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IRREGULARLY OPERATING CONTROL MOTIONS

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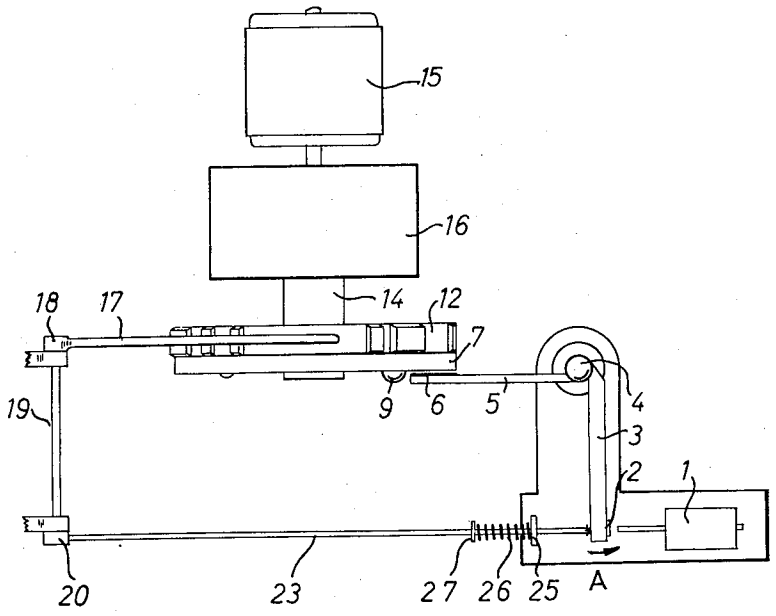


FIG. 1.

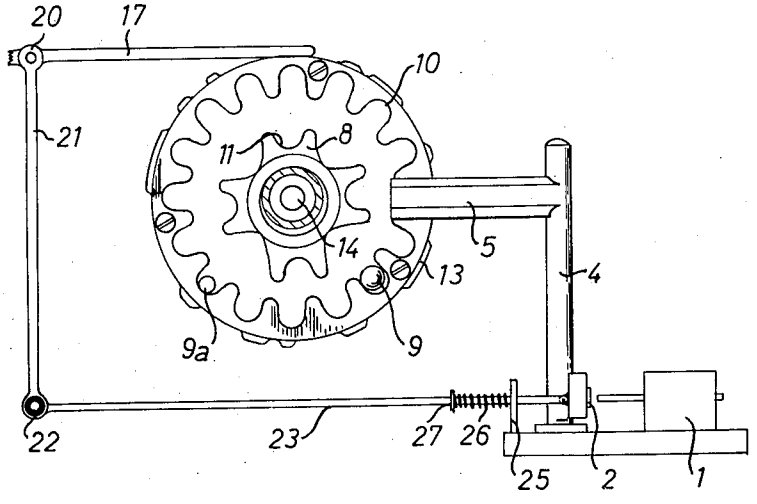


FIG. 2.

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IRREGULARLY OPERATING CONTROL MOTIONS

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The present invention relates to irregularly operating control motions such as may be employed for example in connection with textile spinning frames for controlling the movement of the feed or delivery rollers. The present invention is particularly applicable to the use in the spinning of carpet yarn of longitudinally varying colour or colour character.

According to the present invention an irregularly operating control motion comprises a hollow rotary control member having irregularly circumferentially spaced external cams each adapted during rotation of the control member to exert a controlling influence at a given locality in the rotary path of the control member and having circumferentially spaced internal pockets and a tumbler within the control member adapted during the rotation of the control member to fall haphazardly from one pocket to another and while located in a pocket to protrude therefrom in the axial direction of the control member to exert a controlling influence at a given locality in the rotary path of the control member.

In preferred forms of construction the control member is rotatable about a horizontal or substantially horizontal axis and the external cams are of non-uniform circumferential extent.

The control motion may include electrical switch means operable by said cams and said tumbler and in a preferred form of construction a single switch is operated by the cams and tumbler.

The arrangement may be such that the tumbler may exert a controlling influence during movement of the control member through only a small angle or, in other words, for a relatively short period of time whereas the cams may for the most part be spaced apart by angles greater than the angle through which the tumbler control is effective. Likewise at least some of the cams may subtend angles at the centre of the controller substantially greater than the angle through which the tumbler is effective.

The invention is particularly useful for controlling the spinning of carpet yarn of longitudinally changing colour character and of substantially uniform cross-sectional area such as may be employed in the tufting of carpets. Such yarn is relatively coarse and of the order of 5000 or less yards per pound. For this purpose the control motion may cause alternate engagement of two clutches through which two sets of back rollers feed rovings of different colour character to the front rollers of a spinning frame. The cams and tumblers may control a common switch which when in one position will cause one of the clutches to be engaged and when in another position will cause the other clutch to be engaged. The clutches may be electromagnetic clutches. In such an arrangement the main or more widely separated colour changes will arise from actuation of the switch by the cams but there will be subsidiary colour changes of shorter duration arising from actuation of the switch by the tumbler which will result in the feeding of one of the colours for short intervals of time corresponding to the relatively short exercise of control by the tumbler.

The invention thus includes a drafting frame for producing carpet yarn suitable for tufting and of longitudinally varying colour character and comprising two

sets of back rollers adapted to feed yarn components to a single set of front rollers, the back rollers being driven through electromagnetically engageable clutches under the control of a control motion as hereinbefore set forth.

The invention furthermore includes a method of making carpet yarn suitable for tufting and of longitudinally varying colour character, that is to say relatively coarse yarn of the order of five thousand or less yards per pound and of substantially uniform cross-section, in which yarn components of different colour character are fed to the front rollers of a spinning stage by separate sets of back rollers driven at changing speeds to produce changes of colour character in the yarn when spun, the back rollers being subject to a repeating series of changes of speed at irregular intervals and to haphazardly occurring changes of speed of duration different from (preferably shorter than) the average interval between the changes of said repeating series.

The invention also includes carpet yarn suitable for tufting which is characterized by a repeating series of irregularly occurring changes of colour charatcer having interspersed therewith haphazardly occurring changes of colour character of duration different from (preferably shorter than) the average interval between the irregular changes of said series.

The invention is further described by way of example with reference to the accompanying drawings in which:

FIG. 1 is a plan view of one embodiment of the present invention; and

FIG. 2 is a section, partly cut away, corresponding to FIG. 1.

The switch **1** which is spring loaded towards the left can be actuated by a contactor **2** disposed on an arm **3** of a pivotal pillar **4**, the pillar **4** having a second arm **5** with an abutment **6** thereon. Adjacent the abutment **6** is a hollow rotatable control member **7** which includes a movable deflector **8** and a projecting tumbler in the form of a ball **9**, and a smaller non-projecting tumbler in the form of a ball **9*a***, the balls **9** and **9*a*** being retained within the control member by a shield or guard plate (not shown) at the front of the control member. Disposed circumferentially around the inner surface of the control member **7** are pockets **10** of similar dimensions to recesses **11** provided in the deflector **8**, the balls **9** and **9*a*** being of size to lodge, during part of the rotation of control member **7** and deflector **8**, in a pocket **10** or a recess **11**.

The control member **7** has a disc **12** which closes its rear face. The disc **12** has a series of irregularly circumferentially spaced cams **13** on the external surface. The cams are of differing circumferential length. The control member **7** and disc **12** are keyed to a common shaft **14** driven by a motor **15** through a reduction gearing **16**, the deflector **8** being freely mounted on shaft **14**. A follower lever **17** abuts against the disc **12** or a cam **13** thereon and is connected at **18** to a pivotal shaft **19** which in turn is connected at **20** to an intermediate lever **21** which is itself connected at **22** to an actuating lever **23**. Pivotal movement of follower lever **17** thus results in longitudinal movement of the actuating lever **23**.

A fixed stop **25** is provided against which presses a compression spring **26** whose other end abuts against an abutment **27** secured to the actuating lever **23** with the result that the lever **17** is biassed by the spring **26** to a position abutting against disc **12** or a cam **13** thereon.

In operation, the disc **12** and control member **7** are rotated by the shaft **14** which is driven by the motor **15** through the reduction gearing **16**. The arm **3** of the pillar **4** can be moved in the direction A by operation of the lever **17** by a cam **13** and by contact between the ball **9** and the abutment **6**. The ball **9*a*** is too small to make contact with the abutment **6** and so does not oper-

ate the lever **17**, but it increases the irregularity of the movement of the lever **17** by influencing the movement of the deflector **8** when the ball lodges in the recesses **11**.

The cams **13** thus provide for a given irregular series of switch actuations which is repeated during each rotation of the control member **7**. Superimposed upon this repeating irregular series of switch actuations are the haphazard switch actuations which result from contact between the ball **9** carried in a pocket **10** and the abutment **6**. Movement of the arm **3** by these means is sufficient to allow the contactor **2** to actuate the switch **1** whereby to operate an electromagnetic clutch means or the like included in a circuit of which the switch **1** is a part.

I claim:

1. An irregularly operating control motion comprising a hollow rotary control member with irregularly circumferentially spaced cams on its external periphery and circumferentially spaced pockets therewithin, a tumbler within the control member adapted during rotation of the control member to fall haphazardly from one pocket to another and while located in a pocket to protrude axially from the control member, a control element in the path of and displaceable by said cams, a second control element in the path of and displaceable by said tumbler when located in a pocket, and a switch means subject to both of said control elements.

2. A control motion according to claim 1 comprising a control member formed of two parts of which one is a disc which is angularly fixed relatively to the other and has cams of non-uniform circumferential length on its external periphery.

3. An irregularly operating control motion comprising a hollow rotary control member having an external periphery with irregularly circumferentially spaced cams thereon and an internal periphery formed with circumferentially spaced pockets therein, a tumbler within the control member adapted during rotation of the control member to fall haphazardly from one pocket to another and while located in a pocket to protrude axially from the control member, a control element in the path of and displaceable by said cams, a second control element in the path of and displaceable by said tumbler when located in a pocket, and a switch means subject to both of said control elements.

4. A control motion according to claim 3 comprising a control member formed of two parts of which one is a disc which is angularly fixed relatively to the other and has cams of non-uniform circumferential length on its external periphery.

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