No. 870,075. PATENTED NOV. 5, 1907.

J. M. BAIN.

AUTOMATIC CHAIN DRIVE REGULATING DEVICE FOR SPINNING MACHINES.

APPLICATION FILED OCT. 11, 1906.

3 SHEETS—SHEET 1.

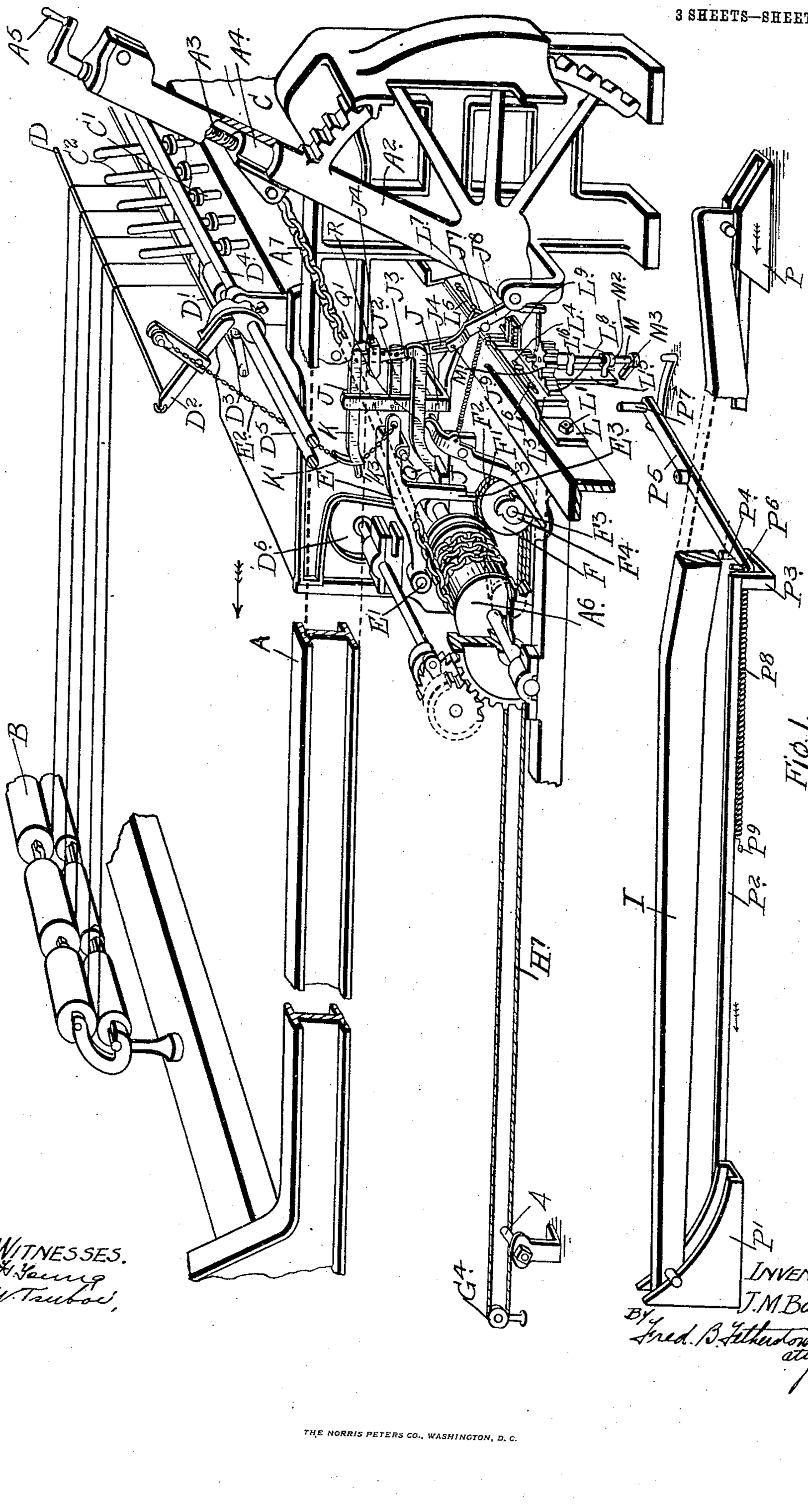

Fig. 1.

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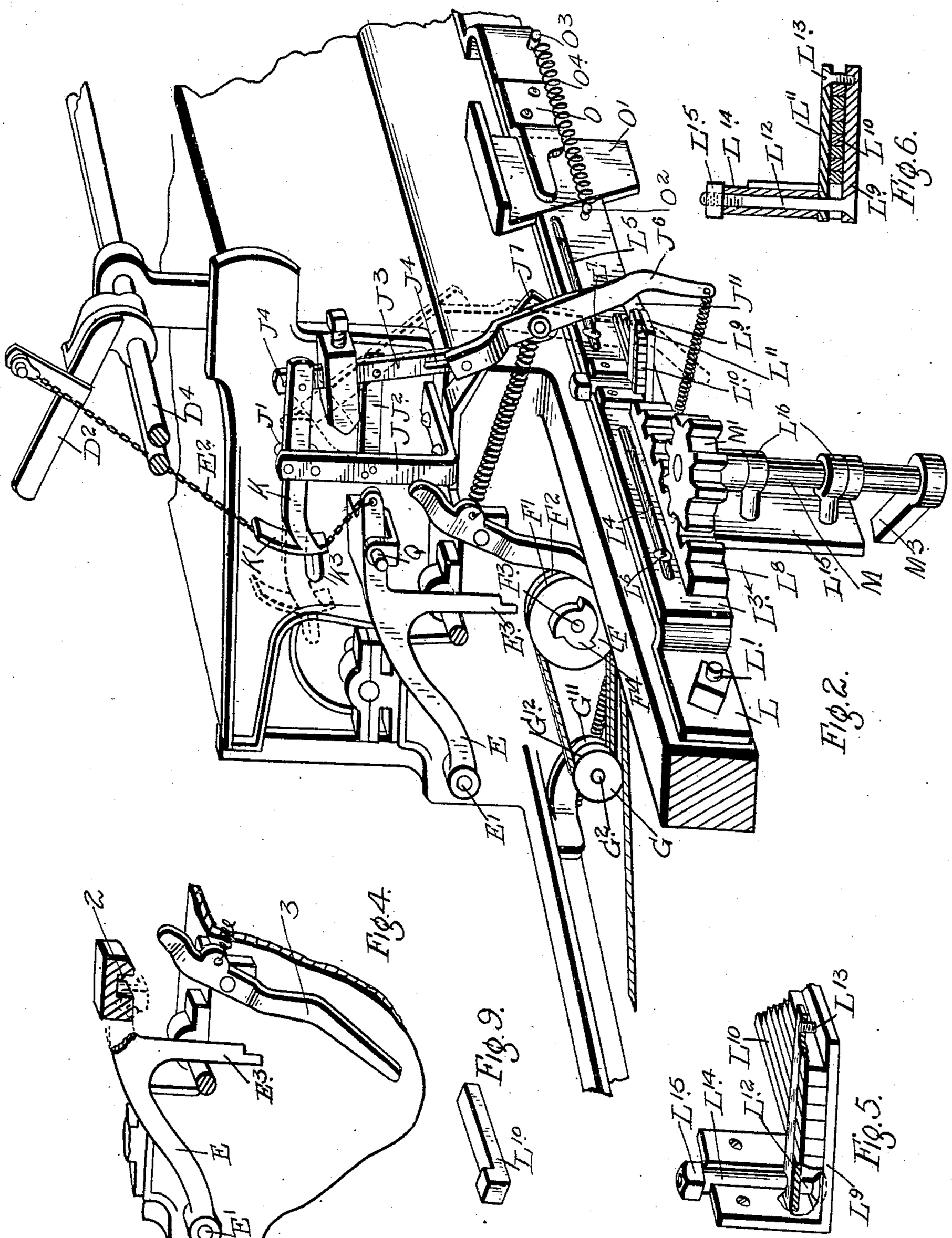

Fig. 2.

Fig. 6.

Fig. 4.

Fig. 9.

Fig. 5.

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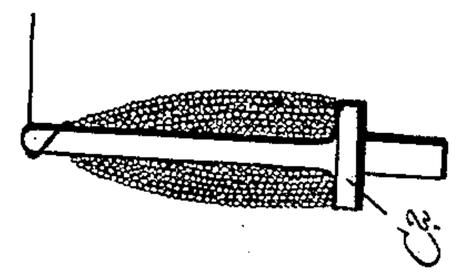

Fig. 8.

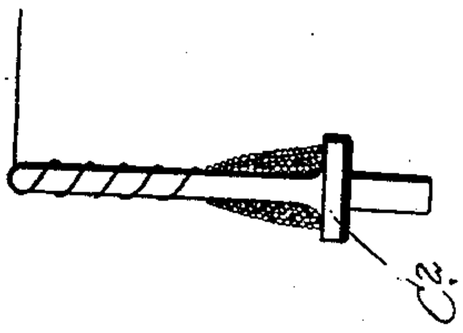

Fig. 7.

Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN M. BAIN, OF PETERBORO, ONTARIO, CANADA

AUTOMATIC CHAIN-DRIVE-REGULATING DEVICE FOR SPINNING-MACHINES.

No. 870,075. Specification of Letters Patent. Patented Nov. 5, 1907.

Application filed October 11, 1906. Serial No. 338,528.

To all whom it may concern:

Be it known that I, JOHN M. BAIN, of the city of Peterboro, in the county of Peterboro, Province of Ontario, Canada, spinner, have invented certain new and useful Improvements in Automatic Chain-Drive-Regulating Devices for Spinning-Machines, of which the following is the specification.

My invention relates to improvements in automatic chain drive regulating devices for spinning machines, and the object of the invention is to provide an automatic device which will regulate the speed at which the bobbin spindles rotate so that there will always be sufficient slackness in the yarn or other material being wound to compensate for the increase in diameter of the bobbin as the bobbin is being formed and also to reach the top of the bobbin at the end of each winding movement of the machine and also to provide automatic means whereby the slackness formed for the above purpose is gradually reduced in proportion to the increasing height of the bobbin, and it consists essentially of a dog arm pivotally secured to the end of the bobbin carriage, a flexible connection between the free end of the arm and the tension wire of the machine, a suitably journaled counter shaft, bevel gears connecting the counter shaft and screw spindle of the quadrant lever of the machine an idler pulley journaled on a stud at the end of the bobbin carriage, a rope gear wrapped around such pulley and a pulley on the counter shaft, a ratchet secured to the idler pulley with which the dog arm is designed to engage, the builder bar, a lever pivoted intermediately of its length connected to the bar, a pressure bar designed to be brought into contact with the flexible connection supporting the dog arm and a trip device operated by the builder bar whereby the pressure bar is moved longitudinally against the said flexible connection, as hereinafter more particularly explained by the following specification.

Figure 1, is a general perspective view of my device partially broken away and in section to exhibit the construction thereof. Fig. 2, is an enlarged perspective view of the main portion of my device. Fig. 3, is a perspective view of the rope gear and its connection to the machine. Fig. 4, is a perspective detail of the dog arm and means of throwing such arm out of engagement. Fig. 5, is a perspective detail of the tripping shoe. Fig. 6, is a sectional detail of the shoe. Fig. 7, is a detail of the bobbin partially wound. Fig. 8, is a detail of the bobbin completely wound. Fig. 9, is a detail of one of the tripping bars of the shoe.

In the drawings like letters of reference indicate corresponding parts in each figure.

I will first describe the parts of a spinning machine with which my device is connected.

A is the frame of the machine supporting feed rolls B.

C is the reciprocating carriage on which are located the bobbin spindles C′ which hold the bobbins C^2.

D is the tension wire secured to the counter faller arms D^2 which are secured in the usual manner to the shaft D^4.

D′ is the builder wire secured to the arms D^3 of the faller which are secured to the faller shafts D^5.

D^6 is the usual driving drum for the bobbin spindles.

A′ is a forward extension of the main frame. At the end of the extension A′ is pivoted the quadrant lever A^2 of the machine. The lever is provided with the usual threaded center spindle A^3 the movable block A^4 and the crank handle A^5 secured on the end of the threaded spindle A^3.

A^6 is the main driving drum around which is wrapped the chain A^7 one end of the chain being connected to the drum and the other end to the block A^4 of the quadrant lever. The drum A^6 is connected by suitable gears to the driving drum D^6 of the bobbin spindles C′.

To those familiar with spinning and winding machines it will be understood that as the bobbin increases in diameter the speed at which it rotates must be reduced in order to allow of sufficient slack in the yarn to compensate for the increasing diameter of the bobbins, the speed at which the yarn is fed being uniform. If this were not done, too great a tension would be exerted on the yarn as the size of the bobbin increase causing the yarn to break in consequence. It will also be understood that on completion of the winding or inward movement of the bobbin supporting carriage there must be sufficient slack yarn left to reach from winding of the bobbin to the top of the bobbin as shown in Fig. 7. This has been accomplished to some extent by the operator rotating the crank handle A^5 and threaded rod A^3 by means of which the block A^4 is moved in an upward direction on the spindle. As the carriage C moves inwardly on the feed rollers, the chain A^7 is unwrapped from the drum rotating it and through suitable connecting gear rotates the driving drum D^6 of the bobbin spindles. During this inward movement of the carriage the quadrant lever A^2 swings in the same direction on its pivot. The speed at which the drum rotates is regulated by the position of the block A^4 on the rod A^3. The higher the position of the block on the rod the slower will be the rotating movement of the drum. Though the speed of the bobbin spindles may be regulated to some extent by this means it is found that the operator is liable either to regulate the speed rotation of the spindles at too high or too low a speed. If the former is done then all the threads of yarn at the end of the inward movement become broken, if the latter the yarn is slackly wound on the bobbin and on the return or spinning movement of

the machine the yarn will be harder spun and heavy. It will also be understood that as this adjustment has to be made upon every return movement of the carriage that it is very inconvenient and involves a waste of much time as the operator is not always near the center of the machine when the adjustment has to be made and is apt to neglect to make the adjustment at all. To overcome these objections I have devised the following automatic device whereby a uniform tension is preserved on the threads of yarn as they are wound or spun on the bobbin and which I will now describe.

E is an arm pivoted on the stud E′ formed on the end of the bobbin carriage C.

E^2 is a chain or other suitable flexible connection between the free end of the arm E and the arm D^2 of the upper tension wire.

F is a double idler pulley formed with grooves F′ and F^2 and journaled on the stud F^3 on the end of the bobbin carriage.

F^4 is a ratchet wheel secured to the pulley F.

E^3 is a depending portion of the arm E designed to engage with the ratchet F^4 when the tension wire is depressed.

G is a double idler pulley journaled on the stud G^2 formed on the bracket G^3 secured to a suitable portion of the main frame, and provided with grooves G^{11} and G^{12}.

G^4 is an idler pulley journaled on a suitable standard secured to a suitable base.

G^5 is a triple pulley journaled on the pin G^6 secured to the bracket G^7. The pulley is formed with the grooves G^8, G^9 and G^{10}.

H is a bevel wheel secured to the lower end of the threaded rod A^3.

H′ is a counter shaft journaled in a suitable bracket H^2 secured to the portion A′ of the main frame and provided at one end with a bevel gear H^3 designed to mesh with the gear H on the rod A^3. H^4 is a double pulley secured to the other end of the shaft H′ and provided with grooves H^5 and H^6.

H^7 is the driving cord or belt which extends from the groove F′ of the pulley F around the groove G^{11} of the pulley G around the groove G^{10} of the pulley G^5 then around the groove H^6 of the pulley H^4 in a reverse direction, then around the groove G^9 of the pulley G^5, and then around the groove H^5 of the pulley H^4, then around the groove G^8 of the pulley G^5, then around the pulley G^4, then around the groove F^2 of the pulley F, then around the groove G^{12} of the pulley G then back to the groove F′ of the pulley F.

The arm E is provided with a notched portion 2.

3 is a pivoted arm secured to a portion of the bobbin carriage, the lower end of the arm 3 is connected by a tension spring to a suitable portion of the frame.

4 is a trip pin located in the path of the lower end of the arm 3 in proximity to the point limiting the extreme inward movement of the bobbin carriage.

When the carriage reaches the end of its inward movement the lower end of the arm 3 comes in contact with the trip pin tilting the arm on its pivot and carrying the upper end into the notch formed in the arm E raising it out of engagement with the ratchet F^4. This arrangement of parts is retained during the outward movement of the carriage and preventing unnecessary friction between the ratchet and arm E^3. The arm 3 is relieved by the pin Q riding up on the cam arm Q^1 at the end of the outward movement of the carriage. As the bobbin increases in diameter the tension of the strands of yarn is exerted on the tension wire D depressing the arms D^3. The free end of the arm E hung from the arm D^2 by the chain E^2 swings down around its pivot E′ until the depending portion E^3 engages with one of the ratchet teeth of the ratchet wheel F^4 preventing the pulley F rotating.

It will be seen that under normal conditions that is, before the ratchet is locked by the engaging portion E^3 the bobbin carriage will move inwardly in the direction indicated by arrow (see Fig. 1) the pulleys F and G rotating idly without drawing on the cord H^7. As soon as the engaging portion E^3 holds the ratchet F^4 and pulley F from rotating; the pulley F as the carriage moves inwardly draws on the cord H^7. The cord H^7 through the connecting pulleys G^5 and H^4 rotates the counter shaft H′ and turns the adjusting spindle A^3 through the bevel wheels H and H^3. This movement raises the block A^4 thus regulating the chain drive A^7 to drive the drum at a decreased speed. The feed being uniform, the decreased speed of rotation will compensate for the increase in diameter of the bobbin.

It will be understood by referring to Figs. 7 and 8 of the drawing that not only is an extra amount of slack yarn required to compensate for the increasing diameter of the bobbin but also there must be a sufficient supply of slack yarn to reach the top of the bobbin spindle at the end of the winding or inward movement of the carriage.

When the bobbin is commencing to build up a great deal of slack is required as shown by Fig. 7 of the drawings and very little is required for this purpose when the bobbin is nearing completion as by Fig. 8 of the drawings. It is therefore necessary when the bobbin is commencing to form to adjust the parts to so regulate the rotation of the bobbin spindles that sufficient slack is allowed not only to compensate for the increasing diameter of the bobbin but also to reach the top of the bobbin and then to provide mechanism whereby as the bobbin is built up toward the top of the spindle the slack is automatically cut off. I will now describe the mechanism whereby such extra slack is automatically cut off.

I is the usual builder bar of the machine designed to operate the builder wire D′ by mechanism now commonly in use and therefore not necessary to describe in this specification.

J is a bracket standard secured to the end of the bobbin carriage and provided with an eye J′ at its upper end.

K is a sliding bar designed to move longitudinally to itself in the eye J′. The bar K is provided at its inner end with a contact shoe K′ and a loop K^3 through which the chain E^2 is designed to pass.

The bracket J is provided intermediately of its height with an outwardly extending arm J^2.

J^3 is a lever bar pivoted intermediate of its length to the arm J^2 and at its upper end to the bar K. The end is provided with a longitudinal slot J^4.

J[6] is a lever bar pivoted to the bracket J[7] and connected by a pin J[9] passing through the lower slot J[4] to the bar J[3].

L is a supporting plate secured to the frame of the carriage at the front by a bolt L′.

L[3] is a longitudinally sliding plate provided with longitudinal slots L[4] and L[5] through which pass the screws L[6] and L[7].

L[8] is a rack gear secured to or forming part of the plate L[3].

On the bracket are clamped a series of bars L[10] of varying length by means of the clamping bars L[11], bolt L[12] and screw L[13]. The bolt L[12] passes up through a sleeve L[14] for the purpose of bringing the nut L[15] into any suitable position for loosening.

J[10] is an extension piece formed at right angles to the lever J[6] and designed to rest on the shortest of the bars L[10] in proximity to the end thereof.

J[11] is a tension spring connecting the end of the lever J[6] with a suitable portion of the frame.

L[15] is a depending portion of the plate L[16] to which are attached bearings in which is journaled the vertical shaft M.

M′ is a pinion secured to the end of the shaft M and designed to mesh with the rack L[8].

M[2] is a securing collar.

M[3] is a projecting piece extending at right angles to the shaft M to which it is secured.

One end of the sliding plate L[3] is formed inclined.

O is a retaining bracket designed to hold the wedge plate O′.

O[2] and O[3] are pins respectively secured to the sliding plate L[3] and to the plate L. The pins O[2] and O[3] are connected by a tension spring O[4].

P, P′ are the sliding pieces supporting the builder bar I and P[2] is a bar connecting such pieces together.

P[3] is a bracket secured to the bar P[2] and provided with a pin P[4].

P[5] is a lever pivoted to a suitable support intermediately of its length and provided at each end with an upwardly projecting pin P[6] and P[7] respectively. The pin P[6] is connected by a spiral tension spring to a stationary screw P[9].

It will be understood by those skilled in the art, that as the blocks P and P′ move in the direction indicated by the arrow the builder bar descends and by means of connecting mechanism the builder bar rises to regulate the height of the bobbin. By the movement of the blocks P and P′ in the above direction the lever P[5] is swung on the pivot in the direction indicated by the arrow gradually bringing the pin P[7] into the path of the projection M[3]. It will be understood that this is a very slow movement. The block P and P′ are moved by mechanism in use in the majority of spinning machines. This is not shown or described as it is very common and well known to those familiar with this art and it has not been shown or described as it forms no part of the present invention. As soon as the pin P[7] is brought into the path of the projection at each inward movement of the bobbin carriage the projection M[3] contacts with the pin P[7] tilting the lever P[5] against the tension of the spring P[8]. Immediately the projection M[3] has passed the pin P[7] the tension spring P[8] carries the lever P[5] back into its normal position. At each outward movement of the carriage the projection contacts again with the pin P[7] but on this outward movement of the carriage the lever is held in place by having its opposite end in contact with the pin P[4]. As the projection passes the pin P[7] the shaft M is partially turned moving the sliding plate slightly in the direction indicated by the arrow. This operation is repeated at each outward movement of the carriage. By such successive movements the bars L[10] are moved from beneath the lever J[6] allowing the lower end of the lever to gradually fall. On the depression of the lever J[6] the bar K is given a forward movement against the chain E[2] giving a greater bend thereto and gradually bringing the parts into the position shown by dotted lines in Fig. 2.

It will be understood that the greater the bend or bow in the chain the greater will be the delay in bringing the depending portion E[3] into contact with the ratchet wheel F[4] during the inward movement of the carriage and consequently the block A[4] is moved at a gradually decreasing distance at every return movement of the bobbin carriage, so that the speed of the bobbin spindles will be reduced to a less degree as the builder wire rises and the bobbin becomes full.

As the plate L[3] is moved longitudinally step by step against the tension of the spring O[4] the wedge plate O′ drops at each movement thus preventing the return of the plate.

It will be understood by those skilled in the art that upon the completion of the outward movement of the carriage there is a slight inward or easing movement to allow of the contraction in length of the strands of yarn as they are spun. To avoid any liability of the yarn during this movement contracting sufficiently quick to cause a tension on the wire D, depressing the same and allowing the arm E[3] to engage with the ratchet wheel F resulting in slackening in the speed of the bobbin I provide a pin Q on the arm E and a cam Q′ secured to the frame A.

As the carriage completes its outward movement the pin Q bears on the arm Q′. Should the tension of the contracting strands of yarn be sufficient to depress the tension wire the arm E[3] will be held out of engagement by the pin Q and the arm Q′ until such contraction is complete and the pin Q drops off the arm Q′.

R is an adjustable stop block sliding on the lever bar J[3] and adjustably secured thereon by the set screw J[X]. If it is found that too much or too little slack is being cut off I adjust the block R on the arm J[3]. As the arm K is moved inwardly the block comes in contact with the standard J thus limiting the movement of the arm thereby regulating the amount of slack cut off.

When the bobbins are wound the block A[4] is lowered on the screw spindle in the usual way by rotating the crank handle A[5].

It will also be understood that my device is adapted to the spinning and winding of various kinds of materials which have a tendency to stretch to a more or less degree. By rearranging the bars L[10] I am enabled to cut off more or less slack as required.

It will be seen from this description that I have devised a very simple, effective and automatic means of regulating the feed of the yarn so as to always allow of sufficient slack therein and yet prevent the production of too much slack in the yarn which in the case of insufficient slack would cause the strands of yarn to break

from over tension and in the case of too much slack would cause the yarn to wind unevenly on the bobbin and also when spinning would prevent the required number of turns to the inch being put in the yarn.

What I claim as my invention is.

1. In an automatic device for controlling the chain drive of a spinning machine, the combination with the tension wire, and the dog arm, of a chain connected at one end to the tension wire and at the opposite end to the dog arm and independent of the builder wire and means for automatically and gradually bending such flexible connection as the bobbin increases in size as and for the purpose specified.

2. In an automatic device for controlling the chain drive of a spinning machine, the combination with the tension wire and the dog arm, of a flexible connection between the dog arm and the tension wire and means operated by the builder bar for automatically and gradually bending such flexible connection as the bobbin increases in size as and for the purpose specified.

3. In an automatic device for controlling the chain drive of spinning machines, the combination of the tension wires, the dog arm, the flexible connection supporting the free end of the dog arm, of a longitudinal movable pressure bar designed to be automatically brought against the flexible support of the dog arm as the bobbin increases in size as and for the purpose specified.

4. In an automatic device for controlling the chain drive of a spinning machine, the combination with the tension wire the dog arm, the flexible support for the dog arm, and the longitudinally movable pressure bar, of the movable builder bar blocks, a lever pivoted intermediately of its length, one end of which is spring held against a stop connected to the said block and the other end provided with an upward projection, a vertical shaft journaled in brackets in the frame and provided with a right angular off set designed to engage with the upward projection of the lever, mechanism interposed between the shaft and the pressure bar whereby the longitudinal movement is imparted thereto upon tne said upward projection of the lever and off set coming into contact as and for the purpose specified.

5. In an automatic device for controlling the chain drive of a spinning machine, the combination with the tension wire, the dog arm, the flexible connection supporting the free end of the dog arm, the ratchet and pulley gear, and the builder bar, of a longitudinally movable pressure bar designed to be brought gradually against the flexible support of the dog arm, and means operated by the builder bar for imparting such movement to the pressure bar, as and for the purpose specified.

6. In an automatic device for controlling the chain drive of spinning machines, the combination of the tension wire the dog arm, the flexible connection supporting the free end of the dog arm, the ratchet, pulley gear and builder bar, of a longitudinally movable pressure bar, a shoe having a notched edge a compound lever the upper end of which is connected to the pressure bar, the lower end designed to rest on the edge of the notched shoe and means for imparting a longitudinal movement to the shoe from beneath the end of the lever, as and for the purpose specified.

7. In an automatic device for controlling the chain drive of spinning machines, the combination with the tension wire, the dog arm, the flexible connection supporting the dog arm, the ratchet, the pulley gear and builder bar, of a longitudinal movable pressure bar, a shoe secured to a longitudinal slidable bar, and provided with a series of bars of varying lengths forming a notched edge, a compound lever connected at the upper end of the pressure bar and the lower designed to rest on the edge of the shoes and means operated from the builder bar for imparting a longitudinal movement to the shoe supporting bar, as and for the purpose specified.

8. In a device of the class described the combination with the dog arm and flexible support therefor of a longitudinally movable pressure bar designed to be fed forward against the chain, a shoe composed of bars of varying lengths and a clamp for holding such bars together to form an inclined notched edge, a compound lever connected at its upper end to the pressure bar and designed to rest at its lower end on the edge of the notched shoe and means for imparting a longitudinal movement to the shoe supporting plate, as and for the purpose specified.

9. In a device of the class described the combination with the bobbin carriage, the bobbin spindles, the tension wire, dog arm, flexible support therefor and the builder bar, of a pressure bar designed to be moved against the flexible support of the dog arm, a notched shoe, a compound lever connected at the upper end of the pressure bar and designed at the lower to rest against the notched edge of the shoe, a longitudinal slidable supporting bar, a vertical rock shaft journaled at right angles to the plate, a right angular projection secured to the lower end of the shaft, a movable stop designed to be moved gradually into the path of such projection by the action of the builder bar and a connecting gear between the rock shaft and plate designed to impart a longitudinal movement to the plate, as and for the purpose specified.

10. In a device of the class described the combination with the tension wire, dog arm, and flexible support for the arm, of a pressure bar designed to be brought into contact with the flexible support, means for moving such bar into contact as the bobbin increases in height, and an adjustable stop designed to limit the movement of the pressure bar, as and for the purpose specified.

11. In a device of the class described the combination with the tension wire, dog arm, and flexible support for the arm, of a pressure bar designed to be brought into engagement with the flexible support of the arm by a step by step movement and connecting mechanism between the builder bar and pressure bar, for imparting such movement from the movement of the builder bar, as and for the purpose specified.

12. In a device of the class described the combination with the tension wire, the dog arm, the flexible support for the arm, of the pressure bar, a spring held lever connected to such bar designed to impart a longitudinal movement to the pressure bar, and a trip device operated by the builder bar for imparting a gradual longitudinal movement to the pressure bar, as and for the purpose specified.

13. In a device of the class described the combination with the tension wire, dog arm, the flexible support therefor and the builder bar, of a longitudinally movable pressure bar, a lever for operating the pressure bar, a longitudinally movable plate, supporting a tripping device for the lever, connecting mechanism between the plate and builder bar whereby a step by step movement is imparted to the plate and a locking means for holding the plate between the longitudinal movements thereof, as and for the purpose specified.

14. In a device of the class described the combination with the tension wire, dog arm, the flexible support therefor and the builder bar, of a longitudinal movable pressure bar, a lever for operating the pressure bar, a spring held longitudinal movable plate supporting a tripping device for the lever and having an inclosed end, connecting mechanism between the plate and builder bar whereby a step by step movement is imparted to the plate and a wedge plate designed to coact with the inclined end of the movable plate to hold the plate in position, as and for the purpose specified.

15. In a device of the class described, the combination with the tension wire, having a notch in the free end thereof, the dog arm, the flexible support for the arm and the ratchet wheel, of a pivotally supported spring held trip arm designed to enter the notch in the dog arm, and suitably located stops designed to coact with the lower end thereof, to throw the upper end into and out of engagement with the notch on the dog arm, as and for the purpose specified.

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