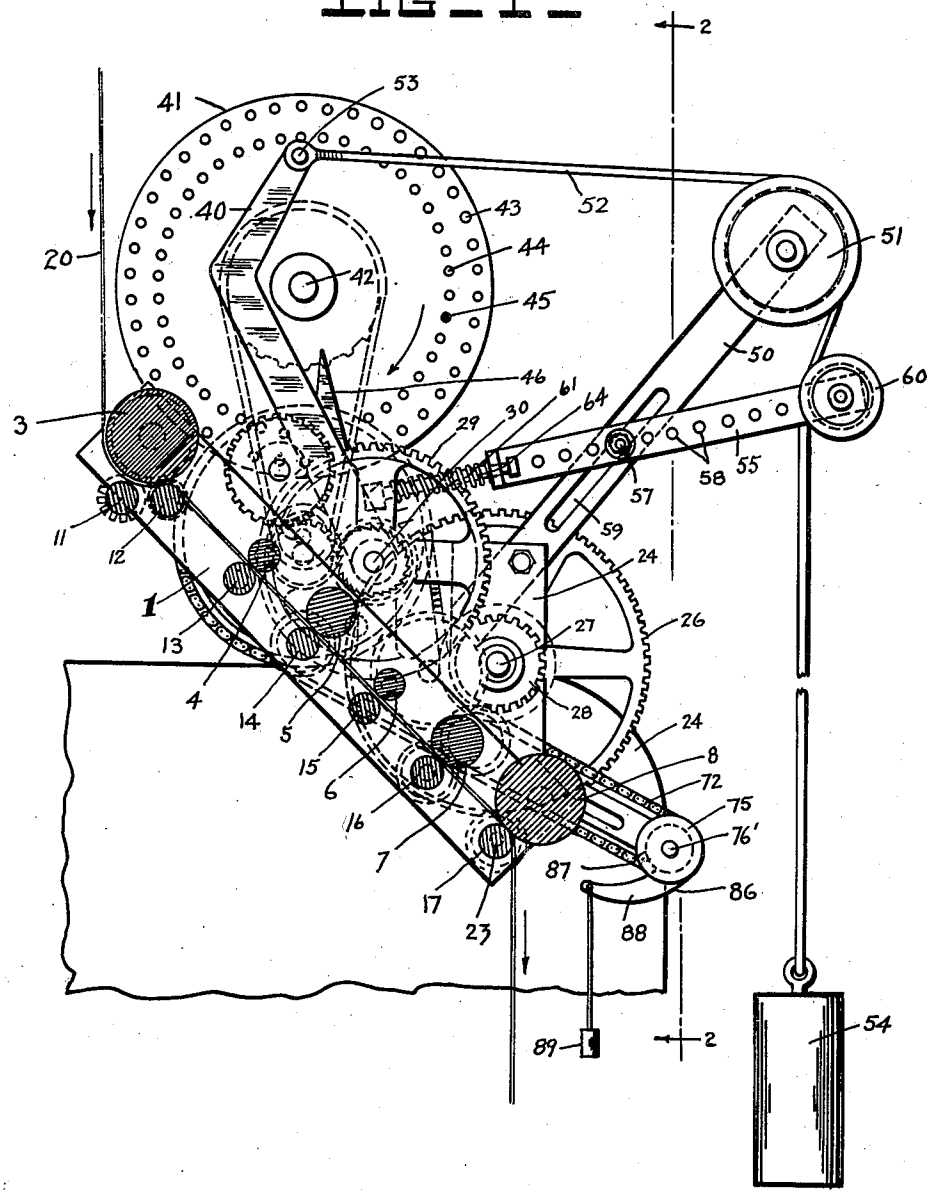
Feb. 17, 1942. G. PARTINGTON 2,273,137

SLUBBING MECHANISM

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FIG. 1



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SLUBBING MECHANISM

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FIG. 2.

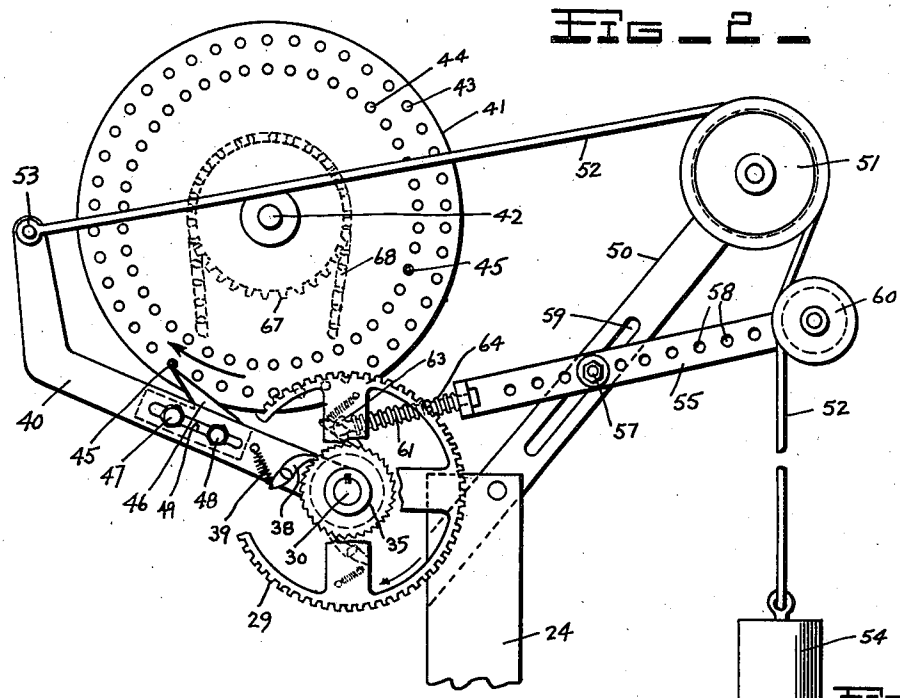


FIG. 3.

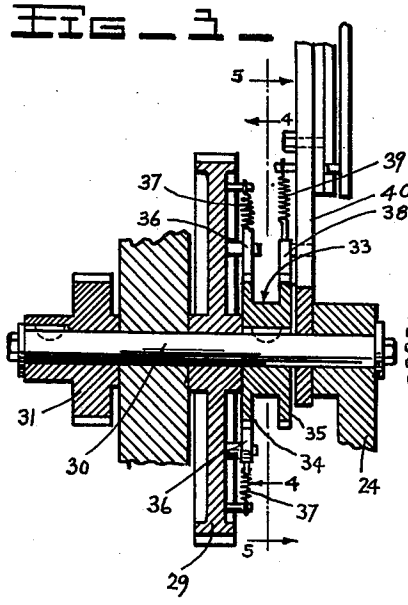


FIG. 4.

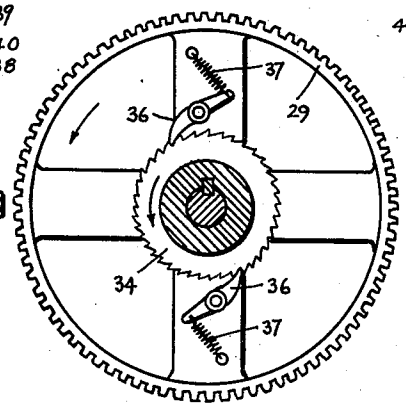
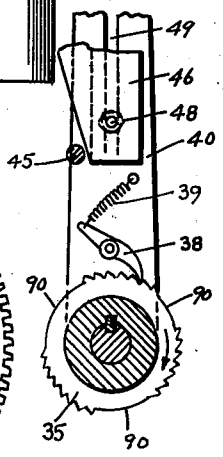


FIG. 5.



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SLUBBING MECHANISM

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FIG. 6.

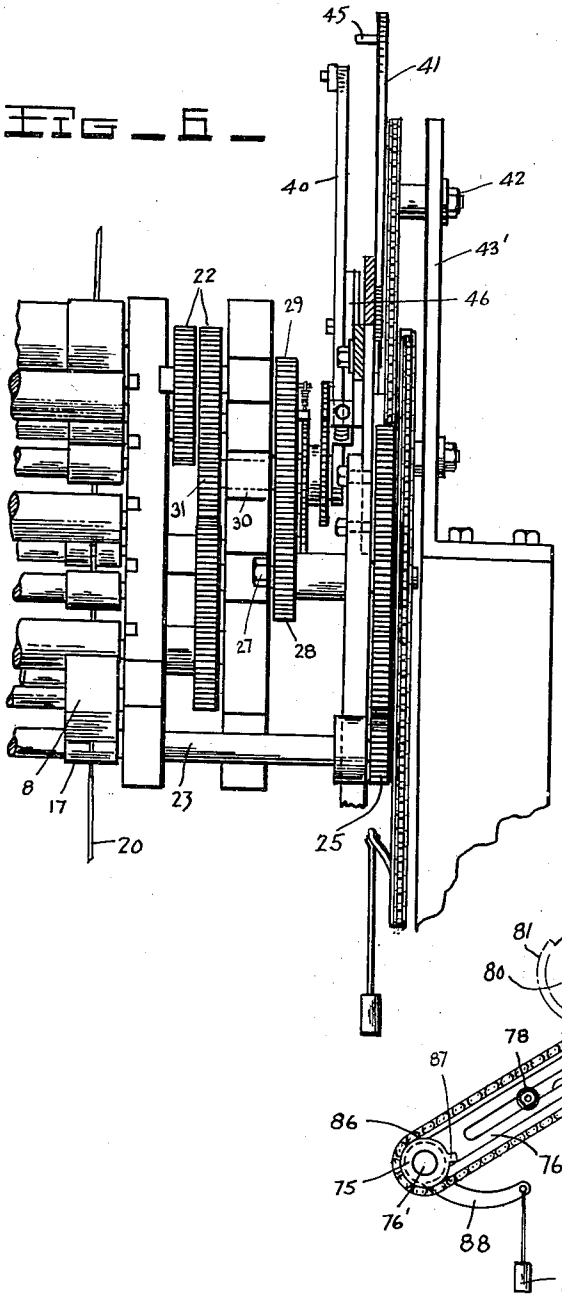
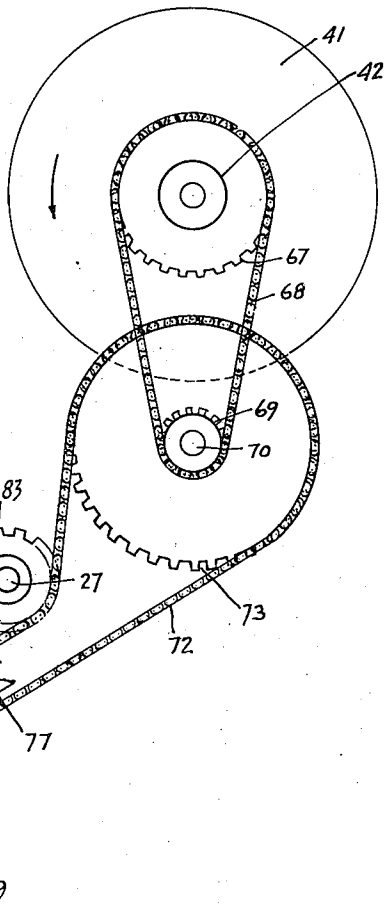


FIG. 7.



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UNITED STATES PATENT OFFICE

2,273,137

SLUBBING MECHANISM

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Application July 3, 1941, Serial No. 400,928

17 Claims. (Cl. 57—38)

This invention relates to an improved slubbing mechanism or attachment constituting an element of or an attachment used in connection with spinning or roving mechanism capable of forming yarn having slubs of varying lengths or thicknesses placed at irregular intervals therein, which yarn may have, at the same time, a crepe twist.

One object of the invention is the provision in a mechanism of this character of means for inserting in a thread or yarn, slubs of varying lengths and thicknesses positioned at irregular intervals throughout the extent of the yarn or thread.

Another object of the invention is to provide a means of this character for forming yarn from textile fibres in such a manner as to simulate Douppioni yarn which is normally made from a natural highly irregular silk imported from China, and which is characterized by having variations therein located in an irregularly irregular order.

Another object of the invention is to provide an attachment or control means for a conventional spinning or roving machine which will cause the spinning or roving mechanism to operate in such a manner as to form irregularly located and shaped slubs in the yarn.

A further object of the invention is the provision of a modified spinning or roving forming mechanism of the character described adapted for use in the formation of yarns or rovings having irregularities irregularly positioned therein.

A further object of the invention is the provision of a mechanism of this character which will be economical to construct and simple in operation while capable of use with or adapted for application to conventional forms of spinning and roving frames.

Other objects and advantages of the invention relate to various improved details of construction and novel forms and arrangements of the parts as will be more fully set forth in the detailed description to follow.

Referring to the drawings:

Fig. 1 is a side view showing in section an arrangement of drawing rolls such as may be employed in a conventional form of spinning frame, and illustrating in side elevation portions of the roll operating mechanism as well as operating elements of the improved structure,

Fig. 2 is a side elevational view of parts of the control mechanism for controlling the operation of the rolls,

Fig. 3 is a detail sectional view through certain of the roll operating elements which are mounted upon a single operating shaft for driving the drawing roll operating mechanism, taken substantially along the line 3—3 of Fig. 6,

Fig. 4 is a detail side elevational view, partially in section, taken substantially along the line 4—4 of Fig. 3,

Fig. 5 is a second detail side elevational view, partially in section, taken substantially along the line 5—5 of Fig. 3,

Fig. 6 is a front elevational view illustrating a portion of the mechanism as seen from a position indicated by the line 6—6 of Fig. 1, and

Fig. 7 is a side elevational view of the driving mechanism for driving the control or pattern member from a part of the drive mechanism, substantially as seen from the right of the operating mechanism shown in Fig. 6.

Various attempts have been made heretofore to form cottom, rayon or other yarns or threads having irregularly formed and irregularly spaced portions therein such as would simulate Douppioni yarn. So far as known such efforts have been successful only to the extent of making yarn having a definite pattern in so far as the slub arrangement is concerned and which may therefore be termed yarns possessing regularly irregular portions, that is, a yarn in which a definite pattern of irregularity is repeated over and over, so that the yarn when woven will show a more or less definite arrangement of the irregularities in the woven fabric instead of disclosing an irregularly distributed non-uniform arrangement of the yarn irregularities which do not form a definite pattern and do not repeat.

In forming yarns of this character on a commercial scale it is desirable to employ a spinning or roving frame having means for varying irregularly the operation of the rolls or provide an attachment for conventional spinning or roving frames capable of operation therewith for varying irregularly the operation of the rolls to form regularly or irregularly shaped slubs irregularly positioned in the yarn through operation of some form of regulating mechanism adapted to interrupt or vary the operation of the rolls in an irregularly occurring order, sequence or degree.

In the form or embodiment of the invention illustrated herein there is provided a drawing roll mechanism, which may be of a conventional or any suitable type adapted for the purpose together with a form of regulating means and control therefor which may be built into the machine or employed as a temporary or permanent attachment connected therewith.

In the form of the machine shown herein a roll supporting frame 1, which may be of a conventional type, supports a plurality of top rolls 3, 4, 5, 6, 7 and 8 together with bottom rolls 11, 12, 13, 14, 15, 16 and 17, which are adapted to receive therebetween a roving or the like, 20, which may be passed downwardly through the rolls in the operation of the roll mechanism, as is indicated in Figs. 1 and 6 of the drawings.

In the form of drawing roll mechanism shown herein the bottom rolls 11 to 17 are driven at progressively increased speeds in the order named, as by gear trains, substantially as indicated at 22. Both the rolls and the means for driving the same are of conventional form and arrangement in machines of this character, as is well-known in the art.

The front delivery roll shaft 23 extending across the front of the machine is driven by any suitable means and from any desired source of power at the end of the machine opposite to that shown, and serves to transmit power to the gear train 22 together with the remaining machine elements and operating parts as shown in the drawings. An end frame 24, as shown in Figs. 1 and 6, supports the conventional operating mechanism generally and the control mechanism for controlling the operation of the rolls in the formation of special yarns or rovings, as more particularly shown and described herein.

A driving gear 25 is carried by the front delivery roll shaft 23 and drives the crown gear 26 with which it is operatively engaged. The crown gear 26 is secured to a shaft 27 which carries a small gear 28 operatively engaging and driving a lower roller driving gear 29 which is mounted for rotation on a shaft 30 and drives a small gear 31 fast on the shaft 30 by means which will be more fully described hereinafter. The small gear 31 in turn drives the conventional gear train 22 for rotating the several bottom rolls from the end of the machine frame shown in drawings.

The machine parts and elements heretofore described are in general common to or typical of machines of this character for driving the series of bottom rolls, such as are indicated herein by reference characters 11 to 16 inclusive, at progressively increasing speeds from the rear to the front of the machine. As is usual in machines of this character, the bottom front roll 17 may be adapted to be driven at a speed as much as twenty times greater than that of the rear bottom rolls 11 and 12 for drawing the roving into a fine yarn at the point where it emerges from the roll, where the roving may be spun by means of a rotating spindle of a conventional type (not shown) operating at a high rate of speed.

The normal operation of a conventional form of spinning mechanism, as shown herein, results in the formation of a yarn of substantially uniform diameter and consistency throughout. The present improvement as represented by the mechanism now more particularly to be described, and which mechanism may be incorporated in a conventional machine of this character or employed as an attachment therefor, modifies the operation of the roll mechanism by introducing variations in the roll operation at regular or irregular intervals and to a uniform or non-uniform degree, whereby slubs may be formed in the yarn at regular or irregular intervals of uniform or non-uniform lengths and thicknesses, although the mechanism is particularly adapted for the purpose of forming non-uniform slubs in the yarn at irregular intervals and in an irregular order whereby recurring pattern changes or repeats are eliminated in the formation of the slubs.

In the present construction, the lower roller driving gear 29 is rotatably mounted on the shaft 30 carried by portions of the frame 24. A gear 31 is keyed to the shaft 30, as is also a double ratchet member 33, which includes a ratchet member 34 located adjacent to the lower roller driving gear 29 and a ratchet member 35 spaced therefrom longitudinally of the shaft 30. Pawls 36 are carried by the lower roller driving gear 29 and engage the ratchet member 34, being held in engaging relation with the ratchet member by springs 37. A slub control arm 40 is rotatably mounted on the shaft 30 and is located adjacent to the ratchet member 35. The slub arm 40 carries a pawl 38 mounted for engagement with the ratchet member 35 with which it is held in engaging relation by spring 39.

The slub control arm 40 extends outwardly radially of the shaft 30 and is mounted for movement in substantially parallel spaced relation with the plane of rotation of a slub control or pattern disk 41, which is rotatably mounted on a shaft 42 carried by a support 43', which may be secured to or form a part of the end frame 24. The control disk 41 is provided with one or more series of openings extending circumferentially thereof (preferably two or more), which in the present embodiment of the invention are shown as two in number and are indicated by the reference characters 43 and 44. One or more pins 45 may be positioned in any of the openings of the series 43 or 44 as may be desired, which pins serve to engage a contact member 46 adjustably mounted on the slub control arm 40 and which is adapted to be secured thereto in any one of a plurality of adjusted positions longitudinally thereof by means of bolts 47 and 48 mounted in a slot 49 formed in the slub control arm 40.

A supporting arm 50 is fixedly secured to a portion of the end frame 24 and carries a pulley 51 rotatably mounted upon a shaft carried by the supporting arm. A flexible strap or chain 52 is secured to the slub control arm 40, as at 53, and passes over the pulley 51 to extend downwardly therefrom and have a weight 54 secured to the free end thereof.

A buffer arm 55 is carried by the supporting arm 50 being adapted for adjustable connection therewith by means of a bolt 57 which may be passed through any one of a series of openings 58 formed in the buffer arm and a slot 59 formed in the supporting arm 50 whereby angular adjustment of the arms 50 and 55 may be had as well as a longitudinal adjustment of the arm 55 relative to the arm 50. A pulley 60 is rotatably supported by the buffer arm 55 in position to receive the flexible strap or chain 52 after it passes over the pulley 51 carried by the supporting arm 50. The buffer arm 55 carries a spring pressed extension which may be in the form of a bolt 61 slidably mounted in one end of the buffer arm 55 and having a padded end 63 adapted to engage a portion of the slub control arm 40 when the arm is in its released position with reference to the control disk 41. A coiled spring 64 is shown as surrounding the bolt 61 outwardly of the buffer arm 55 so that opposite ends thereof will engage the end of the buffer arm 55 and the padded end 63 of the bolt 61 to provide a resilient mounting for the bolt 61 tending to resist inward movement

of the bolt 61 longitudinally of the buffer arm 55.

The slub control disk 41 is provided with a sprocket wheel 67 which is secured thereto and mounted concentric therewith through which the slug control disk 41 is driven by means of a sprocket chain 68 from a sprocket wheel 69 which is mounted on a shaft 70 carried by a portion of the frame 24. The sprocket wheel 69 is driven from a sprocket chain 72 which passes over a sprocket wheel 73 secured to and mounted for rotation concentric with the sprocket 69 and extends over a chain tension pulley 75 rotatably mounted on a shaft 76' in an extension plate 76 carried by the frame 24 and having an adjustable connection therewith by means of a slot 77 formed in the plate 76 and a bolt 78 through which the extension plate may be secured to the frame 24 in any one of a plurality of longitudinally adjusted positions. The sprocket chain 72 passes beneath and is driven from a mutilated sprocket wheel 80 which is mounted upon the shaft 27 and is driven by the front delivery roll shaft 23 through the gear 26. The mutilated sprocket wheel 80 has side flanges 81 to retain the sprocket chain 72 in position thereon and is provided with any suitable or desired number of gear teeth less than the full complement, which in the present case are two in number and indicated by the reference character 83. From this it will be seen that the control disk 41 is driven intermittently by means of the mutilated sprocket wheel 80 carried by the shaft 27 so that the slub control disk 41 may be rotated in any desired irregular manner by means of the number and arrangement of teeth 83 carried by the mutilated sprocket gear 80. The movement of the slug control disk 41 may be varied additionally through irregular operation of the sprocket chain 72 by unequal registration of the teeth 83 with the sprocket chain links which cause engagement of the teeth 83 with the chain links generally while allowing the chain links, or certain of them, to override the teeth 83 in certain positions of the parts.

As an additional means for imparting irregular movement to the control or pattern disk 41, a plate 86 is mounted loosely on the shaft 76' adjacent to the chain tension pulleys 75 and is provided with an offset dog 87 engageable with the sprocket chain 72 as it passes around the chain tension pulley 75. The plate 86 has an arm 88 carrying a weight 89 which serves to hold the dog 87 in contact with the sprocket chain links at all times during the forward movement of the chain. The provision of this dog mechanism serves to change the movement of the sprocket chain irregularly during its travel, as the dog acts in opposition to the teeth 83 of the mutilated sprocket 80 so that the teeth 83 will at times slip over one or more sprocket links thereby producing irregularities in the movement of the control disk 41 other than those which would normally be imparted thereto through the location of the teeth 83 on the mutilated sprocket gear 80. The ratchet 35 may be provided with blank portions 90, as shown in Fig. 5 of the drawings, and which, as shown, are formed by the omission of a certain number of ratchet teeth, as, for example, three, five and seven teeth in the form shown herein, whereby irregular throws are imparted to the control arm 40 by the weight 54 during certain of the releases caused when contact 46 rides over a pin 45.

Irregularities in the operation of the control arm 40 and control member 41, as shown herein, may be caused in varying degree and in irregular order by means of the following devices and combinations of means, all of which may be employed together or only certain of them may be used, as may be found desirable in practice. The weight 54 may be increased or decreased as desired to vary the speed and extent of "throw" imparted to the control arm 40 when contact 46 slips over a pin 45. Irregularity in the occurrence and "throw" of arm 40 is also obtained by means of the blanks 90 formed on the ratchet gear 35. Sprocket chain 72 is given an irregular operation by reason of the fact that it is mounted on a toothless tension pulley 75 and held under tension by the dog 87 so that the limited number of teeth 83 on the mutilated sprocket gear 80 may engage operatively or slip over certain of the links of the chain 72 in the travel of the chain. The extent of "throw" and travel of the arm 40 may also be varied by changing the point of connection of the buffer arm 55 with its support 59, as well as by changes in the strength of the spring 64. Another variation is obtained by placing the pins 45 at different radial distances from the center of the disk 41 to cause release of arm 40 at different positions whereby the length and extent of its "throw" is varied.

The rotation of the disk 41 which may be irregular and intermittent causes the pins 45 to engage the contact member 46 in the order of their occurrence. Since the pins 45 may be placed at different distances from the center of the disk 41 the "throw" of the arm 40 may be varied in this way in each or certain of its movements since the engagement of the pins with the contact member 46 may occur in a variety of different angular positions of the arm 40 dependent upon the locations of the pine relative to each other on the face of the control disk 41.

In the operation of the mechanism above described the lower rolls 11 to 16, inclusive, are driven through the gear train 22 by means of the gear 31 which is keyed to the shaft 30 and driven from the lower roller driving gear 29, the gear 31 in the present construction, however, being mounted for rotation through operation of the ratchet member 33 by the pawls 36.

As the lower roller driving gear 29 is rotated by the gear 28 it normally drives the gear 31 through the ratchet member 33 by engagement of the pawls 36 with the ratchet member 34 to secure normal operation of the rolls 11 to 16, inclusive, until such operation is interrupted through operation of the slub control arm 40 by the control disk 41.

It is to be understood that the front driven roll 17 is mounted on the front delivery roll shaft 23 which carries the gear 25 driving the gear 26. This roll is driven constantly at a uniform speed, while the rolls 11 to 16, inclusive, are driven through the operation of the gear train 22. Consequently, the front roll 17 is not speeded up by operation of the overrunning means, but the rolls accelerated by operation of the overrunning means are the rolls 11 to 16, inclusive, which are normally rotated at slower speeds than the roll 17, and which are driven through the gear train 22. The speeding up or acceleration of the rolls 11 to 16, inclusive, is effected through operation of the mutilated sprocket wheel 80 on the sprocket chain 72 which causes the control disk 41 to be rotated at irregular intervals.

When one of the pins 45 engages the contact member 46 the control arm 40 is turned into a

position approximating that shown in Fig. 2 of the drawings and the pawl **38** is caused to slide over a certain number of teeth of the ratchet **35**. As the pin **45** passes over the contact member **46** the control arm **40** is released and caused to move sharply in a clockwise direction, as seen in Fig. 2, about its axis, of rotation **30** by the weight **54** until it is stopped by the padded end **63** of the buffer arm extension **61** striking the control arm **40** and causing it to stop suddenly and rebound. During this clockwise movement of the control arm about the shaft **30**, the pawl **38** rotates the ratchet **35**, and together with it the ratchet **34**, to cause a sudden quick forward or overrunning movement of the ratchet member **34** with respect to its pawls **36**. This action gives a sudden accelerated movement to the shaft **30** and the gear **31** carried thereby which results in a suddenly increased speed of rotation of the rolls to feed a portion of the roving therethrough at a speed much increased over its normal rate. This action at the end of each release of the contact member **46** by one of the pins **45** may occur as a single movement or as a series of movements varying in extent dependent upon the power exerted by the coiled spring **64** and the weight **54**. The provision of the blank spaces **90** on the ratchet **35** produces further irregularity in the operation of the mechanism by either varying the extent of overrunning of the ratchet **34** or the time of its occurrence, since certain movements of the control arm **40** may occur without being communicated to the ratchet **34** or may be communicated thereto only partially.

When the drawing rolls **11** to **16**, inclusive, are suddenly speeded up by the overrunning of the ratchet **34** as operated by the control arm **40**, yarn sections of greater or less length, dependent upon the degree and extent of the speedup, pass quickly through the rolls without being completely drawn out. This forms slubs of varying thicknesses and lengths in the yarn dependent upon the degree and extent of the accelerated movement, and these slubs may be irregularly positioned in the yarn by reason of the various non-uniformly occurring factors causing the speedup, such as have previously been described.

It will be seen from the above description that while the present mechanism is particularly adapted for use in the production of irregularly positioned slubs of varying lengths and thicknesses which occur in the yarn in a constantly varying order and arrangement by reason of the various irregularly operating control factors employed including those mentioned above together with the adjustable relation of the contact member **46** to the slub control arm **40** as well as the variable positioning of the buffer arm **55** relative to its supporting arm **50**, the mechanism in a modified form is also capable of and adapted for use in treating yarns or rovings for forming irregularities in accordance with any desired pattern arrangement or recurring order.

What I claim is:

1. The combination with a spinning frame provided with drawing rolls and having means for rotating certain of said rolls, of mechanism operable intermittently and irregularly for increasing the speed of rotation of certain of said rolls to form irregularly positioned thickness variations of a non-repeat character in yarn operated upon by said drawing rolls.

2. The combination with a drawing mechanism provided with rolls and having means for rotating certain of said rolls, of means for varying the speed of rotation of certain of said rolls comprising a ratchet operated drive means, and means acting upon said ratchet operated drive means intermittently and in a continually irregular manner for increasing the speed of rotation of said rolls through the overrunning action of said ratchet operated drive means at irregularly changing irregular intervals and to varying degrees.

3. In a drawing mechanism having drawing rolls and means for rotating certain of said rolls, of means for changing the speed of rotation of certain of said drawing rolls at continually irregularly occurring intervals in the operation of the mechanism and for different time periods to form slubs of different lengths in the yarn which are irregularly spaced from each other in an irregularly recurring manner.

4. In a yarn treating mechanism provided with drawing rolls, means for rotating said drawing rolls, means for varying the speed of rotation of certain of said rolls comprising overrunning drive means, and a plurality of irregularly actuated interacting means for operating said overrunning drive means with substantially continually changing irregularity.

5. In a yarn treating mechanism provided with drawing rolls, means for driving certain of said drawing rolls, means for varying the speed of rotation of certain of said drawing rolls comprising overrunning drive means; and means comprising a pattern member, means, operated by said pattern member for actuating said overrunning drive means and means modifying the operation of said pattern member irregularly to vary the operation of said roll driving means and increase the speed of rotation of certain of said drawing rolls at intervals of substantially non-recurring irregularity.

6. In a drawing mechanism comprising drawing rolls and means for rotating said drawing rolls, means for accelerating the speed of rotation of certain of said rolls at irregularly occurring non-repeat intervals comprising an overrunning means, and means for actuating the overrunning means with substantially continually changing irregularity comprising a control arm, a pattern member for operating the control arm and means for changing the travel of the pattern member irregularly.

7. In a yarn drawing mechanism comprising drawing rolls, means for rotating the drawing rolls, means for accelerating the speed of rotation of said rolls temporarily and intermittently comprising an overrunning means, and means for actuating said last named means comprising an intermittently driven pattern member.

8. A yarn drawing mechanism comprising rotatably mounted drawing rolls, means for driving said drawing rolls, and means for accelerating the speed of rotation of certain of said rolls intermittently comprising overrunning means, and mean for operating said overrunning means comprising a control arm and irregularly displaceable means actuated by said control arm operatively engaging said overrunning means.

9. In a spinning frame having rotatably mounted drawing rolls, means for rotating said drawing rolls, means for increasing the speed of rotation of certain of said drawing rolls at intervals comprising an overrunning means, a control arm member for operating said overrunning means, and means for actuating irregularly said control arm member comprising counterbal-

anced gravity influenced and spring operated means.

10. In a spinning frame having rotatably mounted drawing rolls, means for rotating said drawing rolls, means for increasing the speed of rotation of said drawing rolls intermittently comprising an overrunning means, a control member for operating said overrunning means, a pattern control member for actuating said control member, and means for imparting irregular movement to said pattern control member.

11. In a spinning frame having rotatably mounted drawing rolls, means for actuating said drawing rolls, means for increasing the speed of rotation of said drawing rolls intermittently comprising an overrunning means, a control member for operating said overrunning means, a pattern control member for actuating said control member, and means for varying the degree of movement imparted to said overrunning means by said control member.

12. A yarn drawing mechanism comprising rotatable drawing rolls, means for rotating said drawing rolls and means for increasing the speed of rotation of certain of said drawing rolls intermittently and irregularly comprising a pattern member, means for driving said pattern member, and means operable irregularly for interrupting the operation of said pattern member driving means.

13. A yarn drawing mechanism comprising rotatable drawing rolls, means for rotating said drawing rolls and means for increasing the speed of rotation of certain of said drawing rolls intermittently and irregularly comprising a pattern member, means for driving said pattern member, and means for changing irregularly the travel of the pattern member.

14. A yarn drawing mechanism comprising rotatable drawing rolls, means for rotating said drawing rolls and means for increasing the speed of rotation of certain of said rolls intermittently comprising a pattern operated spring actuated and gravity influenced counterbalancing means.

15. A yarn drawing mechanism comprising rotatable drawing rolls, means for rotating said drawing rolls and means for changing the speed of rotation of certain of said rolls unabruptly to form tapering slubs comprising a speed change mechanism, a driven pattern member, and opposed spring actuated and gravity influenced means actuated by said pattern member for operating said speed change mechanism.

16. In a yarn treating mechanism provided with drawing rolls, means for rotating said drawing rolls, means for increasing the speed of rotation of certain of said rolls intermittently and with a substantially constantly changing irregularity in the operation of the mechanism to form slubs in the yarn at indefinitely placed irregular intervals.

17. In a yarn treating mechanism provided with drawing rolls, means for rotating said drawing rolls, means for increasing the speed of rotation of certain of said rolls intermittently and for substantially continually changing periods in the operation of the mechanism to form slubs of continually changing irregular lengths in the yarn.

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