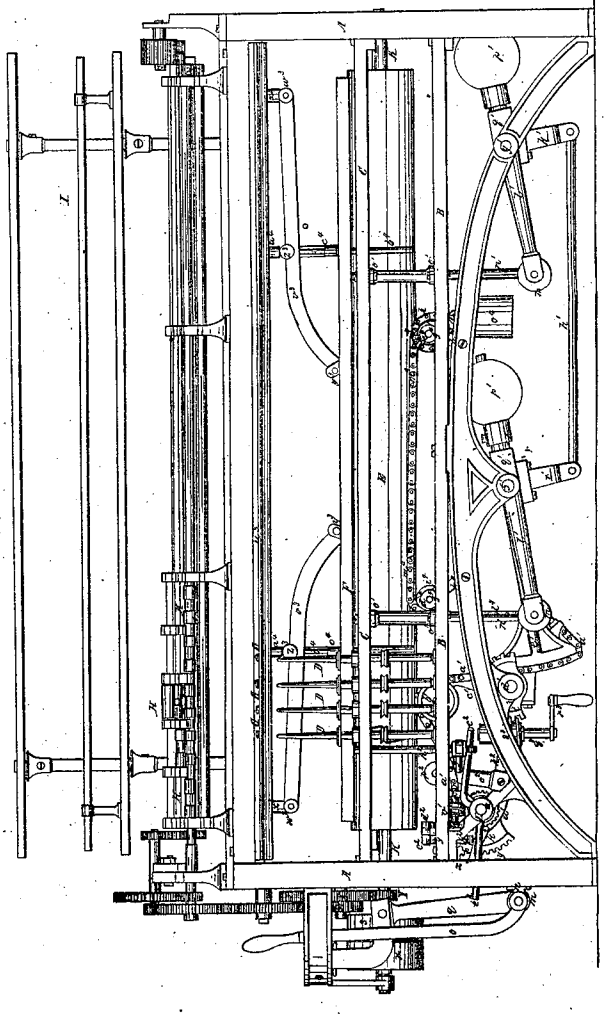


Fig. 4.



2 Sheets. Sheet 2.

G. H. Dodge.

Spinning and Winding Yarn.

No. 8997. Patented June. 8. 1852.

Fig. 17.

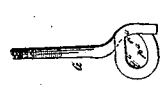


Fig. 18.

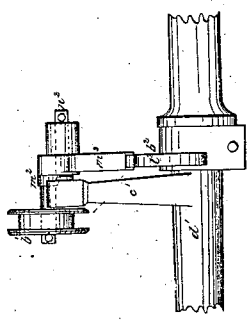


Fig. 6.

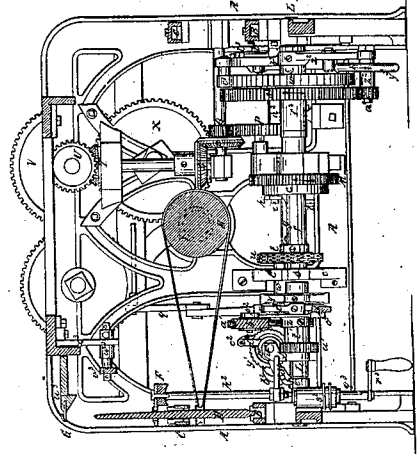


Fig. 10

Fig. 15.

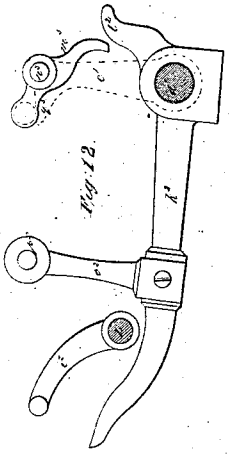
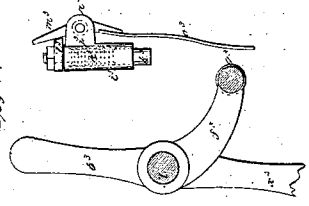


Fig. 12.

Fig. 14.



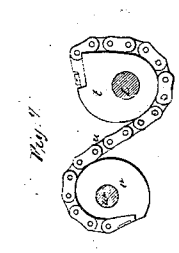


Fig. 11.

Fig. 9.

Fig. 10

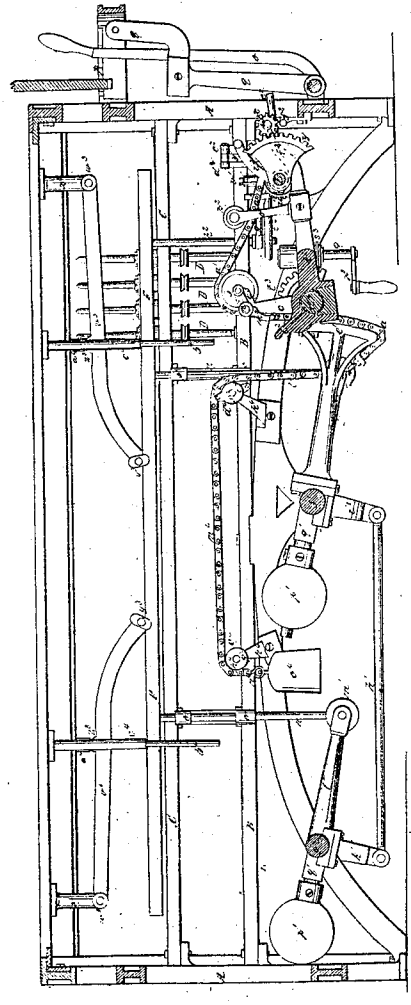
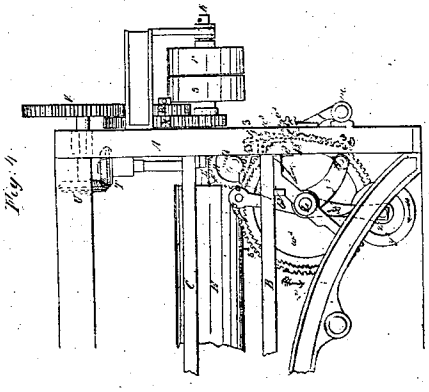


Fig. 8.



UNITED STATES PATENT OFFICE.

GEO. H. DODGE, OF ATTLEBOROUGH, MASSACHUSETTS.

COP-SPINNING FRAME.

Specification of Letters Patent No. 8,997, dated June 8, 1852.

To all whom it may concern:

Be it known that I, GEORGE H. DODGE, of Attleborough, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Machinery for Spinning and Winding Yarn; and I do hereby declare that the same are fully described and represented in the following specification and accompanying drawing, letters, figures, and references thereof.

On the twenty-seventh day of November A. D. 1847. Letters Patent (numbered 5378) of the United States of America, were granted to me for sundry improvements in machinery for spinning and winding yarn; the peculiar object of such improvements which were applied to a throstle spinning frame, having been to wind the yarn as fast as twisted or when properly twisted, upon each of the spindles, in a regular or proper shaped cop which should have a binding thread between each two adjacent layers of its yarn, the same being to prevent the cop from falling apart while being removed, or after its removal from the spindle. My present or new, improvements have a similar object, they also being for the purpose of obviating sundry difficulties which were subsequently found to be incident to the operations of some one or more of the former ones. The drawings which accompany my specification will consequently exhibit more or less of such former improvements as may be necessary to a full illustration of the connection and operation of them with what constitutes my present or new improvements and for a more full description than is hereinafter given of such former improvements reference may be had to the specification of my said Letters Patent.

Of the drawings which make part of or appertain to the following specification, Figure 1, exhibits a front elevation of a throstle frame, having my improvements applied to it, Fig. 2, is an elevation of that end of it to which the driving power is applied, Fig. 3, is a horizontal section of it the same being taken through the axis of the main drum which drives the spindles, the scroll shaft and other parts situated below the plane of the section being represented in top view. Fig. 4, is an elevation of part of the rear side of the machine, the copping or ring rail and the spindles generally placed on the side not being exhibited, they being but repetitions of such contrivances as applied to the front side and shown in Fig. 1. Fig. 5, is a vertical and longitudinal section of the scroll shaft and parts immediately connected with it.

Such other figures as may be necessary to a full description and delineation of my new improvements will be hereinafter referred to and described.

In several of the said figures A, A, denote the cast iron ends of a throstle spinning frame.

B, B, on the sides are the step rails of the spindles; C, C, the upper bearing rails thereof.

D, D, D, &c., are the spindles; E the main drum by which they are driven.

F, is the copping or ring rail.

G, G, G, &c., are the guides to the threads in their passage from the front pair of drawing rollers to the spindles.

H, is a series of drawing rollers such as are in use in other throstle frames.

I, is the bobbin frame or creel.

K, is the main driving shaft from which the drawing rollers and other parts receive their motions.

L, is what I term the scroll shaft. It is situated beneath the main shaft and extends transversely across the machine and revolves in permanent bearings a, a, situated below the step rails. It also passes through and revolves in a third box or bearing b, supported on a projection c^5, from the end A, of the frame. The said scroll shaft has a reciprocating partial rotary motion imparted to it, it being made to move first in one direction with a slow motion, and next in the opposite direction with a much faster one.

I shall now proceed to explain a new mode or mechanism for effecting the upward and downward movements of the copping rail, and which differs in some important features from that explained in my said Letters Patent numbered 5378.

Upon the scroll shaft L, a loose spur wheel M, is placed, in the position as seen in the drawings, such spur wheel being made to receive its motion from the main shaft K, by means of any proper collection or train of gearing made to intervene between the two.

Fig. 6, represent a transverse section of the machine taken through the second spindle D and as though the spectator were looking toward the scroll shaft.

N is the pinion gear, which engages with the spur wheel M. The wheels of the train of gearings by which the said spur wheel M, is put in constant revolution in the direction denoted by the arrows on it, being seen at P, Q, R, S, T, U, V, W, X, and Y, the last one Y, being fixed upon the main driving shaft K. To the side of the spur wheel M, is attached a circular clutch flanch *c*, in which is an opening or passage *d*, see Fig. 7, which is a side view of the spur wheel M, and its clutch flanch *c*. Working or fitting within the circular flanch *c*, is a circular disk or plate *e*, which is attached to a tubular shaft *f*, that plays loosely on the scroll shaft. A spring click or dog *g*, is made fast to the shaft *f*, and works in a radial slot or opening cut in the circular disk *e*. This spring click operates in connection with the opening or passage *d*, of the clutch flanch *c*, and when within such opening, it clutches the circular disk *e*, of the shaft *f* (and consequently the shaft *f*) to the spur wheel M. A curved lever *h*, (see Fig. 8, which is a view of the circular disk or plate *e*, and the spur wheel M,) is applied to the side of the circular disk or plate *e*, and works upon a fulcrum pin *i* at its lower end and at the upper part of its curve it rests on the spring click *g*. The lever, *h*, besides being curved is bent radially or outward, as seen in the drawings, and so that such bent part during the rotation of the lever, in a direction toward the adjacent end of the main frame, may be carried down upon and made to bear against a projection *k*, extending horizontally from an arm *l*, which projects inward from one end of a horizontal rocker shaft *m*, disposed as seen in the drawings, and working in bearings *n*, *n*, affixed to the outer side of the frame end A. On the other end of the horizontal rocker shaft a spring shifting lever *o*, is fixed, which works in connection with a locking plate *p*, in the usual way. From the middle part of the shaft, a fork arm *q*, rises upward and receives the driving belt within its fork, and causes it to be moved either upon a loose pulley *r*, or a fast-pulley *s*, (fixed upon the main driving shaft K,) according to the direction in which the shifting lever may be moved.

On the tubular shaft *f*, a scroll cam *t*, (see Fig. 9, which is a side view of said scroll cam, its chain *u*, and another scroll cam *v*) is fixed. To the periphery of this scroll cam, one end of a chain *u*, is attached and extends around said periphery and has its other end secured to the periphery of a second scroll cam *v*, which is fixed upon one end of a horizontal shaft *w*. On the opposite end of the shaft *w*, is a pinion *x*, which gears into a toothed quadrant or sector *y*, attached to the scroll shaft L.

Fig. 10 is a longitudinal and vertical section of the machine taken through the toothed pinion *x*, and quadrant *y*, and as though the spectator were looking toward that side of the machine, at which the spindles are situated, the drawing rollers and none of the machinery on top of the frame being represented.

On the scroll shaft L, is another scroll cam *z*, (see Fig. 11) to whose periphery a chain *a'*, is attached, and around which it works, and from which it extends to and partially around a grooved roller *b'*. Said roller *b'* is connected with the upper end of an arm *c'*, (as will be hereinafter described,) which extends upward from a transverse rocker shaft *d*. Then the chain *a'*, passes downward and is attached to the periphery of a sectoral arm *e'*, which extends horizontally from another transverse horizontal rocker shaft *f'*. There is also another horizontal rocker shaft *g'*, which is connected with and operated by the rocker shaft *f'*, by means of a connecting rod *h'*, and two arms of equal length *i'*, *k'*, extending downwardly respectively from the rocker shafts *f'*, and *g'*, such connections of the said shafts *f'* and *g'*, being so made and applied to them as to cause the movements of the shaft *g'*, to correspond exactly with, and be produced by, those of the shaft *f'*. From each shaft *f'*, *g'*, an arm *l'*, extends at right angles, as seen in the drawings, and carries a friction roller *m'*, at its extreme end. Upon the periphery of these rollers the lower ends of two vertical rods *n'*, *n'*, rest, the said rods being supported so as to slide freely up and down within proper bearings *o'*, *o'*, and having the copping or ring rail F, affixed to their upper extremities. Each rocker shaft *f'*, *g'*, has a sliding balance weight *p'*, applied to an arm *q'*, extended from it, in the direction as seen in the drawings.

The form of the scroll cam *z*, is represented in Fig. 11. This scroll cam rotates freely on the scroll shaft, and is attached to the end of a tubular shaft *t'*, which turns on the scroll shaft L, and has a worm gear *u'*, fixed upon its other end. The worm gear *u'* engages with an endless screw or worm *v'*, fixed on a shaft *w'*, which revolves in bearings in a standard or frame *x'*, that is fastened firmly to the scroll shaft L. The said shaft *w'*, has a ratchet wheel *y'*, fixed upon its outer end. The shaft *w'* extends through one end of a vibrating lever a^2, which is made to play loosely upon the shaft. The said lever carries upon its other end an impelling pawl b^2, which engages with the ratchet wheel. Over the ratchet wheel, is a retaining pawl c^2, which is jointed to an arm d^2, extending upward from

the frame x'. The ratchet wheel y', has a small crank handle b^4, projecting from its side, the same being for the purpose of turning the mechanism in reversed direction, and thereby lowering the ring rails when the pawls are thrown up or out of the teeth of the ratchet, and when desirable so to do. Directly under the rear or outer end of the lever a^2, is a bent lever e^2, which turns or moves on the scroll shaft L, as a fulcrum. Its outer end when in its lowest position rests on the top of a stationary standard or projection f^2, which is affixed to and projected from the main frame. The inner arm of the said lever e^2, extends directly under a horizontal projection g^2, which is applied to a vertical rod, h^2, extending downward from the adjacent ring rail F. The said projection g^2, should be so adapted to the rod h^2, that it may be elevated and depressed by adjusting screws or nuts in order that its position may be regulated as circumstances may require. The scroll shaft has an arm i^2, fixed firmly to it, the same being seen in Fig. 3, and also in dotted lines in Fig. 10. The said arm i^2, is made to act upon and depress a bent lever k^2, whose fulcrum is on the transverse rocker shaft d'.

Fig. 12, exhibits a side view of the arm i^2, the lever k^2, and the lever which carries the grooved roller b'. The inner or small arm l^2 of lever k^2, is made to bear against the lower arm of the bent lever m^2, which works upon a fulcrum or pin n^2, extending from the upper part of the arm c'. The upper arm of the lever m^2, is bent horizontally over and rests upon a projection q^2, from the top of the arm c', and has the grooved roller b', turning freely upon it, the same being as seen in Fig. 13, which represents a view of the edge of the grooved roller b', the arm c', and the rocker shaft d', to which said arm is attached. From the long lever k^2, a vertical arm or standard o^2, projects upward, and carries a roller p^2, beneath and against which the chain a', passes. The object of the arm i^2, levers k^2, m^2, rollers b', p^2, and arm c', constructed as described and applied to operate in connection with the arm o^2, and roller p^2, shown in the drawings, is to cause the copping or ring rail F, to perform a short and sudden rise or lift to finish each upward movement of it, and this so as to wind as little yarn as possible at the nose of each of the conic layers composing the cop. It is very important that but very little yarn should be wound at the nose or upper end of each layer of the cop.

In my Letters Patent numbered 5,378 I described a combination of mechanism for the purpose of causing the ring rail to rise upward with the increased velocity necessary to prevent the piling of the yarns in any one place or part of each layer composing the cop. The said mechanism consisted of a cam, a lever and roll as combined with the scroll shaft and its appurtenances as therein explained, and in combination with such mechanism I claimed and described a projection applied to the cam, the same being for the purpose of producing a very quick rise of the ring rail in order to finish the nose or upper extremity of each layer of yarn composing the cop. In the use of the contrivance for elevating the copping rail such contrivance is made and described in my said Letters Patent 5,378. I have found that there was too much strain brought upon the clutch, such strain being productive of wear or other injurious consequences. Now, in order to avoid such strain or obviate the difficulty I have combined and make use of the improved clutch contrivance, (with one opening d,) the two scroll cams t, and v, the chain w, the pinion x, and quadrant y. By means of the quadrant and pinion, I give to the scroll shaft the proper movement, and by the addition of the cams t, v, and their chain, I am not only able to reduce the strain upon the spring click or dog, but by giving to either one or both of the said cams a proper form, I can dispense with the use of the cam or contrivance which was formerly used to produce the increased speed of the copping rail. In order that it may be understood what cam or contrivance I allude to I would remark that it is represented in Fig. 8 of the drawings of my said Patent 5,378.

Having thus premised I will now proceed to describe a mode of operation of that part of the mechanism above described by which the bottom part of a cop is formed on each spindle and the whole cop gradually built up or completed with a binding thread between each two consecutive layers of yarn wound on said cop, and making part thereof.

From what has been before specified, it will be seen that when the scroll cam z, is moved so as to drag upon its chain a', that the elevation of the ring rail F, must ensue, and this elevation continues while such drag takes place, also that this drag is produced when the shaft f is clutched to the spur wheel M, by the spring click or dog g, being within the opening d, of the clutch flanch c. As soon however as the said spring click or dog g is forced downward and out of said opening by reason of the curved lever h, being carried into contact with the projection k, of the arm l, the tubular shaft f, will be unclutched, and left free to move in an opposite direction, and will be so moved in said opposite direction by the gravitating power of the ring rail which on being thus left free will fall down by its own weight or by means of any power applied to it to depress it.

The fall of the ring rail while the spindles are in rapid revolution will cause the

yarn to be laid on each cop in a helix which will cross the several threads of the layer of yarn previously spun and wound on the spindle. By means of the scroll or cam z, I regulate the length of each successive layer of yarn composing the cop. As the scroll shaft has a positive motion imparted to it, that is as it is always made to rotate forward a certain distance or a certain number of degrees of a circle and not in the opposite direction or backward a like distance or number of degrees, it will be seen that in order to increase the length of each successive layer of yarn wound on the spindle, to form the bottom part of the cop, the elevation of the ring rail must be gradually increased. This is produced by the peculiar shape given to the scroll or cam z, and by moving or gradually turning said cam around on the shaft.

In my Letters Patent numbered 5,378 I described a mode of building the cop, and I would remark that that method is the same as adopted by me at present. The first layer of yarn I suppose to be wound on the spindle a distance equal to about one half the length of the last layer composing the bottom part of the cop. From this it will readily be understood why the scroll or cam z, must be gradually turned around on the scroll shaft so as to increase the length of each successive layer of yarn composing the bottom part of the cop, what is termed the top part, and what is termed the bottom part of the cop, having been fully described in my said Letters Patent numbered 5,378.

It is the purpose of the worm gear u', worm or endless screw v', shaft w', standard or frame x', ratchet wheel y', vibrating lever a^2, impelling pawl b^2, lever c^2, standard or projection f^2, projection g^2, and vertical rod h^2, hereinbefore described, to produce the gradual rotation of the cam in order to form both the top and bottom part of the cop. This last mentioned machinery for gradually turning around the cam z, in order to increase the length of each successive layer of yarn, forming the bottom part of the cop, constitutes no part of my present or new improvements, but as it is used in connection with them I have deemed it advisable to give some description of it, and would here remark that for a more particular description of it reference may be had to the specification of my said Letters Patent No. 5,378. In my said specification of said Patent No. 5,378 I described a mechanism the office of which was to ease the ring rail in its fall or to cause it to fall with the variable or required velocity or such a velocity as would not be so quick or sudden as either to break the yarn or not put on the cop a sufficient quantity of binding thread. I have made an improvement on such mechanism, which I shall now proceed to describe.

A tubular shaft r^2 is placed and made to run freely upon the scroll shaft L, the said shaft r^2 having a large spur gear s^2 fixed upon it, which spur gear receives its motion (in the direction denoted by the arrow thereon) from a pinion t^2 fixed upon one end of a shaft u^2 (represented in dotted lines,) which has upon its other end a gear b^2, that receives its motion from the gear wheel P, hereinbefore mentioned. On the side of the spur gear s^2, is a ratchet wheel w^2. An arm x^2 is fixed firmly to the scroll shaft L, and projects downward from it, and carries a small fly wheel y^2 on an axle z^2 extending horizontally from it. The said fly wheel has a small pinion a^3 affixed to it, which engages with the large spur gear s^2. The said gear s^2 during its revolution will so act upon the pinion a^3 as to put it and the fly wheel y^2 in rapid revolution, in the direction denoted by the arrow on said fly wheel. This taking place while the ring rail is being raised, will cause a considerable momentum to be generated in the fly wheel. Now when the ring rail falls, the momentum so generated in the fly wheel will be brought into action in such manner as to cause the pinion a^3 to so operate against the gear s^2 as to counterbalance in a certain degree the tendency of the ring rail to fall too quickly or suddenly. The ring rail will thus be eased down, so as to prevent breakage of the threads. The last described machinery with some exceptions is essentially like that described in my said Letters Patnt No. 5378, for the purpose of easing the fall of the ring rail, and insuring the descent of it in such manner that a binding thread will be laid upon the cap. But in order that it may operate to better advantage I connect with it certain other mechanism which I shall now proceed to describe, such mechanism constituting part of my new improvement.

I extend upward from the scroll shaft and in an opposite direction to that in which the arm x^2 extends an arm b^3 to whose upper end I apply a retaining pawl or click c^3 which I cause to rest upon the periphery of the ratchet wheel w^2. Upon the completion of the upward traverse of the copping or ring rail F, the spring click or dog g is disengaged from the opening d, of the clutch flanch c, and permits the copping rail to descend which descent taking place, produces such action upon the radial arm x^2 as to arrest the momentum of the balance wheel y^2 which being effected, the pawl or retaining click c^3 upon the arm b^3 will take into the ratchet or catch wheel and lock the balance wheel to the spur gear s^2 in such manner as to prevent the said balance wheel from reversing its motion, and also permit the descent of the copping or ring rail to take place with a nearly positive or uniform

motion, governed by the speed of the spur gear s^2.

My next improvement is for the purpose of effecting the change of the downward to the upward motion of the copping rail in an easy manner and so as to prevent injurious strain when the spring click or dog g strikes into gear with the clutch flanch c. Fig. 14 represents a view of the apparatus constituting such improvement. An arm f^3 bearing a roll g^3 extends outward from the scroll shaft L, and between the arms x^2 and b^3 as seen in the drawings. A spiral spring h^3 (represented in Fig. 14 by dotted lines) is placed within a vertical tube i^3, bolted or made fast to the frame work. This spring is connected with and serves to depress a rod k^3, which extends upward through the same, and has a cam stud or projection l^3 extending laterally from its upper part as seen in the drawings. The lower end of the rod k^3 projects below the tube or bearing i^3 so that when the arm f^3 rises upward it may be brought in contact with such lower end of the rod and produce the elevation or rising upward of said rod, such as will cause the cam l^3 of it to be borne against the upper end of a curved or bent lever m^3 and thereby turn said lever on its fulcrum or pin n^3 and in such manner as to press a flat spring o^3 (which projects downward from the lower arm of the lever m^3, as seen in the drawings) against the roll g^3. The harder the arm f^3 bears against the rod k^3 the harder will the said flat spring be borne against the roll. The fulcrum pin n^3 is made to extend from a projection p^3 from the side of the tube or bearing i^3.

The parts of the mechanism last described are so arranged that the pressure of the spring may be brought into action immediately on the passage of the spring dog g into the opening a and in such manner as to relieve the strain on the clutch apparatus, which might otherwise be produced.

Another part of the machine or mechanism is the contrivance for lowering the copping or ring rail for the purpose of doffing or removing the cops from the spindles. For this purpose I make use of a crank shaft q^3 arranged and having a crank r^3 upon it, as seen in the drawings. On said crank shaft is an endless screw s^3 which gears into or works in the teeth of a sector or quadrant t^3 fixed upon the transverse rocker shaft d'. By turning the winch or crank in the right direction the shaft d', will be put in motion in such manner as to depress the grooved roller b', and thereby slacken the chain a', and allow the sectoral arm e', to fall downward, and thereby permit the fall of the ring rail sufficiently for the purpose of doffing the cops.

My next improvement may be thus described. The guides G, G, G, through which the threads pass in their passage from the front drawing rolls to the spindles, are represented as attached to a bar u^3. In the common throstle machines this bar has heretofore been a stationary or immovable bar, placed at such a distance above the tops of the spindles as would be sufficient to leave a proper length of yarn between each guide G, and the ring or traveler of its spindle, when the ring rail was in its highest position. The descent of the ring rail, as a matter of course would constantly increase this distance, and as the centrifugal force generated by the rotation of the yarns would cause such yarns to "belly," or be thrown outward, it became necessary to place such spindle at such a distance from the one immediately adjacent to it as to prevent the yarn of one when in rotation from coming in contact with that of the other. By my improvement I make the guide rail or bar u^3, movable, and combine it with the ring rail, by such machinery, as will gradually elevate it, as the wind of each layer of the cop increases, from its commencement to its termination. The method of accomplishing this, and regulating the distance between the guide rails, and the copping or ring rail during the period of their respective movements is as follows. For this purpose I use on each side of the middle or center, a lever v^3, whose fulcrum w^3, is at its outer end, and is supported by a projection x^3, extending downward from the frame work as seen in the drawings. Each lever has a stud or projection y^3, which rests upon the top of the copping or ring rail F, and as the said copping or ring rail moves upward it imparts an upward motion to the levers. Upon a swell or projection z^3, on each lever a standard a^4, supporting the guide rail or bar u^3, rests, and from each of said standards a guide rod b^4, extends downward through a suitable bracket or guide c^4, or one such as together with the said rod, will permit the guide bar u^3, to play freely up and down, while at the same time it preserves the correct position of the bar in other respects. The guide rail will be moved upward when the copping rail is elevated, its motion being in proportion to the relative distances of the stud y^3, (resting on the copping rail) and the swell z^3, (supporting the standards of the guide rails) from the fulcrum w^3, of the lever v^3. The traverse of the guide rail in proportion to the traverse of the copping or ring rail, being regulated by adjusting the position of the swell z^3, on the lever in accordance with the amount of variation which it may be desirable to have between the movements of the guide and the ring rails. A material advantage of this improvement when a ring and traveler flier is used in spinning is to be found in its enabling me to arrange the spindles closer

together, or at a less distance apart, from one another than we could do with safety were the guide rail made stationary. By reducing the distance between the copping or ring rail and the guide rail during their respective movements we lessen the angle at which the yarn is delivered from the guide wires, to their respective spindles, and preserve the yarn from the liability of breakage or injury in coming in contact with each other. By thus reducing the distance between the spindles, I am enabled to put more of them in a frame, than I could under other circumstances or in other words were the guide rail to be kept stationary.

My next improvement is for the purpose of regulating the action of the copping rail or rails on the scroll z, according to the leverage or in other words for providing a compensation for the difference of leverage produced by the scroll. When the chain of the scroll z, is tangential to that part of the periphery of the scroll which is at the greatest distance from the axis of the scroll shaft, it is evident that the draft or drag upon the scroll produced by the action of the copping rail is at a maximum; so when said chain is tangential to that part of the scroll which is nearest to its center, or the axis of the scroll shaft, such strain is at its minimum, there being continual variation of the said strain during the rotary motion of the scroll or scroll shaft. It is very desirable that this strain should be equalized, and for this purpose, I make use of two cams d^4, e^4, which revolve freely and respectively upon two horizontal axes, f^4, g^4, arranged and extending from the arms h^4, h^4, secured to the main frame work, as seen in the drawings. Fig. 15, represents a side view of one of these cams, and Fig. 16, an edge view of the same, each cam being fixed to the side of a rotary circular wheel or pulley i^4, k^4, which also revolves freely with the cam. A chain l^4, is attached at its lower end to the arm l', of the shaft f', its upper end being attached to the periphery of the wheel i^4. Another chain m^4, is attached to the periphery of the cam d^4, extends around the same and is attached at its other end to the periphery of the wheel k^4. A third chain n^4, has one end secured to the periphery of the cam e^4, is extended over the same, and has a weight o^4, suspended to its lower ends. The two cams are made and arranged in such manner that the weight o^4, shall so act as to compensate for the variation in the action of the copping rail.

My next improvement is for the purpose of preventing the yarn from being either broken or injured at the time, either of stopping or starting the machinery and when the yarn is being laid on the spindle at the nose of the cop. It is well known that the part of the spindle on which the yarn is first wound at the commencement of building the cop, must be of a diameter large enough to create a lateral drag of the yarn on the traveler, sufficient to readily overcome, when the traveler is first started on its ring, the inertia of the traveler and impart to it (the traveler) a velocity on the ring, that will prevent the thread from breaking. To obtain the advantages of a small spindle and at the same time have a diameter at its bottom large enough to enable the yarn to start the traveler, without danger of rupture to the former, I made an improvement which was described in my said Patent 5378. Now it will readily be seen that if we suddenly stop or start the machinery at or immediately previous to the formation of the nose or small part of each cop layer, the wind of yarn upon the spindle will be so small in diameter as not to be sufficient to produce the degree of lateral drag to the traveler required to overcome its inertia. In order that I may not stop the machine precisely at such point, I provide the rocker shaft m, of the shifting lever o, with the bent arm l, and the projection k, hereinbefore described, and so arrange said arm with respect to the shifting lever, that when the latter is moved outside to the extent of its motion or so as to throw the driving belt upon the loose pulley r, the projection k, shall be elevated or raised up so as to meet the curved lever, h, of the spring click or dog g, sooner than it otherwise would, and thereby cause the unclutching of the circular disk or plate e, from the clutch flanch c, and so as to arrest the motion of the ring rail, just before the formation of the nose of the cop, and while the wind of yarn, is of a diameter large enough to produce the amount of lateral drag sufficient to overcome the inertia of the traveler, when the machine is next started or put in motion. It will also be seen that if the machine is stopped at the time the nose of the cop layer is being formed, the momentum of the traveler would be liable to break or injure the yarn.

My next improvement is to be found in the manner in which I construct or make each of the thread guides G, G. For this purpose I have represented in Fig. 17, a top view of one of the said guides, as it appears before it is inserted in the guide rail. My improvement consists in making the opening or thread passage p^4, of the guide, elongated, in the direction of a vertical plane, passing through all of the spindles; in connection with making the back of the opening or that part which is next to the guide board, and against which the thread rests, straight or very nearly straight as seen at q^4, r^4. The thread in its passage from the draw rolls through the opening of the guides, always lies or bears hard against

the rear side of said opening that is provided the front draw rollers are placed in rear and some distance back from the guides, as they are in the drawing. If the rear side of the opening is curved, the thread of course will be drawn into the rearmost part of the curve, and this will obstruct the twist or more or less prevent it from passing into that part of the thread which lies between the guide, and the front draw roller. Therefore it will be seen that if the back part of the passage of the thread guide is made straight as seen at q^4, r^4, the thread during the motions of the traveler, will have the opportunity of moving or being moved or vibrated upon said straight part, whereby the twist will not be obstructed, as hereinbefore mentioned.

Although I have described the above specified mechanism under certain forms of its parts as represented in the drawings, yet it must be borne in mind that I do not intend to limit my claim to such forms or such arrangements as are described or represented but intend to vary the same to any extent to which I may be legally entitled so to do, so long as I do not change the novel character or features constituting my invention or improvements.

What I claim is as follows,—

1. I claim the toothed quadrant y, the pinion x, and its shaft w, in combination with the two scroll cams t, v, their chain u, tubular shaft f, and the clutch contrivance, made with the spring click g, and one single detent or opening d, the whole being applied to the scroll shaft L, and spur gear M, and made to operate substantially in the manner and for the purpose as hereinbefore stated.

2. I also claim the ratchet wheel w^2, the arm b^3, and retaining pawl or click c^3, or any mechanical equivalent therefor, in combination with the balance wheel apparatus (viz. the arm x^2, the fly wheel y^2, its shaft and pinion a^3) and the spur gear s^2, having a positive motion as described, the whole being for the purpose, as specified.

3. And in combination with the scroll shaft and its mechanism for effecting the upward and downward movement of the ring rail, I claim the mechanism for effecting the change of the downward to the upward motion of the said rail in an easy manner and so as to prevent injurious strain when the spring click g, strikes into the recess d of the clutch flanch c, the said mechanism consisting of the arm f^3, roll g^3, spring h^3, tube i^3, rod k^3, cam l^3, curved lever m^3, and spring o^3, (or their mechanical equivalents) combined and operating together substantially as herein before described.

4. I also claim the improvement of so applying or combining the thread guide G, or the guide bar or rail u^3, to or with the ring rail and the frame, that the said guide or guide bar shall be movable or made to move upward and downward while the ring rail so moves; and this with a movement either equal to or in accordance with that of the ring rail or a variable one, as circumstances may require, the same being for the purpose as specified.

5. And in combination with the scroll z, its chain and connections with the ring rail, I claim a compensature mechanism or apparatus for regulating the action of the copping rail or rails on the said scroll, according to the leverage or in other words for providing a compensation for the difference of leverage produced by the scroll, as described, the mechanism employed by me and the combination of which I also claim, consisting of the two cams d^4, e^4, the pulleys i^4, k^4, the chains l^4, m^4 n^4, and weight o^4, as applied together and to the frame, and operating substantially as specified.

6. And I claim the bent arm l, and its projection k, or other equivalent contrivances in combination with the driving belt, shifting lever or contrivance; the same being for the purpose, as hereinbefore set forth.

7. And I also claim my improvement in the construction of the thread guide G; the same consisting in making the opening of it straight on its rear side substantially as seen at q^4, r^4, the same being for the purpose as herein before explained.

8. And I also claim my improved or new combination of mechanism by which a sudden or very quick rise of the copping rail is effected in order to finish each upward movement and this so as to wind as little yarn as possible at the nose or upper end of each conic layer composing the cop, the said combination consisting of the arm i^2, upon the scroll shaft L, the levers k^2, m^2, the arm c', and the rollers b', p^2, as applied and operated together essentially as hereinbefore specified.

In testimony whereof I have hereto set my signature this fourth day of April A. D. 1851.

GEORGE HENRY DODGE.

Witnesses:

R. H. Eddy,

Francis Gould.