

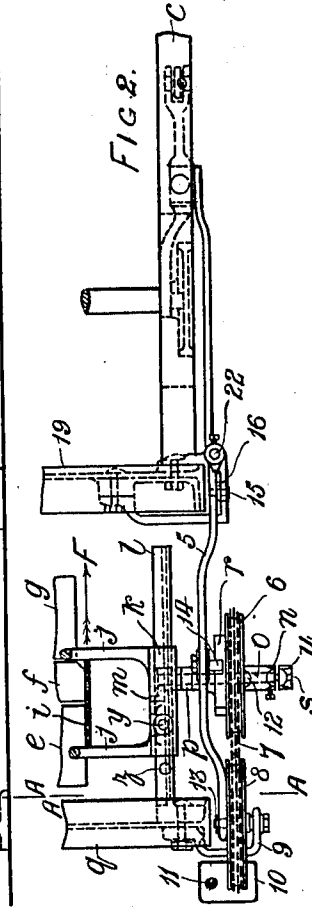
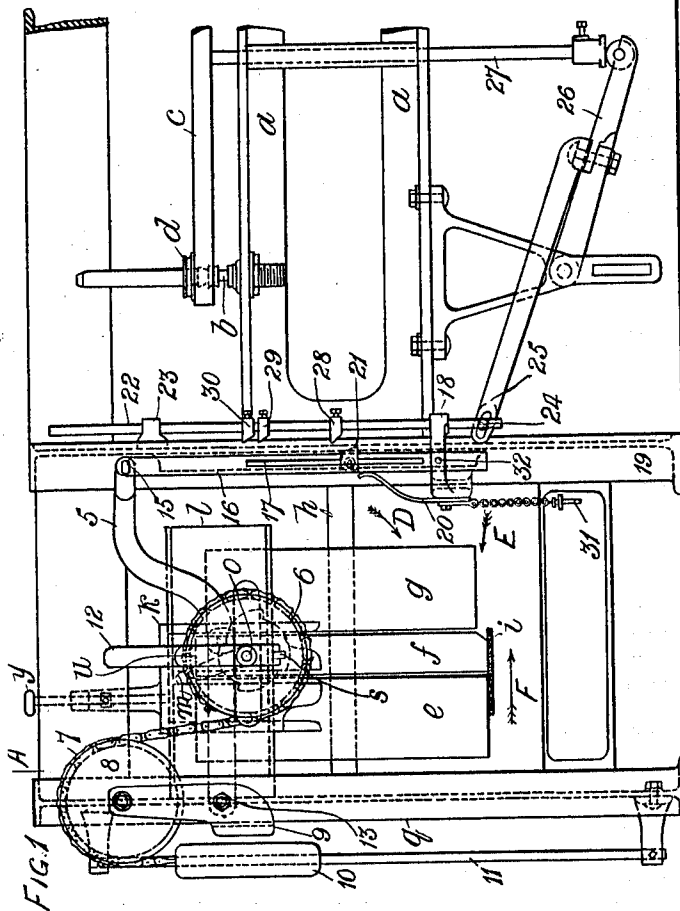
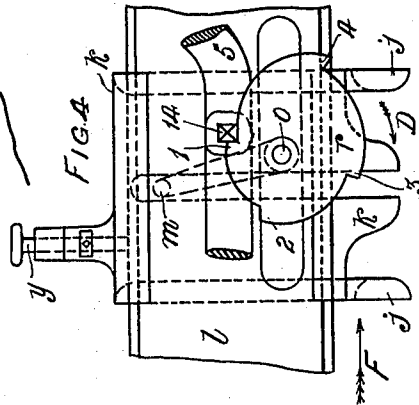
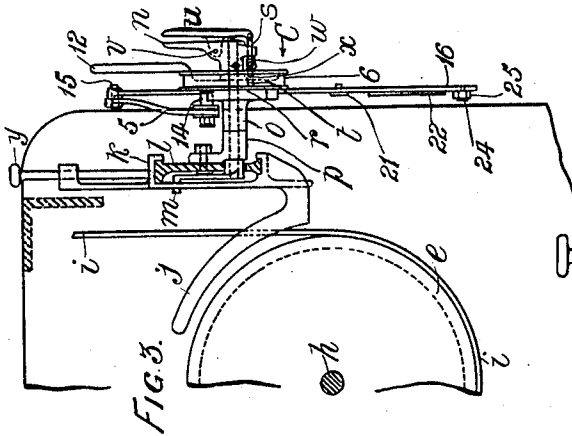
G. BANCROFT.
RING SPINNING AND RING DOUBLING MACHINE.

APPLICATION FILED FEB. 27, 1909.

Patented Dec. 24, 1912.

2 SHEETS—SHEET 1.

1,048,273.



Witnesses:
Henry Thime.
F. George Barry.

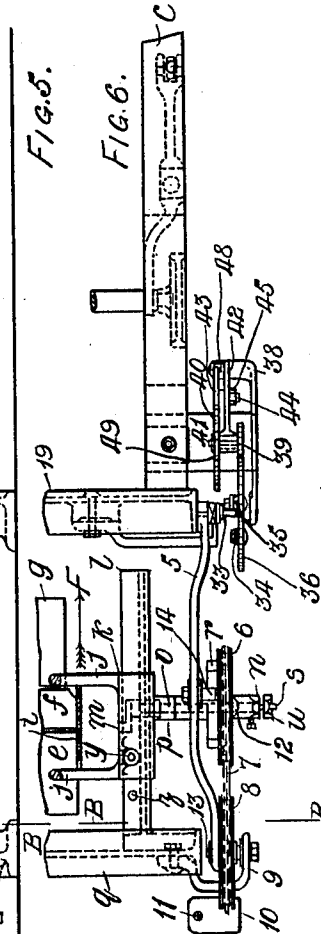
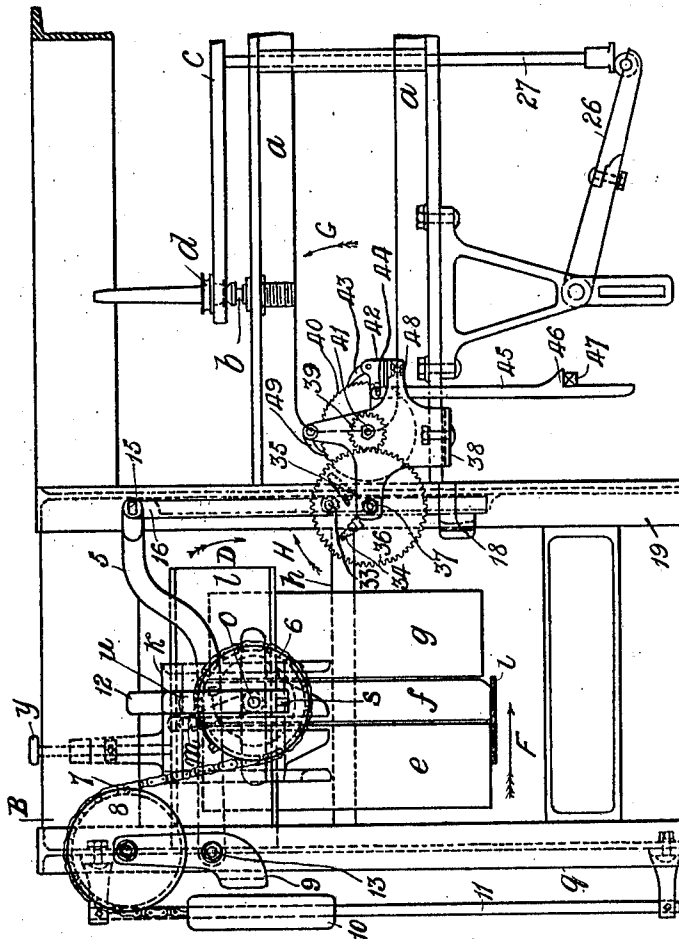
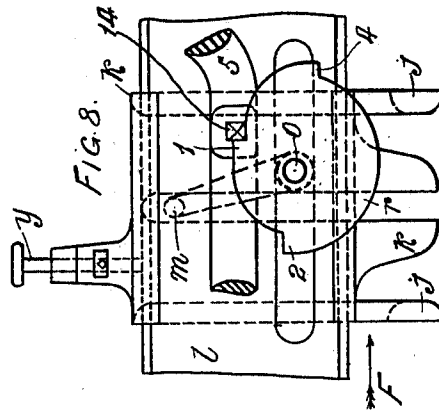
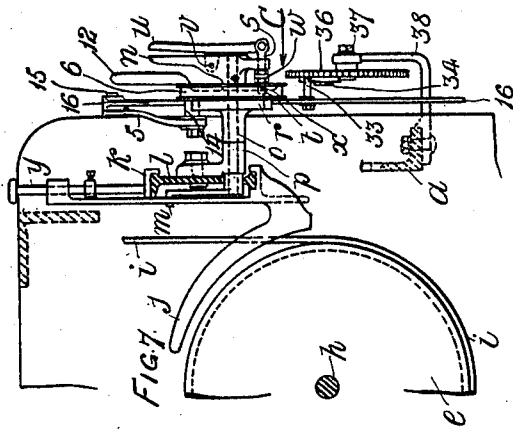
Inventor:
George Bancroft
by his attorneys
Brown & Seward

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2 SHEETS—SHEET 2.



Witnesses:-
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UNITED STATES PATENT OFFICE.

GEORGE BANCROFT, OF OLDHAM, ENGLAND.

RING-SPINNING AND RING-DOUBLING MACHINE.

1,048,273.

Specification of Letters Patent.

Patented Dec. 24, 1912.

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To all whom it may concern:

Be it known that I, GEORGE BANCROFT, a subject of the King of the United Kingdom of Great Britain and Ireland, and resident of 39 Derby street, Oldham, in the county of Lancaster, England, have invented a new and useful Improvement in Ring-Spinning and Ring-Doubling Machines, of which the following is a specification.

This invention relates to mechanism for facilitating the driving of ring-spinning and ring-doubling machines at different speeds.

Heretofore mechanism has been provided or proposed to be provided by which a ring-spinning or ring-doubling machine being set to work at one speed may be caused in due time by the automatic action of the mechanism to be driven at a higher speed and mechanism has also been heretofore provided or proposed to be provided by which such a machine may, by the automatic action of the mechanism, be caused to be driven alternately at a lower speed and at a higher speed.

This invention consists in mechanism by which a machine set to work at the commencement of a set of cops or bobbins at a relatively slow speed may not only be caused in due time by the automatic action of the mechanism to be driven at a higher speed as in the use of mechanism heretofore provided or proposed to be provided but may also after continuing for the required time to be driven at the higher speed be automatically stopped for doffing forthwith or if it be considered desirable be automatically made to work at the lower speed for a short period and then be automatically stopped for doffing. The mechanism provided according to this invention also permits that at any time during the spinning or doubling the machine may be stopped by the attendant and started again whether the machine is working at the higher or at the lower speed without otherwise interfering with the sequence of the control by the automatic devices. When the set of cops or bobbins has been completed and doffed the automatic devices must be restored to their starting position by the attendant before commencing to spin or to double yarn into or on to another set of cops or bobbins.

According to this invention a ring-spin-

ning or ring-doubling machine is provided with a loose pulley and two driving pulleys of different diameters, in order that the belt or rope used to drive the machine may be moved from the loose pulley on to the driving pulley of larger diameter and then at the proper time moved on to the pulley of smaller diameter and then from the driving pulley of smaller diameter to the loose pulley either with or without being retained for a time on the driving pulley of larger diameter, before being placed on the loose pulley.

One method of carrying this invention into effect for example with a machine constructed to make bobbins or cops which are known as "cop build" bobbins or cops is as follows:—The belt-fork or rope-guide is mounted in any convenient manner, as for example, in the ordinary and well-known slide-bracket operated by the usual crank-pin and setting-on handle mounted on the crank-pin-axis. In order that, after the apparatus has been adjusted and made ready for work, the movement of the belt or rope from the loose pulley to the larger driving pulley and again from the larger driving pulley to the smaller driving pulley and then as required from the smaller driving pulley to the larger driving pulley and finally back to the loose pulley may be effected automatically, a disk or escapement-plate provided with dents or stops is employed rotatively mounted and connected to the shaft or axis carrying the crank-pin by suitable devices, as for example by means of a pin or spring-catch arranged in conjunction with the setting-on-handle. The movement of the disk or escape-plate is controlled by a governing lever or other catch automatically moved at proper times in the working of the machine.

A weight or spring is provided to actuate the disk or escape-plate when liberated by the governing lever. After each doffing it is necessary for the attendant to re-wind up the weight or to recharge the spring when such is used which operates the disk or escape-plate. The ring-rail or any suitable part moving with it or in convenient relation to it is used to act on the said governing lever, or other catch, at suitable times in the working of the machine in order to disengage it from the dents or stops in the disk or escapement-plate so as to allow the latter

to make a partial revolution. The dents or stops on the disk or escapement-plate are formed or placed in proper positions to insure that the said disk or escapement-plate shall only turn through the proper angular distance at each of the required changes. In the case, for example, of a governor-lever or other catch moved from time to time by the ring-rail or other part moving in like manner, the dents or stops presented in succession to the governor-lever or other catch may be formed or placed at successively greater distances from the center of the disk or escape-plate to hold the lever or catch when disengaged in the position or positions necessary to be occupied by it on the successive occasions when it is to be acted upon in order to release the escape-plate or disk for the further movement of the belt or rope. Provision is made that a pin or spring-catch in the setting-on-handle can be used to connect and disconnect the crank-pin-axis with and from the disk or escape-plate whatever may be the position then occupied by the disk or escape-plate. The projecting dents or stops or other means to enable the governor-lever or other catch to regulate the movement of the disk or escape-plate are four in number if the machine is intended after being driven at the higher speed to be driven for a time at the lower speed before being stopped for doffing on the completion of a set of cops or bobbins and three in number if the belt or rope is intended to pass from the quick speed pulley directly on to the loose pulley to stop the machine previous to doffing the set of cops or bobbins.

This invention is also applicable to ring-spinning and ring-doubling machines working with a "parallel build" either with or without "shortening motion" in the winding of the yarn on the bobbins or cops, operating automatically in a manner analogous to the example already described in which the invention is used in a machine for making bobbins or cops with the "cop build."

In the accompanying drawings Figures 1, 2, 3 and 4 illustrate the application of one form of mechanism provided according to this invention to a ring-spinning machine constructed to make bobbins or cops which are known as "cop build" bobbins or cops and Figs. 5, 6, 7 and 8 illustrate the application of a very similar form of mechanism to a ring-spinning machine constructed to work with a "parallel build" in the winding of yarn on bobbins or cops.

The mechanism illustrated in Figs. 1, 2, 3 and 4 is adapted to cause the machine in which it is employed to be driven at higher speed after being driven for a time at a lower speed and to be driven again at the lower speed after being driven at the higher

speed before being stopped for "doffing" and the mechanism illustrated in Figs. 5, 6, 7 and 8 is adapted to cause the machine in which it is employed to be driven at a higher speed after being driven for a time at a lower speed and then after being driven for a time at the higher speed forthwith to be stopped for doffing.

In Figs. 1, 2, 3 and 4 and also in Figs. 5, 6, 7 and 8, the mechanism provided according to this invention is shown in conjunction with sufficient of the machine to which it is applied, to enable the application and use of the said mechanism to be readily understood and in the description following, parts which neither form part of the mechanism provided according to this invention nor are modified in some way for the purpose of this invention, will only be described in so far as may be convenient for the better description of this invention and the manner of carrying it into effect.

The same letters of reference are employed to indicate corresponding parts in all the figures of the said drawings.

Fig. 1 is a front elevation and Fig. 2 is a plan partly in horizontal section of the mechanism illustrated in and by Figs. 1, 2, 3 and 4. Fig. 3 is a transverse vertical section taken approximately on the plane indicated by the line A A of Figs. 1 and 2 and Fig. 4 is a front elevation drawn upon a larger scale than Figs. 1, 2 and 3 and showing the disk or escapement-plate employed and the governing lever used with it and certain other parts separate from the rest of the mechanism and more clearly than is possible in Fig. 1 in which such parts are behind other parts. Fig. 5 is a front elevation and Fig. 6 is a plan partly in horizontal section of the mechanism illustrated in and by Figs. 5, 6, 7 and 8. Fig. 7 is a transverse vertical section taken approximately on the plane indicated by the line B B of Figs. 5 and 6, and Fig. 8 is a front elevation drawn upon a larger scale than Figs. 5, 6, and 7 and showing the disk or escapement-plate employed and the governing lever used with it and certain other parts separate from the rest of the mechanism and more clearly than is possible in Fig. 5, in which such parts are behind other parts.

In the apparatus represented in Figs. 1, 2, 3 and 4, *a* is the spindle-rail and *b* one of the spindles of the ring-spinning machine, *c* is the ring-rail and *d* one of the rings mounted thereon and *e* is the loose pulley and *f* and *g* are the driving pulleys provided for use in driving the ring-spinning machine. The driving pulley *f* is made of larger diameter than the driving pulley *g* and the driving pulleys *f* *g* are both mounted fast upon the driving shaft *h* of the machine. The pulley *e* is mounted loose

upon the shaft *h* which in Fig. 1 is only shown in part. In the case illustrated, the larger driving pulley *f* is placed between the smaller driving pulley *g* and the loose pulley *e* in order that the driving belt *i* used to drive the machine may be moved from the loose pulley *e* to the pulley *f* and then at the proper time be moved on to the driving pulley *g* of smaller diameter and afterward back from the driving pulley *g* of smaller diameter to the driving pulley *f* of larger diameter and then on to the loose pulley *e*. The driving belt *i* is shown only in part, and, to obviate confusion the part shown is only indicated in section in Figs. 1 and 2.

The belt or rope-fork *j* to guide the belt *i* (see Fig. 2) forms part of the well-known slide-bracket *k* adapted to be moved upon a longitudinal arm of a bracket *l* by means of the usual crank-pin *m* and a setting-on-handle *n* mounted fast on the axis *o* of the crank-pin *m*. The axis *o* is mounted in a bracket *p* which is secured by a bolt shown only in Fig. 3 to the bracket *l* which is secured by a bolt shown only in Fig. 2 to the standard *q* forming part of the end-frame of the machine. A disk or escapement-plate *r* is mounted loosely upon the shaft or axis *o* which carries the crank-pin *m* and a pin or bolt *s* adapted to engage in a hole *t* in the disk or escapement-plate *r* and carried by means of a lever *u* mounted upon the setting-on-handle *n* secured to the shaft or axis *o* is provided to connect in a positive manner the disk or escapement-plate *r* to the shaft or axis *o* and to enable it to be disconnected from or to be connected to it at any time in whatever position the disk or escapement-plate *r* may then be.

When the machine is under the control of the automatic devices the disk or escapement-plate *r* and the shaft *o* are positively connected together but in order to stop or start the machine by hand, it is necessary to disconnect the escapement-plate from the shaft to enable the strap to be moved independently of the disk or escapement-plate.

The lever *u* is formed with an ear to enter a hollow in the setting-on-handle *n* and to receive a pin *v* passed through the setting-on-handle *n* and the pin or bolt *s*, being mounted between ears on the lever *u* is connected thereto by a pin and is guided by means of a hole formed in an extension of the setting-on-handle *n*. A spring *w* surrounding the bolt *s* and bearing at one end against a pin *x* inserted in the bolt *s* and at the other end against the extension of the setting-on-handle *n* is provided to press the bolt *s* in the direction indicated by the arrow C into engagement with the hole *t* in the disk or escapement-plate *r*. To retain the belt *i* on the loose pulley *e* when

stopping the frame for any purpose during the building of a set of cops or bobbins a detent-peg or latch *y* is provided to engage in a hole *z* in the bracket *l* from which it must be disengaged before the frame can be again started.

The disk or escapement-plate *r* is provided with four dents or stops, 1, 2, 3, 4, in order that its movement may be controlled as will be hereinafter further described by means of a governing-lever 5 moved automatically at proper times in the working of the machine. The disk or escapement-plate *r* is formed with a barrel 6. A chain 7 connected at one end to the barrel 6 is led over a pulley 8 carried by a stud in a bracket 9 secured to the standard *q* by the bolt which also serves to secure the bracket *l* in position and is provided at its other end with a weight 10 tending when wound up to turn the disk or escapement-plate *r* in the direction indicated by the arrow D. In order that the weight 10 may be guided in its movement it is formed with a hole and made to slide upon a rod 11 secured by set-screws in brackets fastened by bolts to the standard *q*. The disk or escapement-plate *r* is provided with a handle 12 by means of which it may be turned in order to wind up the weight 10.

The governing lever 5 is mounted so that it may be turned about a stud 13 secured in the bracket 9 and is provided with a stud or catch 14 secured in it to rest upon the disk or escapement-plate *r* and to engage with the dents or stops thereof. The governing lever 5 is provided with a stud 15 from which hangs a rod 16 provided with a slot 17 and guided so that it may slide up and down and be made to swing to and fro lengthwise of the machine in a bracket 18 carried by the frame-work 19 to which the spindle-rail *a* shown is secured at one end.

A spring 20 secured by a screw to the bracket 18 is provided to bear upon the rod 16 and keep it pressed in the direction opposite to that indicated by the arrow E and ordinarily approximately in the position in which it is indicated in the drawings. A projecting catch or finger 21 with an upwardly directed inclined face is secured to the rod 16 by means of a screw passed through the slot 17 which enables the catch or finger 21 to be adjusted into different positions. A rod 22 mounted to slide in the bracket 18 and another bracket 23 bolted to the framework 19, is provided at its lower part with a pin 24 embraced by the slotted end 25 of an arm bolted to the lever 26 employed to raise and lower one of the lifter-pillars 27 employed to raise and lower the ring-rail *c*, so that the slotted end 25 of such arm extending beyond the fulcrum of the lever 26 will descend as the ring-rail *c* is raised and ascend as the ring-rail *c* is

lowered. The upward movement of the ring-rail *c* as spinning proceeds being a succession of ascents followed by shorter descents giving a gradual resultant ascent, the downward movement of the rod 22 as spinning proceeds will be a gradual descent brought about by a series of descents followed by shorter ascents. The rod 22 is furnished with three projecting fingers 28, 29, 30 with downwardly directed inclined faces and adjustable in position upon it, a set-screw being provided in each finger, 28, 29 or 30, in order that it may be secured in position independently of the others.

In the gradual downward movement of the rod 22 the inclined face of each finger 28, 29, 30, will be made in its turn to act in its descent against the inclined face of the finger or catch 21 and force the rod 16 in the direction indicated by the arrow E and allow the spring 20 to move it in the opposite direction in the succeeding ascent of the rod 22, until in the continued gradual downward movement of the rod 22, the said finger 28, 29 or 30 is made to pass below the finger or catch 21, whereupon the spring 20 will force the finger or catch 21 over the finger 28, 29 or 30 so that in the succeeding ascent of the rod 22 the rod 16 will be raised and lift the catch 14 of the governing-lever 5 clear of the dent or stop of the disk or escapement-plate *r* with which it may then be in engagement, and so set the disk or escape-plate *r* free to be turned by the weight 10 until stopped by the next dent or stop arriving against the catch 14 of the governing lever 5. The four dents or stops 1, 2, 3, 4, are formed as is indicated in Fig. 1 in such positions that at each change of position, the disk or escapement-plate *r* shall only turn through the proper angular distance and that when the dent or stop 1 is made to bear against the catch 14, the belt or rope fork *j* shall be in position for the belt *i* to remain partly on the loose pulley *e* and on the larger driving pulley *f* as shown in Fig. 1; when the dent or stop 2 is made to bear against the catch 14 the belt-fork *j* shall be in proper position for the belt *i* to remain upon the smaller driving pulley *g*; when the dent or stop 3 is made to bear against the catch 14 the belt-fork *j* shall be in position for the belt *i* to remain upon the larger driving pulley *f*; and when the dent or stop 4 is made to bear against the catch 14 the belt-fork *j* shall be in position for the belt *i* to remain upon the loose pulley *e*. The dents 1, 2, 3, 4 on the escape-plate are placed at different distances from the shaft *o* on which the escape-plate *r* is mounted in order that the rod 16 may be held in the most convenient positions for the projecting fingers 28, 29 and 30 to operate successively on the finger or catch 21.

In Figs. 1, 2, 3 and 4 of the accompanying

drawings the parts are shown in the position occupied by them when the driving belt is on the slow-speed-pulley for forming the bottoms of the bobbins or cops. The belt *i* will continue to drive the machine by means of the pulley *f*, until, for example, as the formation of the "bottoms" of the cops or bobbins is completed, the lowest finger 28 and the finger or catch 21 having been set in proper relative positions, the gradual ascent of the ring-rail *c* having caused the inclined face of the finger 28 to act for a time upon the inclined face of the catch or finger 21 and thereby caused the rod 16 to swing to and fro, will lower the finger 28 so far that the finger or catch 21 may be pushed over it by the spring 20 as the ring-rail *c* reaches the top of one of its ascents and then in the following descent of the ring-rail *c*, the rod 22 and finger 28 being raised, will raise the catch or finger 21 and rod 16 and lift the catch 14 of the governing lever 5 out of engagement with the dent or stop 1 and allow the weight 10 to turn the disk or escape-plate *r* in the direction indicated by the arrow D until the dent or stop 2 arrives against the catch 14 so as to be in position for the catch 21 to be acted upon later by the finger 29. This turning of the disk or escapement-plate *r* will also cause the crank-pin *m* to be turned and move the belt-fork *j* in the direction indicated by the arrow F into position to put the belt *i* upon the smaller driving pulley *g* and cause the machine to be driven at a higher speed. The machine will continue to be driven at the higher speed until in the continued ascent of the ring-rail *c*, the finger 29 is caused to act upon the catch or finger 21 in a manner similar to that in which the finger 28 was caused to act upon such catch or finger 21 and the catch 14 being disengaged from the dent or stop 2 allows the weight 10 to turn the disk or escapement-plate *r* further in the direction indicated by the arrow D and into position to bring the dent or stop 3 against the catch 14.

The turning of the disk or escapement-plate *r* to bring the dent or stop 3 against the catch 14 and in position to be acted upon later by the finger 30, turning the crank-pin *m* will cause the belt-fork *j* to be moved in the direction opposite to that indicated by the arrow F and thereby will cause the belt *i* to be moved from the smaller driving pulley *g* to the larger driving pulley *f* so that the machine will be driven again at the lower speed. The machine will then be driven at the lower speed until in the further ascent of the ring-rail *c* the finger 30 is made to act upon the catch or finger 21 as did the finger 28, and the catch 14 is disengaged from the dent or stop 3 in order that the weight 10 may turn the disk or escapement-plate *r* still further in the direc-

tion indicated by the arrow D and bring the dent or stop 4 against the catch 14 and by means of the crank-pin *m* also move the belt-fork *j* further in the direction opposite to that indicated by the arrow F and bring the belt *i* off the larger driving pulley *f* on to the loose pulley *e* and thereby cause the machine to be stopped in readiness for the completed cops or bobbins to be doffed from the spindles. As the belt *i* is moved on to the loose pulley *e* the detent or latch *y* passes into engagement with the bracket *l* to hold the belt *i* upon the loose pulley until the machine is in readiness for being restarted.

The position of the fingers 28, 29 and 30 and the position of the catch or finger 21 may be adjusted as may be desirable from time to time for the formation of cops or bobbins of different lengths. Ordinarily the finger or catch 28 will be set to act upon the catch or finger 21 as soon as cops or bobbins in process of formation attain the full diameter and the finger 29 will be set to act upon the catch 21 as soon as the yarn being spun commences to be wound upon a part of the bobbin or spindle, where, because of the risk of breakage of "ends" or yarn or of the production of unsatisfactory yarn, it is inadvisable to continue spinning at the higher speed. The finger 30 will be set to act upon the catch or finger 21 and cause the machine to be stopped when the cops or bobbins in process of formation attain the length desired.

When the machine has been stopped in consequence of the finger 30 having been made to act upon the finger or catch 21, the rod 16 is pushed aside by the attendant in the direction indicated by the arrow E and a peg 31 shown as attached to the bracket 18 by a chain is inserted into a hole 32 formed in the bracket 18 so as to hold the finger 21 clear of the fingers 28, 29 and 30, during the preparation of the machine for the formation of a fresh set of cops or bobbins. The completed cops or bobbins having been doffed in the usual way and the ring-rail *c* "wound back" into proper position for the commencement of a fresh set of cops or bobbins, the bolt *s* being disengaged from the disk or escapement-plate *r*, the disk or escapement-plate *r* is turned by means of the handle 12 in the direction opposite to that indicated by the arrow D until the dent or stop 1 is brought again into position to be engaged by the catch 14.

When the machine has been prepared for the formation of a fresh set of cops or bobbins the peg 31 is removed from the hole 32 and the latch or detent *y* is disengaged from the bracket *l* and the setting-on-handle *n* is turned by hand to bring the belt *i* on to the larger driving pulley *f* to start the machine and the bolt *s* is allowed to enter into engagement with the hole *t* and again lock

the disk or escapement-plate *r* to the shaft or axis *o*, and the automatic operations of the mechanism will again take place in a manner similar to that hereinbefore described.

If it be requisite the machine may be stopped and started again at any time by the attendant without interference with the disk or escapement-plate *r* and governing lever 5 if the bolt *s* be disengaged from the disk or escapement-plate *r* by means of the lever *u* so as to set the setting-on-handle *n* free to be turned in either direction, and by the bolt *s* being again allowed to reënter the hole *t* the mechanism will be restored to its normal condition to work automatically in the manner hereinbefore described. In any case in which it is not desired to drive the machine at the lower speed after it has been driven at the higher speed an escapement-plate *r* without the detent or stop 4, but otherwise similar to that shown in Figs. 1, 2, 3 and 4, may be employed.

The apparatus illustrated in and by Figs. 5, 6, 7 and 8 is largely similar to that illustrated in Figs. 1, 2, 3 and 4 and therefore in the following description it is sufficient to describe the features of construction and use which differ from those which have already been described in reference to Figs. 1, 2, 3 and 4. In the apparatus illustrated by Figs. 5, 6, 7 and 8 the disk or escapement-plate *r* is provided with only three stops or dents 1, 2, 4, corresponding in function to those marked with these numbers in Figs. 1 and 4. The slot 17, peg 31 and hole 32 are dispensed with, because unnecessary in this apparatus, and the rod 16 does not move sidewise in the bracket 18. The rod 16 is provided with a stud 33 to be acted upon by the inclined faces of cams or tappets 34, 35, bolted to a toothed wheel 36 capable of being revolved upon a stud 37 secured in a bracket 38 bolted to the spindle-rail *a*. Slots in the form of circular arcs are formed in the toothed wheel 36 to enable the tappets 34, 35 to be adjusted in position. With the toothed wheel 36 gears a toothed wheel 39 fast with a ratchet-wheel 40 and with it mounted to revolve upon a stud 41 carried by the bracket 38. The stud 41 serves also to carry a lever 42 provided with a stud upon which a pawl 43 to engage with the teeth of the ratchet-wheel 40 is mounted and also with a stud 44 upon which is suspended a rod 45 provided with a projection 46 to be acted upon by one end of the usual coping lever 47 of which only the end serving to act upon the projection 46 for the purpose of this invention is indicated. The coping lever 47 is made to move up and down as in the ordinary way always through the same distance during the upward and downward movement of the ring-rail. The rod 45 is furnished with an extension extending downward beyond

the projection 46 in order to rest against the coping lever 47 to keep the projection 46 in position to be acted upon by the coping lever 47. A screw 48 screwed into the bracket 38 and furnished with a lock-nut enables the movement of the lever 42 in the direction opposite to that indicated by the arrow G to be adjusted as may be desirable in order to limit, in the manner requisite, the movement imparted by the pawl 43 to the ratchet-wheel 40 in each ascent of the end of the coping lever 47 represented, and movement of the lever 42 in the direction indicated by the arrow G thereby effected. A pawl 49 mounted upon a stud fixed in the bracket 38 is provided to engage with the ratchet-wheel 40 and so to prevent it from being accidentally turned in the direction opposite to that indicated by the arrow G.

In the operation of the mechanism the cam or tappet 34 serves to disengage the catch 14 of the governing lever 5 from the stop or dent 1 and the cam or tappet 35 serves to disengage the catch 14 from the stop or dent 2.

In Figs. 5, 6, 7 and 8, the parts are shown in the positions occupied by them when the belt *i* has been moved partly off the loose pulley *e* and so far on to the larger driving pulley *f* as to set the machine in motion at the slower speed preferable in the commencement and early stages of the formation of a set of cops or bobbins. The belt *i* will continue to drive the machine by means of the pulley *f* until the movement imparted to the pawl 43 by means of the coping lever 47 and rod 45 causing the gradual revolution of the wheel 36 in the direction indicated by the arrow H causes the cam or tappet 34 to act against the stud 33 and raise the rod 16 and thereby to disengage the catch 14 of the governing lever 5 from the stop or dent 1 so as to allow the weight 10 to turn the disk or escapement-plate *r* so far as to bring the dent or stop 2 against the catch 14 and so to move the belt *i* on to the smaller driving pulley *g* by means of the crank-pin *m*. The machine will then be driven by means of the smaller driving pulley *g* at the higher speed until the continued gradual turning of the toothed wheel 36 in the direction indicated by the arrow H caused by the movement of the coping lever 47 causes the cam or tappet 36 acting on the stud 33 to raise the rod 16 and so causes the catch 14 of the governing-lever 5 to be disengaged from the dent or stop 2 so that the weight 10, turning the disk or escapement-plate *r* and crank-pin *m* until the dent or stop 4 is brought against the catch 14, will move the belt *i* on to the loose pulley *e* and so stop the machine in readiness for doffing. Then the weight 10 is wound up again, the pin or bolt *s* being disengaged from the disk or escapement-plate *r*. When the weight 10 has been wound up and the

machine started by hand the pin or bolt *s* is again inserted into the hole *t* so that the machine may be caused to be driven first at the slower speed, then at the higher speed and then stopped in the manner aforesaid. The cams or tappets 34, 35, are placed in such positions and the rate of turning of the wheel 37 is so adjusted that the cam or tappet 35 shall act upon the stud 33 as soon as the higher speed of working is desirable and then the cam or tappet 35 shall cause the machine to be stopped as soon as the cops or bobbins attain the diameter desired.

The mechanism illustrated in Figs. 5, 6, 7 and 8 is applicable either to machines working with or to machines working without shortening motion and the mechanism provided according to this invention and illustrated in Figs. 1, 2, 3 and 4 and that illustrated in Figs. 5, 6, 7 and 8 are applicable to ring-doubling machines as well as to ring-spinning machines.

The description herein given with reference to the accompanying drawings will suffice to indicate that modifications of the mechanism may easily be made. I would have it clearly understood that if desirable in any case modifications may be made in the position of the two fast pulleys *f g* relatively to one another and relatively to the loose pulley *e* and that in any such case the disk or escapement-plate *r* if used may be formed and operated in a corresponding manner in order that the belt-fork or rope-guide may be made to occupy successively the several positions requisite from time to time in the proper order and by way of example it may be explained that if two fast pulleys be placed with the loose pulley between them, the disk or escapement-plate may be made capable of being turned through more than a revolution and be provided with dents or stops in such positions that it may make first a half revolution for the belt to be removed from the larger fast pulley to the smaller, and then a second half revolution for the belt to be moved back to the larger fast pulley and then a quarter revolution for the belt to be moved on to the loose pulley. The description herein given will also suffice to show how this invention may be adapted to machines of the various types to which it has been hereinbefore stated to be applicable and also that by the employment of mechanism provided according to this invention, a machine set to work at one speed for the commencement of a set of cops or bobbins at a relatively slow speed may in due time by the action of the mechanism provided be caused to be driven at a higher speed, and after continuing to be driven for the required time at the higher speed be automatically stopped for doffing, either forthwith or, if it be considered desirable, arranged to work at the lower speed for a

short period before the machine is stopped for doffing, while the machine may be stopped by the attendant and started again whether it be working at the higher or lower speed without the control by the automatic devices being otherwise interfered with. Further, the foregoing description and the accompanying drawings make clear that the mechanism more particularly described in exemplification of this invention and the method of carrying it into effect, enables the invention to be carried into effect and its objects to be attained by very simple, efficient and convenient means.

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

1. In a ring-spinning or ring-doubling machine, two driving pulleys of different diameters upon the driving shaft of the machine fixed to revolve together and in the same position relative to one another, mechanism coacting therewith for driving the machine as a whole at different speeds according as one or other driving pulley is in use, a loose pulley on such driving shaft in proximity to such driving pulleys, driving means, a ring-rail and means worked with the ring-rail for moving the driving means from the driving pulley of one diameter to the driving pulley of another diameter for changing the speed of the machine and in due time to the loose pulley for bringing about the stoppage of the machine, substantially as hereinbefore described.

2. In a ring spinning or ring doubling machine, two driving pulleys of different diameters fixed to revolve together and in the same position relative to one another and a loose pulley in proximity, a movable guide to move the driving means from pulley to pulley, a crank in connection with such guide, means to turn such crank, a disk rotatively mounted in connection with such crank, a governing catch to engage such disk to hold the crank against turning, a rod connected to such catch, a ring rail and means operating in the working of the ring rail to act on such rod to disengage such catch from the disk and thereby to allow the disk to turn and the crank to move the driving means in due stages from driving pulley to driving pulley and eventually to the loose pulley, substantially as hereinbefore described.

3. In a ring spinning or ring doubling machine, two driving pulleys of different diameters fixed to revolve together and in the same position relative to one another and a loose pulley in proximity, a movable guide to move the driving means from pulley to pulley, a crank in connection with such guides, means to turn such crank, a disk rotatively mounted in connection with such crank, a governing catch to engage such disk to hold the crank against turning, a rod con-

nected to such governing catch, catches upon such rod, a ring rail and means worked with the ring rail of the machine to act on the catches on the rod and thereby to disengage the governing catch from the disk and thus to allow the disk to turn and the crank to move the driving means in due stages from driving pulley to driving pulley and eventually to the loose pulley, substantially as hereinbefore described.

4. In a ring spinning or ring doubling machine, two driving pulleys of different diameters fixed to revolve together and in the same position relative to one another and a loose pulley in proximity, a movable guide to move the driving means from pulley to pulley, a crank in connection with such guide, means to turn such crank, a disk rotatively mounted in connection with such crank and furnished with dents or stops at successively greater distances from its center, a governing catch to engage such disk to hold the crank against turning, a rod connected to such governing catch, catches upon such rod, a ring rail and means worked with the ring rail of the machine to act on the catches on the rod and thereby to disengage the governing catch from the disk and thus to allow the disk to turn and the crank to move the driving means in due stages from driving pulley to driving pulley and eventually to the loose pulley, substantially as hereinbefore described.

5. In a ring spinning or ring doubling machine, two driving pulleys of different diameters fixed to revolve together and in the same position relative to one another and a loose pulley in proximity, a movable guide to move the driving means from pulley to pulley, a crank in connection with such guide, an axis in connection with such crank, a disk rotatively mounted upon such axis, means capable of engagement and disengagement to connect the said axis with the disk, means to turn the disk, a governing catch to engage such disk to hold it against turning, a rod connected to such governing catch, a ring rail and means operating in the working of the ring rail to act on such rod to disengage such catch from the disk and thereby to allow the disk to turn and the crank to move the driving means in due stages from driving pulley to driving pulley and eventually to the loose pulley, substantially as hereinbefore described.

6. In a ring spinning or ring doubling machine, two driving pulleys of different diameters fixed to revolve together and in the same position relative to one another and a loose pulley in proximity, a movable guide to move the driving means from pulley to pulley, a crank in connection with such guide, an axis in connection with such crank, a disk rotatively mounted upon such axis, means capable of engagement and disen-

gagement to connect the said axis with the disk, means to turn the disk, a governing catch to engage such disk to hold it against turning, a rod connected to such governing catch, catches upon such rod, a ring rail and means worked with the ring rail of the machine to act on the catches on the rod and thereby to disengage the governing catch from the disk and thus to allow the disk to turn and the crank to move the driving means in due stages from driving pulley to driving pulley and eventually to the loose pulley, substantially as hereinbefore described.

15 7. In a ring spinning or ring doubling machine, two driving pulleys of different diameters fixed to revolve together and in the same position relative to one another and a loose pulley in proximity, a movable guide to move the driving means from pulley to pulley, a crank in connection with such guide, an axis in connection with such crank, a disk rotatively mounted upon such axis with dents or stops at successively greater distances from its center, means capable of engagement and disengagement to connect the said axis with the disk, means to turn the disk, a governing catch to engage such disk to hold it against turning, a rod connected to such governing catch, a ring rail and means operating in the working of the ring rail to act on such rod to disengage such catch from the disk and thereby to allow the disk to turn and the crank to move the driving means in due stages from driving pulley to driving pulley and eventually to the loose

pulley, substantially as hereinbefore described.

8. In a ring spinning or ring doubling machine, two driving pulleys of different diameters fixed to revolve together and in the same position relative to one another and a loose pulley in proximity, a movable guide to move the driving means from pulley to pulley, a crank in connection with such guide, an axis in connection with such crank, a disk rotatively mounted upon such axis with dents or stops at successively greater distances from its center, means capable of engagement and disengagement to connect the said axis with the disk, means to turn the disk, a governing catch to engage such disk to hold it against turning, a rod connected to such governing catch, catches upon such rod, a ring rail and means worked with the ring rail of the machine to act on the catches on the rod and thereby to disengage the governing catch from the disk and thus to allow the disk to turn and the crank to move the driving means in due stages from driving pulley to driving pulley and eventually to the loose pulley, substantially as hereinbefore described.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this seventeenth day of February 1909.

GEORGE BANCROFT.

Witnesses:

HOWARD CHEETHAM,
RUTH M. WILSON.