TRACING DEVICE FOR WINDING MACHINES

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ABSTRACT OF THE DISCLOSURE

Traversing device for moving a thread, wire, etc. back and forth in slotting machines, wherein the thread guiding traversing device element has an arcuate elongated shoe adapted to ride the spiral grooves of a rotatable roller and a platelet form slide plate which is guided between two rails running in traverse direction, characterized in that the platelet form slide piece, in a manner known in itself, engages in two parallel guide grooves running in traverse direction and is swingable in these about its vertical axis.

INTRODUCTION

Devices for the guiding back and forth of a thread, a wire or the like in slotting or winding machines are known in themselves. They consist, as a rule, of a thread or wire traversing element which is reciprocated by a roller, shoe follower, etc., riding in spiral grooves of a roller or drum rotating about its longitudinal axis. The known traversing elements further have a slide piece which is slidable between or on two opposed rails extending in traversing direction or in opposed grooves in these guide rails. With these parts, forming the traverse element proper, there is mounted a thread or wire guide, usually in the form of a small plate, which has a slit or an eye moving the thread or wire back and forth across the winding as the thread or wire runs through the slit or eye.

In order to achieve the reciprocal traversing movement, the roller or drum cylindrical surface has two spiral grooves of opposite hand and are connected at their ends generally by an arcuate curve. If the roller or drum has to execute more than one revolution for one back-and-forth movement of the traversing element, there is one or more crossing points of the two grooves, through which the groove-follower of the traversing element has to move smoothly and without unintended changes of direction in the operation of the device. In order to achieve this, it is a known practice to elongate the follower portion which engages in the spiral grooves sufficiently to assure its desired, smooth movement through the spiral grooves, especially at the groove crossings.

Advantageous as the elongated form of the follower is for the sure crossing of the crossing points of the spiral grooves, the difficulty nevertheless arises in guiding the follower from one spiral groove into the other at the reversal zones of the path of travel of the follower. The follower, in changing from one spiral groove into the other groove of opposite hand, changes its angular position at the reversal zones. To make possible this movement, it is necessary to use a pivot joint between the follower and the other, linearly reciprocating parts of the traverse element. Such joint, however, makes it impossible to conduct a thread or wire guide, usually in the form of a small plate, which has a slit or an eye moving the thread or wire back and forth across the winding as the thread or wire runs through the slit or eye.

In order to meet these difficulties, it is a known prac-
tice from Swiss Pat. No. 447,902 to make the traverse element in one part, to cease the translatory guidance of the reciprocating slide member and to have the slide member, for example, a rhomboidal slide piece, slide merely between the side surfaces of two, parallel, opposed guide rails running in traverse direction. In such a system the slide piece is restrained against movement transversely to the guide rails and at the reversal zones is able to follow the angular turning of the groove follower by quickly flipping over from one slide position into the other. In order, in spite of this inherently unstable construction, to bring about an adequate safeguarding of the traverse element against tipping, the traverse element of the Swiss patent has between the follower part in engagement with the spiral groove and the slide piece sliding between the guide rails an intermediate piece which fits exactly into the interspace between guide rails and a cam roller which lies tangentially on the surface of the cam roller. In the practical use of such a traverse element it has proved, however, that the required running smoothness and also the desired operating security and resistance to wear cannot be achieved by the use of such an intermediate piece, since the contact area between the cam roller and the intermediate piece is necessarily too small.

With this state of technology there exists the problem of providing a device for the guiding back and forth of a thread, wire or the like in slotting machines, which, with small dimensions and mass and a one-part construction, is surely guided in all regions of the traverse path and is secured against tipping.

THE INVENTION HEREFIN

This problem is solved, surprisingly, according to the invention herein by employing a platelet-form slide piece, engaged in a manner in itself known in two, parallel, opposed, guide grooves extending in traverse direction, and rotatable in these grooves about its vertical axis. Through the combination of the two features, it is possible in an astonishing way to remedy the existing difficulties and to produce an extremely light traverse element which, however, is guided surely in all positions.

It has proved extremely advantageous if the platelet-form slide piece is just as large as possible within the limits dictated by the groove dimensions. This is achieved (a) where the outer contour of the slide piece is bounded by two parallel pairs of sides whose distance spacing is at most equal to the spatial distance between the two groove bottoms and (b) where the two parallel pairs of sides cross their respective parallel lines at an angle which is equal to the requisite swinging or pivot angle of the slide piece, and (c) where the normally obliquely angular corners of the resulting rhombus are rounded off with a circular arc whose diameter is equal to the distance between parallel sides of one of the two parallel pairs of sides.

All the geometric forms of the slide piece which lie inside the range defined by these parameters fulfill the requirements stated earlier. They do this, however, all the better as they become closer and closer to these limits. The guidance of the traverse element of dimensions with small tolerances can thereby be achieved whereby the traverse element is thereby controlled virtually by the slide piece as it reciprocates in the grooves.

The guide grooves of the traverse devices herein can be formed in different ways. It is possible, for example, to cut the grooves in a pair of spaced, suitably dimensioned strips, especially at the angularity in the direction of traverse or to compose each strip of several superposed strips. The grooves may also be formed or cut in opposing sides of an elongated slot in a longitudinally slotted plate or the like. For example, a suitable, elongated recess may
be provided in each side of the slot of a longitudinally slotted plate which is covered by a likewise longitudinally slotted cover plate of suitable form. Which of the means is chosen in a particular case depends primarily on factors of economics and manufacturing technology. Furthermore, it has proved advantageous if the facing side walls of the slot formed by or in the opposed strips, the slotted plate or the like are spaced to serve as slide surfaces by lying directly against opposite sides of the neck or body of the traverse element. In this manner a further sliding guidance (as an additional one to or substitute for the guiding structures mentioned earlier) is attained, with virtually no lateral movement in the slot.

Particularly at higher traverse speeds, it can be desirable to guide the traverse element additionally in the zones of the reciprocation reversal in order to resist the high inertia forces and tipping moment which act on the platelet in these zones. Such an additional guidance can be achieved if the guide grooves in the reversal zones cross over into one another and connect the opposed, longitudinal slots at their ends. In such case, the contour of the groove's bottom wall, at least in the reversal zone, lies outside the parameter described by the platelet contour.

THE DRAWINGS

The invention will be further appreciated from the embodiments described in detail and illustrated in the drawings wherein:

FIG. 1 is an exploded side view of a slide piece embodiment and fragment of a slotted strip with a fragment of the spirally grooved roller;

FIG. 2 is a top plan view of the slide piece and fragments of opposed, slotted guide strips; and

FIG. 3 is a top, fragmentary plan view of an embodiment with a connecting cross groove at the reversal zone.

FIG. 1 makes evident the simple and expedient construction of the traverse element according to the invention. The preferably elongated follower 1 rides in the spiral guide grooves 20 and 21 of a roller 22. The traverse element further comprises the narrow neck 2, the slide piece 3 of generally rhomboidal configuration as viewed in plan, and the thread or wire-engaging element 4—all preferably made as a unitary structure.

The slide piece 3 rides in opposed, parallel guide grooves 5 and 5' extending in the traverse direction. In the illustrated embodiment, they are cut in opposing faces of two parallel rails 6 and 6'. As already emphasized, however, the guide grooves can also be provided in other ways, for example, by laminated or superposed individual strips, of which the middle one is correspondingly set back. By virtue of the feature that the upper and lower, side opposing walls of each guide groove 5 and 5' respectively contact substantial areas of the plate 3, there is a faultless guidance and safeguarding against tipping of the entire traverse element. This sure guidance leads not only to the result that the failure of such an element through breakage is very rare, but also to the result that the wear of the surfaces in sliding contact is slight. This sure guidance in itself is adequate but, if need be, can be still further improved by constructing the parallel, facing surfaces 23 and 24 or 25 and 26 adjacent respective edges of grooves 5 and 5' in the strips 6, 6' as slide surfaces lying firmly against the neck 2 or body 20' of the traverse element.

Furthermore, from FIG. 2, the outer contour of the platelet-form slide piece 3 represented by way of example has two parallel pairs of sides 8, 8' and 9, 9', the spacing of which is at most equal to the distance between the two groove bottom walls 10 and 10'. The parallel pairs of sides 8, 8' and 9, 9' cross each other at an angle which is equal to the pivot angle of the slide piece, which angle in turn is dictated by the angular relationship of the spiral grooves 20 and 21 in roller 22. Through this relationship, the sides 8 and 8' or 9 and 9' of the slide plate 3 slide snugly against the groove bottoms 10 and 10' whereby the traverse element is surely guided by these on the entire rectilinear portion of the traverse path.

In order to make possible the pivoting about its vertical axis of the traverse element at the reciprocation reversal zones, the oblique corners 11 and 11' of the slide plate 3 are rounded off with a circular arc whose diameter is equal to the distance between the parallel pairs of sides 8 and 8' or 9 and 9'.

In FIG. 3 there is represented at the zone of the reciprocation reversal a construction capable of sure functioning and the extended linear travel of the traverse element according to the invention. The illustrated embodiment makes use of a cross groove 12 connecting the ends of guide grooves 5 and 5' in the zone of the reversal of the traverse element. The grooves 5, 5' and 12 in this case are milled in the edges of a longitudinal slot 14 in a unitary plate 13. The neck piece 2 of the traverse element extends and slides against the sides of slot 14 which ends as 15.

The traverse element, rushing in the direction of the end 15, is oriented as shown at 16 in FIG. 3. As soon as the element reaches the end position, which corresponds to the point of linear reversal, it pivots about its vertical axis 7 and, at the reversal point, assumes the orientation at 17. A few moments thereafter, it assumes the orientation shown in FIG. 3 at 18 and is now ready for starting the travel in opposite direction. So that the slide piece 3 will not be hampered in carrying out this pivotal movement by the bottom wall of connecting groove 12, this wall, at least in the zone of linear reversal, is contoured so that the groove bottom wall 10 lies beyond the swinging arc 19 of the end of the plate 3 as the latter pivots.

It is thought that the invention and its numerous attendant advantages will be fully understood from the foregoing description, and it is obvious that changes may be made in the form, construction and arrangement of the several parts without departing from the spirit or scope of the invention, or sacrificing any of its attendant advantages, the forms herein disclosed being preferred embodiments for the purpose of illustrating the invention.

The invention is hereby claimed as follows:

1. A traverse mechanism for reciprocating a thread or wire in a spooling machine which comprises a pair of elongated, parallel guide members with respective, opposed, parallel, elongated grooves, and a thread or wire guide traverse element slidably mounted on and between said guide members, said traverse element having (a) a thread or wire-receiving member at one end and (b) an elongated follower at the other end thereof adapted to ride in spiral grooves of opposite hand in a drive roller which is adapted to impart reciprocating movement to said traverse element, and (c) an intermediate platelet member having the edge portions thereof slidably and pivotally received in said opposed grooves in close fit therewith, said platelet member having two pairs of parallel, opposite sides, the distance between respective sides of each pair being substantially the same as the distance between bottom walls of said opposed grooves, the angle between respective sides of said pairs of grooves being equal to the angle of pivot of said element when said linear direction of travel is reversed, and opposite corners of intersection of respective sides of each pair being rounded off in a circular arc, whereby said traverse element is guided in its linear travel by said grooves and can pivot about an axis substantially coinciding with the axis of said member when the direction of linear travel of said element is reversed with said platelet member stabilizing said traverse element against tipping.

2. A traverse mechanism for reciprocating a thread or wire in a spooling machine which comprises a pair of elongated, parallel guide members with respective, opposed, parallel, elongated grooves, and a thread or wire guide traverse element slidably mounted on and between said guide members, said traverse element having (a) a
thread or wire-receiving member at one end thereof, (b) an elongated follower at the other end thereof adapted to ride in spiral grooves of opposite hand in a drive roller which is adapted to impart reciprocating movement to said traverse element, and (c) an intermediary platelet member having the edge portions thereof slidably and pivotally received in said opposed grooves whereby said traverse element is guided in its linear travel by said grooves and can pivot about an axis substantially at right angles to said platelet member when the direction of linear travel of said element is reversed, said element having a neck between said platelet member and said follower and a body portion between said platelet member and said thread guide, and said guide members having opposed, parallel faces closely adjacent opposite sides of at least one of said neck and said body portion to provide opposed guide surfaces for said element in its linear travel.

3. A traverse mechanism as claimed in claim 1, and said mechanism having means providing a cross groove connecting said opposed grooves at the places where said traverse element reverses its linear travel, and the contour of the bottom wall of said cross groove lying outside the swinging arc of said platelet member as it pivots upon linear reversal of said element.

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