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MECHANISM FOR CUTTING ROOT FOLDS IN BOOK BLOCKS WITH PLANE-PARALLEL MOVEMENT

МЕХАНІЗМ ЗРІЗУВАННЯ КОРІНЦЕВИХ ФАЛЬЦІВ У КНИЖКОВИХ БЛОКАХ З ПЛОСКО-ПАРАЛЕЛЬНИМ РУХОМ

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Among the actual problems facing modern enterprises of the printing industry of Ukraine, it is possible to highlight the high energy consumption of technological processes. Today, enterprises are faced with technical problems of modernization and/or replacement of outdated equipment. Taking into account the significant impact of energy costs on the manufacturing processes of finished products, the search for new equipment designs and their modernization has been underway recently. The usage of modern achievements of science and technology should increase the number of new and/or modernized factories, which operating on the principle of energy saving.

One of the technological processes of production of books includes the stage of preparation of the root of the book block, which occurs before the

application of glue, which involves cutting the roots and which associated with large energy costs [1–2].

The purpose of this study is to review a new high-performance continuous-type mechanism for cutting folds in book-magazine blocks (further – BMB), which allows reducing energy costs for the technological process.

The non-stop type of mechanism for cutting folds in book-magazine blocks contains a knife blade 1 installed in a frame 2 (Fig. 1), which is kinematically connected to a slider 3, which is installed in a guide 4 [3].

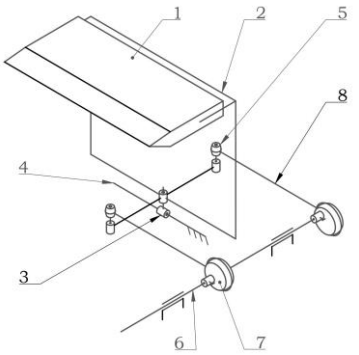

Fig. 1. Kinematic diagram of a non-stop type for folds cutting

A pair of spherical fingers 5 is installed on the frame 2, a drive shaft 6, on which a pair of spherical eccentrics 7, which are kinematically connected to a pair of spherical fingers 5 using a pair of spherical connecting rods 8, is installed with the possibility of adjustment. The presence of two driving links (eccentrics 7) in mechanism is related to the fact that the knife receives two types of movement: reciprocating movement in the direction perpendicular to the movement of the BMB, and reciprocating movement in the direction perpendicular to the movement of the BMB. Thus, this mechanism is formed by two crank-rocker groups, and all kinematic pairs of these groups are spherical, since the gears move in mutually perpendicular planes. The axis of oscillation of the rockers and the frame is mounted on a movable slider, which allows the frame to make the necessary movements.

The trajectory of the movement of the point A located on the edge of the knife blade 1 and coinciding with the center of oscillation has the form of a straight line (OO_1) perpendicular to the plane of supply of the BMB (Fig. 2).

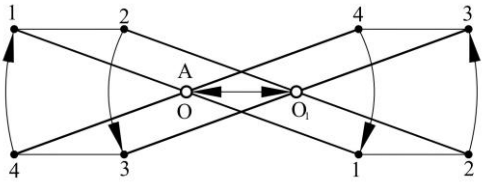

Fig. 2. Kinematic diagram of a non-stop type for cutting folds

The trajectory of movement of any other point lying on the edge of the knife blade has a complex trajectory of movement. From the initial position (1-1), the blade makes a rectilinear movement in a plane perpendicular to the plane of supply of the BMB to position (2-2). Then, the blade rotates relative to point O_1, coinciding with the oscillation point, from position (2-2) to position (3-3). At the same time, all points lying on the edge of the knife blade, except point O, move along the arc of a circle described from the center of oscillation (point A). After the end of the turn from position (3-3), the blade moves in a straight line in a plane perpendicular to the plane of supply of BMB to position (4-4). From position (4-4), the knife blade rotates relative to point O, which coincides with the oscillation point in position (1–1). This ends the kinematic cycle of the knife, after which a new one begins. At the same time, all points lying on the edge of the knife blade, except point A, move along the arc of a circle described from the center of oscillation. In this way, the effect of constant sliding cutting of BMB is achieved during the entire period of its feeding to the edge of the knife blade (BMB material is constantly cut in a direction perpendicular to the direction of supply) with continuous supply of BMB by rollers.

This design of the non-stop mechanism for cutting folds in book-magazine blocks allows you to reduce energy costs for the technological process of preparing the root of the book block due to constant sliding cutting (dynamic cutting angle).

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