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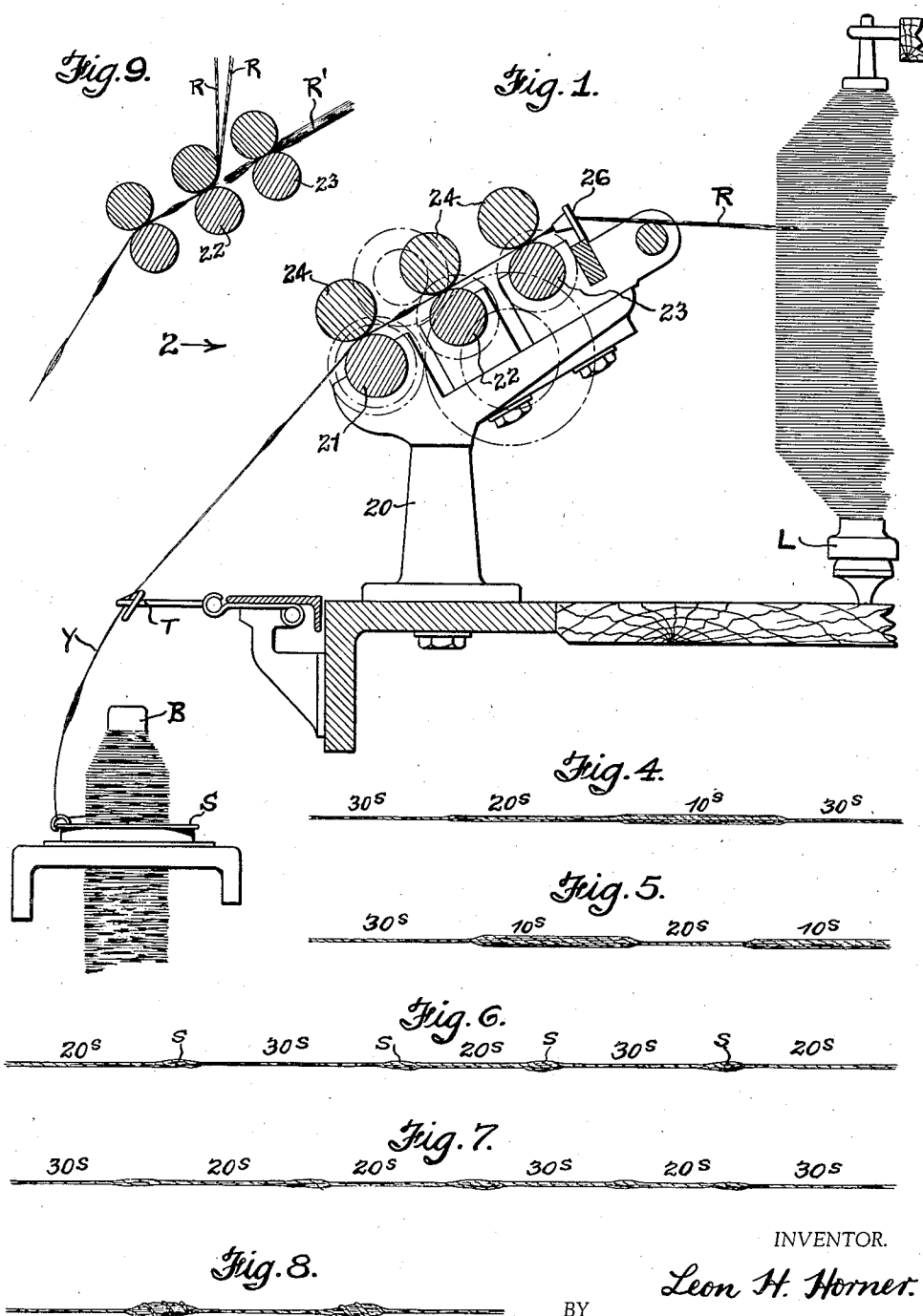
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DRAWING MECHANISM FOR SPINNING OR TWISTING MACHINES

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2 Sheets-Sheet 1



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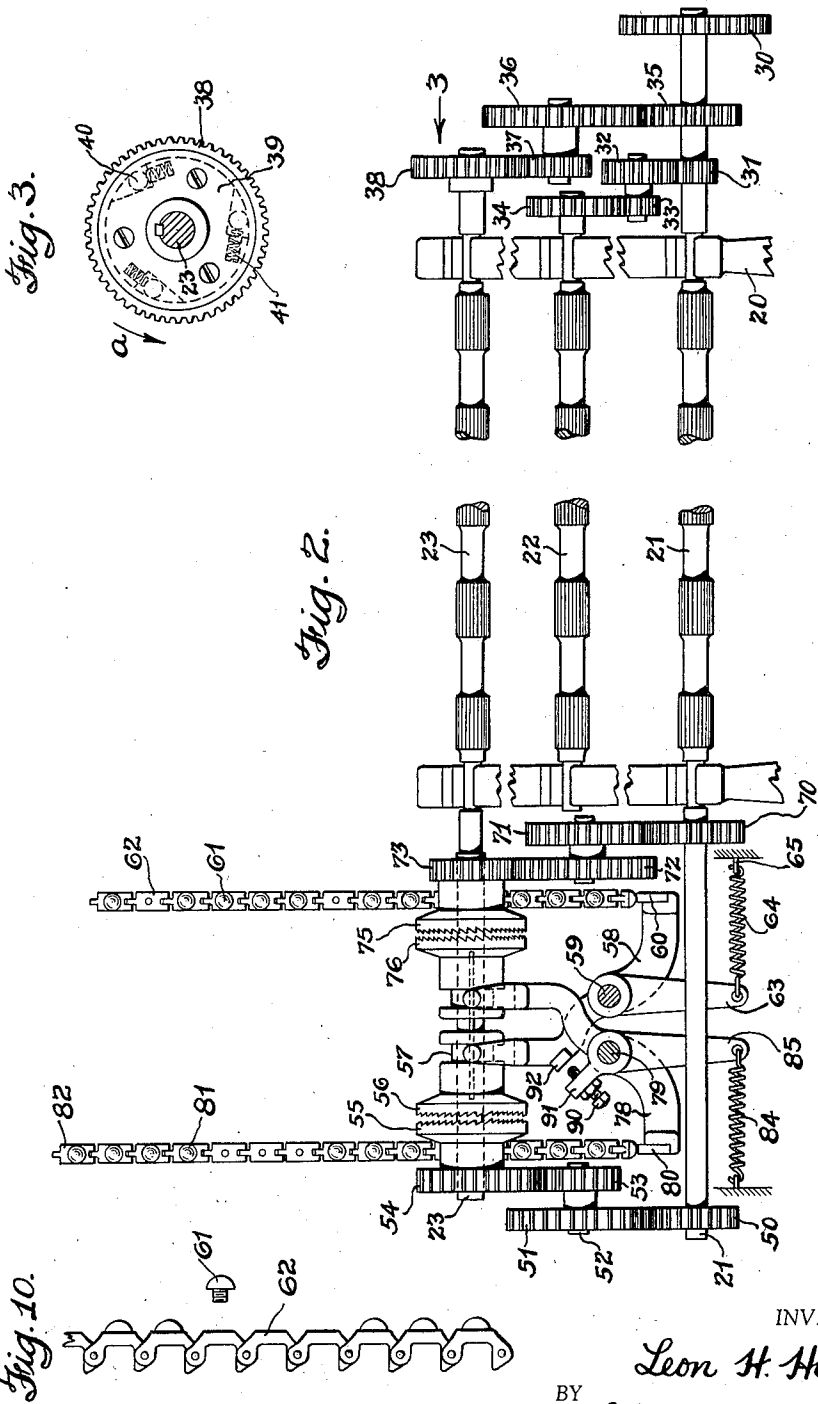
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DRAWING MECHANISM FOR SPINNING OR
TWISTING MACHINES

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This invention relates to mechanism for producing irregular yarn in a spinning or twisting machine. Such yarn is sometimes known as "Himalaya" yarn and is distinguished by marked variations in size in successive portions. The yarn may be further varied by the introduction of slubs or flakes at predetermined points.

It is the object of my present invention to provide improved drawing mechanism by which an increased range of size variations may be made available, and by which the variations may be introduced in any desired order or spacing.

A further feature of my invention relates to the provision of a safety device which will prevent disastrous consequences, if a mistake in the drafting of the pattern chains occurs.

My invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of the invention is shown in the drawings, in which

Fig. 1 is a sectional side elevation of drawing mechanism embodying my invention;

Fig. 2 is a front view thereof, looking in the direction of the arrow 2 in Fig. 1 but with the drawing rolls spaced apart for clearness;

Fig. 3 is a detail side elevation, looking in the direction of the arrow 3 in Fig. 2;

Figs. 4 to 8 inclusive show different kinds of yarn which may be produced by my invention;

Fig. 9 is a detail sectional side elevation, showing a modified use of my invention, and

Fig. 10 is a side elevation of a portion of pattern chain.

Referring to Figs. 1, 2 and 3, I have shown portions of a spinning frame including a roll stand 20 supporting a front roll 21, middle roll 22 and back roll 23. The rolls 21, 22 and 23 are mounted in the usual open-top bearings, the spacing of which is adjustable in the usual way for variations in length of staple. The usual top rolls 24 are provided for the drawing rolls 21, 22 and 23, and suitable weighting devices (not shown) are provided for the top rolls 24.

I have also indicated in Fig. 1 a spool L, from one or more of which roving R is fed through a guide 26 to the drawing rolls. I have also shown a thread guide T, a spinning ring S and a bobbin B on which the yarn Y is wound.

All of the parts thus far described may be of the usual commercial construction.

The front roll 21 (Fig. 2) is assumed to be continuously rotated through a gear 30 mounted on the front roll shaft. The middle roll 22 is shown

as being rotated continuously through a direct gear drive from the front roll 21, said gear drive comprising a pinion 31, gear 32, pinion 33 and gear 34. One or more of these gears may be change gears to permit speed variations if so desired. In some cases it may be desirable to drive the middle roll from the back roll 23 instead of from the front roll 21.

The back roll 23 also has a gear connection from the front roll 21, comprising a gear 35 on the front roll shaft, a gear 36 driven by the gear 35, a pinion 37 rotatable with the gear 36, and a ring gear 38 loosely rotatable on a disc 39 (Fig. 3) secured to the shaft of the back roll 23.

One-way driving connections are provided between the ring gear 38 and disc 39. In Fig. 3, these connections are indicated as comprising balls or rollers 40 mounted in peripheral recesses in the disc 39 and forced outward against the inner face of the ring gear 38 by springs 41. When the ring gear is rotated in the direction of the arrow *a* in Fig. 3, the ball or roller clutch will act to drive the disc 39 and shaft 23 in the same direction. If, however, the shaft of the back roll 23 is independently rotated at a higher speed than the rate at which the ring gear 38 is moving, such higher speed of rotation will cause the disc 39 to run ahead of the ring gear 38, which action will be permitted by the slipping of the one-way clutch connection between the ring gear 38 and disc 39.

The mechanism thus far described and preferably located at the head end of the machine, is adapted to operate in the usual way to drive the drawing rolls 21, 22 and 23 in a desired speed relation to produce yarn continuously and of a predetermined size. With this drive, the speed of the back roll is the lowest, the draft is greatest, and the yarn is the finest and is designated by the highest size number.

At the opposite or foot end of the machine, I provide mechanism for selectively driving the back roll 23 at either one of two additional faster speeds. I will first describe the mechanism shown at the extreme left in Fig. 2 by which the intermediate or next faster than normal back roll speed is produced.

For this purpose, a gear 50 is mounted on the end of the shaft of the front roll 21 and engages a gear 51 mounted on a fixed stud 52 and having a pinion 53 rotatable therewith. The pinion 53 drives a gear 54 loosely rotatable on the end of the shaft of the back roll 23 and having a clutch disc 55 associated therewith.

A cooperating clutch disc 56 is keyed to the

back roll shaft but is slidable thereon toward and away from the clutch disc 55. The hub of the disc 56 is grooved as indicated at 57 to receive the ends of a yoke lever 58 mounted on a fixed pivot 59.

The lower end of the lever 58 has a contact element 60 adapted to be engaged by buttons 61 on a pattern chain 62. The chain 62 is actuated by suitable driving mechanism not shown so that successive links of the chain are progressively presented to the contact element 60. High and low links may be used instead of low links and buttons.

A depending arm 63 is connected to the lever 58 and a spring 64 is connected at one end to the arm 63 and at the other end to a fixed support 65. The spring 64 tends constantly to move the clutch disc 56 into engagement with the driving clutch disc 55, but such movement is prevented as long as the contact element 60 is engaged by a button 61.

When the lever 58 is released by the chain 62, the clutch disc 56 engages the disc 55 and the back roll 23 is rotated at a somewhat faster rate than the normal low speed drive through the one-way clutch. This increase in speed obviously reduces the draft and causes a corresponding increase in the size of the yarn being produced, which increased size is designated by a smaller size number.

Additional mechanism is provided to effect a third or high speed rotation of the back roll 23. The high speed drive is substantially identical with the intermediate drive except for differences in gear ratio, and comprises a gear 70 on the shaft of the front roll 21, a gear 71 driven thereby, a gear 72 rotatable with the gear 71, and a gear 73 loose on the shaft of the back roll 23 and associated with a clutch disc 75 which co-operates with a second clutch disc 76 keyed to the back roll shaft and slidable thereon. The position of the clutch disc 76 is controlled by a yoke lever 78 mounted on a fixed pivot 79 and having a contact element 80 engaged by buttons 81 on a second pattern chain 82.

When a button 81 engages the contact element 80, the clutch discs 75 and 76 are separated and the high speed drive is inoperative. When a button 81 is absent, however, the clutch discs 75 and 76 are engaged by a spring 84 acting through an arm 85, and the back roll 23 is rotated at a speed substantially higher than the intermediate speed previously described. During such rotation, the clutch discs 55 and 56 are separated so that the intermediate drive is inoperative, and the one-way clutch disc 39 overruns the ring gear 38.

It might be disastrous if the intermediate and high speed clutches should both be engaged at the same time. The pattern chains 62 and 82 are assumed to be laid out so that such simultaneous engagement is impossible, but mistakes do occur.

I therefore provide a safety device comprising a screw 90 (Fig. 2) threaded in a lug 91 on the yoke lever 78 and positioned to engage a lug 92 on the yoke lever 58. Whenever either yoke lever is in neutral or inoperative position, there is sufficient clearance between the end of the screw 90 and the lug 92 so that the other yoke lever can move its associated clutch disc into driving engagement.

The space between the screw 90 and lug 92 is not sufficient, however, to permit movement of both yoke levers to driving position at the same

time. If both yoke levers are unintentionally released at the same time by the pattern chains, the safety device will prevent simultaneous movement of both the intermediate and high speed clutches to operative or driving position. Damage to the machine will thus be prevented, should a mistake occur in the placing of the buttons in the pattern chains 67 and 82.

In Figs. 4 to 8 I have indicated some of the different kinds of yarn which can be produced by the use of my improved drawing mechanism. In Fig. 4 I have shown the low speed, intermediate speed, and high speed operated successively to produce fine, intermediate and coarse yarns, indicated for example as 30^s, 20^s and 10^s respectively.

In Fig. 5 the same yarn numbers are used as in Fig. 4 but in different sequence.

In Fig. 6, intermediate and low speeds are alternated to produce 20^s and 30^s respectively, 20 and the high speed drive is used very briefly between each shift from intermediate to low or vice-versa to produce slubs S.

In Fig. 7 an additional variation is produced by shifting successively from low to high to intermediate to high to intermediate to high to low, thus producing a portion of 30^s and two successive portions of 20^s, followed by another portion of 30^s. Also each two successive portions are separated by a slub produced by very brief operation of the high speed drive.

These four examples serve to illustrate the almost innumerable combinations which can be worked out by the use of my improved drawing mechanism.

The device may also be used for the production of so-called "flake" yarn by introducing the regular yarn threads or ends R to the middle drawing roll 22, as indicated in Fig. 9, and by introducing a soft roving R' to the back roll. In this case the low speed drive through the one-way clutch would be disconnected, and if a flake of one size only was desired, the high speed drive or the intermediate drive would be intermittently connected to the back roll to cause it to insert separated flakes of the roving R' in the bight of the middle rolls, where they would be bound in by the regular yarn threads R, as indicated in Fig. 8. If flakes of two different sizes were desired, then the high speed drive and the intermediate drive would both be used.

Where the term spinning machine is used in the claims, it is to be understood as including twisting machines also.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:—

1. Drawing mechanism for a spinning machine having front and back drawing rolls, comprising, means to drive said front roll continuously at constant speed, means to drive said back roll at low speed through an overrunning clutch, means to drive said back roll at a predetermined intermediate speed, means to drive said back roll at high speed, and pattern controlled means determining the selective operation of the low, intermediate and high speed drives.

2. Drawing mechanism for a spinning machine having front and back drawing rolls, comprising, means to drive said front roll continuously at constant speed, means to drive said back roll at low speed through an overrunning clutch, means to drive said back roll at a predetermined intermediate speed, means to drive said back roll at

high speed, pattern controlled means determining the selective operation of the low, intermediate and high speed drives, and means to prevent simultaneous operation of the intermediate and high speed drives.

3. Drawing mechanism for a spinning machine having front and back drawing rolls, comprising, means to drive said front roll continuously at constant speed, means to drive said back roll at low speed through an overrunning clutch, means to drive said back roll at a predetermined intermediate speed, means to drive said back roll at high speed, pattern controlled means determining the selective operation of the low, intermediate and high speed drives, and means to disable one of said intermediate or high speed drives when the other is in operation.

4. Drawing mechanism for a spinning machine having front and back drawing rolls, comprising, means to drive said front roll continuously at constant speed, means to drive said back roll at low speed through an overrunning clutch, means to drive said back roll at a predetermined intermediate speed, means to drive said back roll at high speed, clutches in said intermediate and high speed drives, a lever controlling each clutch, and a pattern chain controlling each lever.

5. Drawing mechanism for a spinning machine having front and back drawing rolls, comprising, means to drive said front roll continuously at constant speed, means to drive said back roll at low speed through an overrunning clutch, means to drive said back roll at a predetermined intermediate speed, means to drive said back roll at high speed, clutches in said intermediate and high speed drives, a lever controlling each clutch, and a pattern chain comprising high and low links, and each high link holding the associated clutch disengaged.

6. In a spinning machine having front and back drawing rolls, in combination, means to drive said front roll continuously at constant speed, means to drive said back roll at low speed through an overrunning clutch, means to drive said back roll at a predetermined intermediate speed, means to drive said back roll at high speed, clutches in said intermediate and high speed drives, a lever controlling each clutch, a pattern chain controlling each lever, and means to prevent simultaneous movement of both levers to clutch-engaging positions.

7. Drawing mechanism for a spinning machine having front and back drawing rolls, comprising, means to drive said front roll continuously at constant speed, means to drive said back roll at low speed through an overrunning clutch, means to drive said back roll at a predetermined intermediate speed, means to drive said back roll

at high speed, a clutch in the intermediate drive, a clutch in the high speed drive, a lever for each clutch, spring means to shift said levers to clutch-engaging positions, and selective pattern means normally counteracting said spring means.

8. Drawing mechanism for a spinning machine having front and back drawing rolls, comprising, means to drive said front roll continuously at constant speed, means to drive said back roll at low speed through an overrunning clutch, means to drive said back roll at a predetermined intermediate speed, means to drive said back roll at high speed, a clutch in the intermediate drive, a clutch in the high speed drive, a lever for each clutch, spring means to shift said levers to clutch-engaging positions, selective pattern means normally acting to prevent such movement of said levers, and a safety device to prevent simultaneous movement of both levers by said spring means to clutch-engaging position.

9. In a spinning machine having front and back drawing rolls, in combination, means to drive said front roll continuously at constant speed, means to drive said back roll at low speed through an overrunning clutch, means to drive said back roll at a predetermined intermediate speed, means to drive said back roll at high speed, a clutch in the intermediate drive, a clutch in the high speed drive, a lever for each clutch, spring means to shift said levers to clutch-engaging positions, and selective pattern means normally acting to prevent such movement of said levers, one of said levers having an adjustable stop screw and the other lever having a portion engaged thereby when either lever is moved to clutch-engaging position.

10. Drawing mechanism for a spinning machine having front, intermediate and back drawing rolls, comprising, means to drive said front and intermediate rolls continuously at constant speed, means to drive said back roll at low speed through an overrunning clutch, means to drive said back roll at a predetermined intermediate speed, means to drive said back roll at high speed, and pattern controlled means determining the selective operation of the low, intermediate and high speed drives.

11. Drawing mechanism for a spinning machine having front, intermediate and back drawing rolls, comprising, means to drive said front and intermediate rolls continuously at constant speed, means to drive said back roll at low speed through an overrunning clutch, means to drive said back roll at a predetermined intermediate speed, means to drive said back roll at high speed, clutches in said intermediate and high speed drives, a lever controlling each clutch, and a pattern chain controlling each lever.

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