April 16, 1957 S. ROSCOE 2,788,666

IRREGULARLY OPERATING CONTROL MECHANISMS

Filed Oct. 26, 1953 2 Sheets-Sheet 1

Fig. 1.

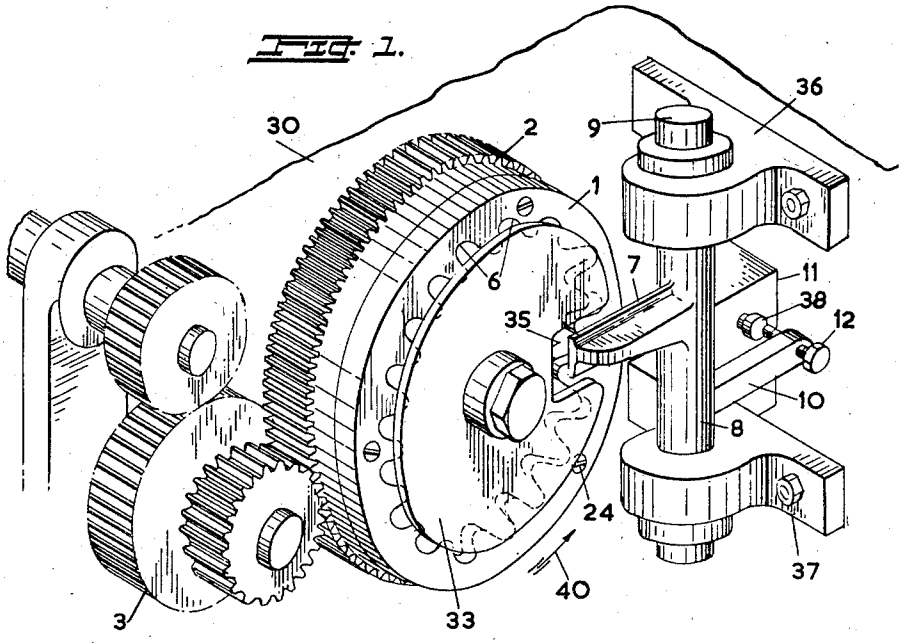


Fig. 2.

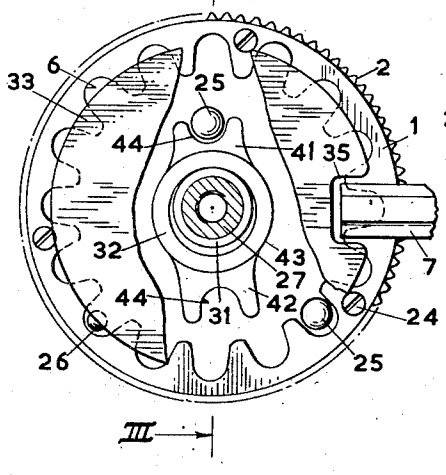
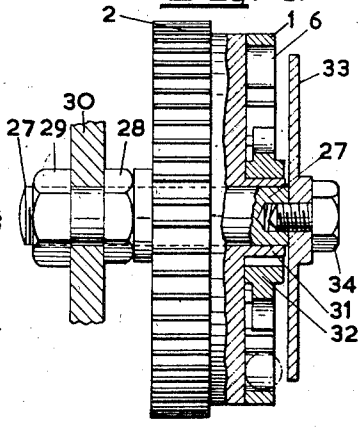


Fig. 3.



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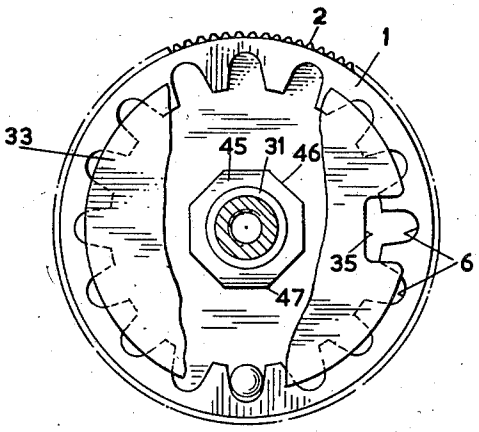


Fig. 4.

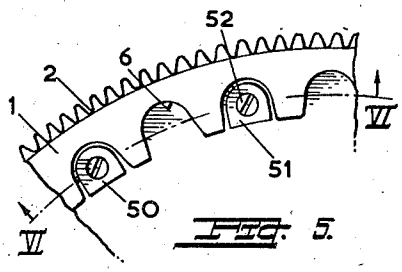


Fig. 5.

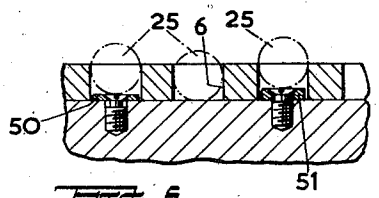


Fig. 6.

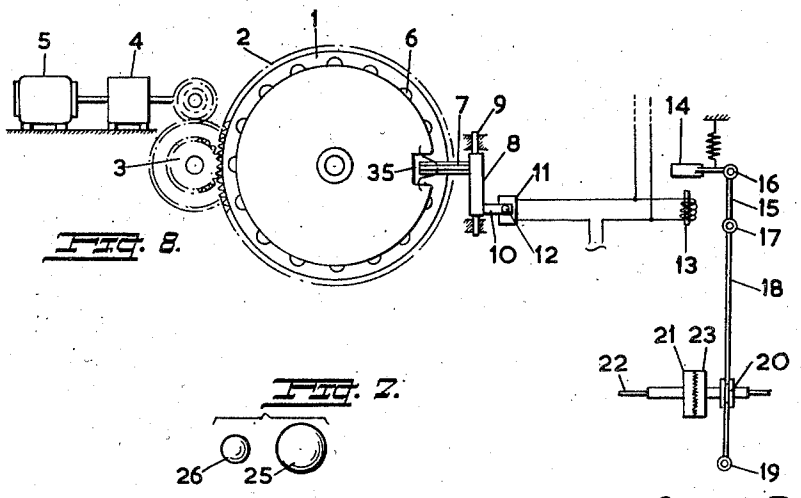


Fig. 8.

Fig. 7.

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IRREGULARLY OPERATING CONTROL MECHANISMS

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Claims priority, application Great Britain November 1, 1952

21 Claims. (Cl. 74—1)

The present invention relates to irregularly or haphazardly operating control mechanisms or motions such for example as may be employed in connection with a spinning frame for irregularly arresting the movement of either the feed or delivery rollers for the purpose of producing yarns with irregularly spaced slubs or enlargements of diameter.

Irregularly operating control motions for use in conjunction with spinning frames for the purpose referred to above are known and motions of this kind can of course be applied for other purposes where an irregular result is desired.

One form of known slubbing motion for producing slubs at irregular intervals during the spinning of yarn, consists of a rotary control member in the form of a cylinder or ring rotating about a horizontal axis, closed on one side and open on the other side and having a number of circumferentially spaced pockets on its internal periphery adapted to receive a sphere or ball which when in position in a pocket is adapted to protrude axially from the cylinder so as, during rotation of the cylinder, to trip a trip element or clutch lever associated with either the front or back rollers of the spinning frame. As the ball reaches a sufficient elevation during the rotation of the cylinder it falls out of the pocket and in due course falls into another pocket. The control member of such control motions can be made to rotate about axes other than horizontal.

The object of the present invention is to increase the irregularity of operation of such a control motion.

The present invention consists in an irregularly operating control motion in which a tumbler falls haphazardly from one to another of a number of circumferentially spaced pockets inside a hollow rotary control member and, when in a pocket, is adapted to protrude therefrom to exercise a controlling influence or execute a controlling step at a given position in the rotary path of the control member and is characterized by the provision of a movable and preferably rotatable deflector within the hollow rotary control member against which deflector the tumbler may engage during its movement from one pocket to another whereby to increase the irregularity of the control.

The hollow rotary control member is preferably rotatable about a non-vertical axis and in a preferred form of construction its rotates about a horizontal or more or less horizontal axis.

The said circumferentially spaced pockets may be formed on the internal periphery of the hollow rotary control member itself or alternatively they may be formed in a lining or insert within the hollow rotary control member.

The term "pocket" is used herein to mean a recess which is not merely capable of receiving the tumbler but of taking up at least a moderate degree of thrust sufficient to hold the tumbler in position protruding from the control member whilst it exerts its controlling influence or performs its controlling step. Thus a pocket may consist of an axial slot with an abutment at one end

thereof. A common abutment for a number of slots circumferentially spaced around the control member may be furnished by an end wall formed integral with or secured to the rotary control member or by an end wall or plate which may be stationary and located closely adjacent to the control member and against which the tumbler may engage for the purpose of holding it in a position protruding from the control member. If the degree of thrust exerted on the tumbler during a controlling step is only slight then a relatively shallow pocket capable of holding the tumbler in position axially of the control member may be sufficient to sustain the thrust and the need for an end wall or plate serving as an abutment may not arise.

One form of deflector consists of multi-sided element, for example an octagonal element, mounted more or less concentrically within the control member and rotatable therewith.

Other forms of deflector may have two or more arms which may be of unequal length. One such deflector may have two arms of unequal length in line with one another whilst another may have at least three such arms arranged at angles to one another. At least one of the arms of such a deflector may have a recess in the end thereof in which the tumbler may temporarily lodge.

Means may be provided for intermittently driving the deflector rotationally. In one such arrangement the centre of gravity of the deflector is eccentric of its rotational axis and a driving element rotatable with the control member is adapted temporarily to engage the deflector to rotate it until the deflector disengages itself from the driving element under the action of gravity.

The deflector may be pivotally mounted on a deflector supporting element within and concentric with the control member and preferably angularly fixed relatively to the control member so as to rotate therewith.

The rotary control member may contain two or more tumblers and in order further to increase the irregularity of the control one or more larger tumblers in the control member may be capable of exercising a controlling influence or of performing a controlling step whilst one or more smaller tumblers may be incapable of doing so.

In order further to increase the irregularity of the control at least some of the pockets may differ in axial length or in axial position to cause the tumbler to protrude axially from the rotary control member to differing extents in different pockets. Thus for example the pockets may be formed as axial slots in a control member which is closed on one side and shims, which may be of differing thicknesses, may be inserted at the closed ends of the slots to vary the effective lengths thereof.

The invention is further described with reference to the accompanying drawings in which:

Fig. 1 is a perspective view of one form of control motion by way of example,

Fig. 2 is a front view of a portion of Fig. 1 with certain parts shown fragmentarily,

Fig. 3 is a part sectional side view taken on the line III—III of Fig. 2.

Fig. 4 is a front view illustrating an alternative form of deflector.

Fig. 5 is a fragmentary front view of a modification of Fig. 2 or Fig. 4.

Fig. 6 is a sectional view on the line VI—VI of Fig. 5.

Fig. 7 illustrates a set of different tumblers which may be used in conjunction with the invention and

Fig. 8 is a diagrammatic general arrangement view.

Referring first of all to Fig. 8 a rotary control member 1 in the form of a cylinder or ring is secured to a toothed driving wheel 2 which is driven through a train of gears 3 and gear box 4 by an electric motor 5. The control member 1 has a number of circumferentially

spaced pockets 6 formed in its internal periphery and contains at least one tumbler in the form of a ball or sphere adapted when resting in a pocket 6 to protrude axially from the pocket and during rotation of the control member 1 to engage a trip arm 7 of a two-armed lever 8 pivotally mounted at its ends 9 in bearings and whose second arm 10 controls a switch 11. The arm 10 has a screw 12 at its end for adjusting the amount of displacement thereof which is required to operate the switch 11.

The switch 11 is connected in an electric circuit which includes an electro-magnetic solenoid 13. When the solenoid 13 is energised it attracts an armature 14 at the end of one arm of a bell crank lever 15 pivoted about a fixed pivot 16. The end of the other arm of the bell crank lever 15 is connected through a floating pivot 17 to an operating lever 18 which is pivoted at its lower end about a fixed pivot 19. The operating lever 18 lies behind a collar 20 having spaced flanges thereon and has a forward projection which engages between the flanges of the collar 20.

A toothed clutch element 21 is axially fixed on a shaft 22 and is adapted for clutching engagement with an opposed clutch element 23 which is slidable on shaft 22. Clutch element 23 is connected to collar 20 and is axially displaceable therewith under the control of armature 14 and lever 18. A spring (not shown) may be provided to keep the clutch elements 21, 23 in engagement with one another until the armature 14 is displaced downwardly by the solenoid 13 to disengage clutch elements 21, 23.

Referring now to Figs. 1 to 3 it will be seen that the rotary control member 1 consists of a ring or cylinder in which are formed a number of pockets 6 in the form of axial slots and that the control member 1 is secured to the toothed driving wheel 2 by means of three countersunk-headed screws 24 so that the driving wheel 2 closes the control member on one side thereof and serves as an abutment for tumblers in the form of balls 25, 26.

The control member 1 and the driving wheel 2 are freely rotationally mounted on a fixed shaft 27 which is secured by nuts 28, 29 to a support 30. The wheel 2 has a forwardly extending collar 31 which serves as a supporting element for a deflector 32 which is freely rotationally mounted thereon.

The tumblers 25, 26 are prevented from falling out of the control element 1 by means of a shield or guard plate 33 which is slightly spaced axially from the control element 1 and is secured to the end of shaft 27 by means of a bolt 34 engaging in a threaded opening in the end of the shaft 27. The shield 33 is cut away at 35 to enable arm 7 of the two-armed lever 8 to overlie the pockets 6 of control member 1.

The two-armed lever 8 is pivotally mounted in bearing brackets 36, 37 and its second arm 10 bears screw 12 adapted to engage a switch-operating element 38 projecting from switchbox 11.

The rotary control member 1 rotates in the direction of the arrow 40 shown in Fig. 1 and it will be clear that if a ball 25 falls into a pocket somewhere near the bottom of the control member 1 it will, on rotation of the rotary control member in the direction of the arrow 40, in due course arrive at a position just beneath the trip arm 7 lying in its path and will thereupon displace the trip arm 7 to cause the screw 12 to depress the switch-operating element 38, whereby to perform a controlling step.

In the arrangement shown in Figs. 2 and 3 the deflector 32 has a shorter arm 41 and a longer arm 42 in line with one another and extending from a ring 43 whose internal diameter is larger than that of the deflector supporting element 31 so that the deflector is loosely mounted on deflector supporting element 31. At its outer end each arm 41, 42 is formed with a tumbler receiving recess 44 in which a tumbler may temporarily lodge after leaving one pocket and before engaging in another pocket.

The deflector 32 will rotate by virtue of its engagement with the rotating supporting element 31 but its rate of rotation will not necessarily be the same as that of the control member 1 and the fact that the arms 41, 42 are of unequal length may cause the deflector to rotate at different rates at different times according to its angular position. If desired an axial projection from the driving wheel 2 may extend into the control member 1 for engagement with one or other of the arms of the deflector 32 in order temporarily to drive the same rotationally. If the centre of gravity of the deflector is sufficiently eccentric of its axis of rotation the deflector will on reaching a given position automatically disengage itself from such driving element under the action of gravity. Thus in the arrangement of Figs. 2 and 3 the deflector rotates somewhat irregularly and a tumbler on leaving a pocket may at different times strike different portions of the deflector or may lodge temporarily in one of the recesses 44 whereby the spacing between pockets from which the tumbler leaves and in which it next lodges will be very irregular.

An alternative form of deflector is shown in Fig. 4. In this case the deflector is in the form of an octagonal body 45 which is preferably a push fit on the deflector supporting element 31 so as to rotate therewith so that a tumbler on leaving a pocket 6 may strike the faces 46 of the deflector when lying at different angles or the corners 47 thereof to increase the irregularity in the spacing of the pockets 6 from which a tumbler leaves and in which it next lodges.

In order further to increase the irregularity of the control different forms of tumblers may be provided in the control member 1 and a set of different tumblers are shown in Fig. 7. Of these, tumbler 25 is spherical and is large enough to displace the trip arm 7 on movement through the cut away part 35 of the shield 33. Tumbler 26 is also spherical but of smaller diameter and incapable of so displacing the trip arm 7.

Tumbler 25 may be used alone but is preferably used with tumbler 26.

In order to vary the extent of movement of the trip arm 7 and thus the period during which the switch 11 is closed the pockets 6 may be of different axial length or in effect they may differ in axial position. This can be achieved by inserting shims 50, 51 at the closed ends of the slots. The shims are secured by means of countersunk-headed screws 52 which engage in corresponding threaded openings in the face of the driving wheel 2. The shims 50, 51 may be of differing thicknesses whereby to cause the tumblers 25 to project axially from the pockets to differing extents.

It will be appreciated that various forms of trip mechanisms may be associated with the control motion of the present invention. For example a trip arm or lever may directly operate a clutch; or it may indirectly operate a clutch through an electric switch and relay mechanism as illustrated diagrammatically in Fig. 8; or again the tumblers reaching a given position in the rotational path of a control member may cause changes in a magnetic field to give rise to electrical impulses to operate an electric relay without the employment of any mechanical trip element such as the trip lever 7 shown in the accompanying drawings.

I claim:

1. In an irregularly operating control motion wherein a tumbler falls haphazardly from one to another of a number of circumferentially spaced pockets inside a hollow rotary control member, the provision of a freely rotatably movable deflector within the hollow rotary control member against which deflector the tumbler may engage during its falling movement from one pocket to another.

2. In an irregularly operating control motion wherein a tumbler falls haphazardly from one to another of a number of circumferentially spaced pockets on the inside of a hollow rotary control member, which is rotata-

ble about a non-vertical axis, the provision of a freely movable deflector within the hollow rotary control member against which deflector the tumbler may engage during its falling movement from one pocket to another whereby to increase the irregularity of the control.

3. In an irregularly operating control motion wherein a tumbler falls haphazardly from one to another of a number of circumferentially spaced pockets on the internal periphery of a hollow rotary control member mounted for rotation about an axis which is approximately horizontal and, when in a pocket, is adapted to protrude axially therefrom to execute a controlling step at a given position in the rotary path of the control member, the provision of a freely movable deflector within the hollow rotary control member against which deflector a tumbler may engage during its falling movement from one pocket to another whereby to increase the irregularity of the control.

4. An irregularly operating control motion embodying a hollow rotary control member rotatable about a non-vertical axis and having circumferentially spaced pockets therein, a tumbler within the control member adapted during the rotation of the control member to fall haphazardly from one pocket to another and whilst located in a pocket to protrude axially therefrom to exert a controlling influence at a given locality in the rotary path of the control member, and a freely movable deflector within the control member for the purpose of haphazardly interfering with the falling movement of the tumbler from one pocket to another.

5. An irregularly operating control motion embodying a hollow rotary control member rotatable about an approximately horizontal axis and having circumferentially spaced pockets therein, a tumbler within the control member adapted during the rotation of the control member to fall haphazardly from one pocket to another and whilst located in a pocket to protrude axially therefrom to exert a controlling influence at a given locality in the rotary path of the control member, and a freely movable deflector within the control member for the purpose of haphazardly interfering with the falling movement of the tumbler from one pocket to another.

6. An irregularly operating control motion embodying a hollow rotary control member rotatable about an approximately horizontal axis and having circumferentially spaced pockets on its internal periphery, a tumbler within the control member adapted during the rotation of the control member to fall freely and haphazardly from one pocket to another and whilst located in a pocket to protrude axially therefrom to exert a controlling influence at a given locality in the rotary path of the control member, and a freely movable deflector within the control member for the purpose of haphazardly interfering with the movement of the tumbler from one pocket to another.

7. A control motion according to claim 1 in which the said pockets are in the form of axial slots closed at one end thereof, that is to say closed on one side of the control member.

8. A control motion according to claim 7 in which the control member is completely closed on said one side.

9. A control motion according to claim 8 including a toothed driving wheel to which the control member is angularly fixed and which serves to close the control member on said one side.

10. A control motion according to claim 3 including a deflector having at least two arms and pivotally mounted within the control member.

11. A control motion according to claim 10 including a deflector having arms of unequal length.

12. A control motion according to claim 10 including a deflector having two arms in line with one another and of unequal length.

13. A control motion according to claim 10 in which the deflector is formed with a tumbler receiving recess at the end of at least one of its arms.

14. A control motion according to claim 1 wherein the deflector is formed with at least one recess in which the tumbler may temporarily lodge.

15. A control motion according to claim 1 including a deflector supporting element within and concentric with the control member, the deflector being freely pivoted on said supporting element.

16. A control motion according to claim 15 wherein said supporting element is angularly fixed relatively to the control member so as to rotate therewith.

17. A control motion according to claim 3 including a deflector in the form of a multi-sided element, for example an octagonal element, mounted more or less concentrically within the control member and rotatable therewith.

18. A control motion according to claim 3 including at least two tumblers within the rotary control member.

19. A control motion according to claim 18, including at least one larger tumbler within the control member capable of exercising a controlling influence and at least one smaller tumbler which is incapable of so doing.

20. A control motion according to claim 7 including a rotary control member having pockets at least some of which differ in axial length or in axial position to cause the tumbler to protrude axially from the control member to differing extents in different pockets.

21. A control motion according to claim 20 including a rotary control member closed on one side with pockets in the form of axial slots and shims inserted at the closed ends of at least some of the slots to vary the effective lengths thereof.

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