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(12) # EUROPEAN PATENT SPECIFICATION

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EP-A-0 001 962
DE-B-2 634 108
DE-B-2 837 392

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Description

This invention relates to apparatus for quarter folding sheet articles such as newspapers, books, magazines and particularly to means for preventing or eliminating dog-ears.

Such quarter folding apparatus generally operates at speeds around and beyond 30,000 copies per hour and at these speeds, dog-earing of individual pages may occur. Such dog-ears are not only objectionable aesthetically but are almost impossible subsequently to remove from the individual pages of the article being folded.

Prior art apparatus for preventing the formation of dog-ears is summarized by the precharacterizing portion of Claim 1 and is known from DE—B—2 837 392. This document describes folding apparatus having a rotating blade adapted to push a product through a slot in a folding table to urge the product between folding rollers. Either side of the folding slot the product is supported between conveyor-belts. Shaped funnels immediately adjacent the folding slot direct air onto the product during the folding process so that when the ends of the product pass into the folding slot, the directed air reduces the likelihood of dog-ears.

It is an object of the invention to remove dog-ears formed on individual pages of an article such as a magazine being folded, or to prevent such dog-ears from being formed.

The present invention is summarized in the characterizing portion of Claim 1. The invention will now be described by way of example only with particular reference to the accompanying drawings wherein:

Figure 1 is a side elevation of sheet folding apparatus and

Figure 2 is a section taken on lines X—X of Figure 1 showing details of the mechanism for removing or preventing dog-ears.

Referring particularly to Figure 2 of the drawings there is provided a rotating cam 1 mounted on the rotating folding blade carriage of the sheet folding apparatus.

A pair of cam rollers 2, 3 are associated with the cam 1, the roller 2 rolling on the surface of cam 1 and actuating bell crank lever 4 and roller 3 being affected by movement of roller 2 and the profile of cam 1 to actuate bell-crank lever 5.

The movement of bell-crank levers 4, 5, is transmitted to a respective pair of shafts 6, 7, via lever linkages 8, 9: shafts 6, 7 having backing blades 10, 11 mounted therein and associated smoothing blades 12, 13 for smoothing out the dog-ears; the smoothing blades 12, 13, being shown in Figure 2 held clear in a slot 14 in the quarter fold table 15. A pair of folding rollers 16, 17 are located beneath the slot 14 in the table 15.

The cam 1 is centred at point 0 and has a small eccentricity shown by the difference in radii r_1, r_2 to give a rise of r_3; said actual cam surface being made to follow a modified trapezoidal acceleration curve. Movement of the cam rollers 2, 3 via the linkages 4, 8; 5, 9; effect arcuate rotation of shafts 6, 7, respectively to lift and lower said smoothing blades 12, 13, with respect to the surface of the quarter fold table 15, in synchronism with the rotation of the folding blade 18 which is rotated epicyclically via sun and planet gearing shown generally at 26.

The apparatus operates as follows:—

The product, which may for example be a magazine is transported by tapes (not shown) to a position below the folding blade 18 which is rotating. The smoothing blades 12, 13 at this time, are held by means of the cam dwell, above the surface of the quarter fold table 15, as shown in Figure 2. When the folding blade 18 begins to push the product down through the slot 14 in the table 15 and between the folding rollers 16, 17, the shafts 6, 7, carrying the blades 10, 11 on which the respective smoothing blades 12, 13 are mounted, rotate through a limited arc to press the ends of the brushes on to the product. The smoothing blades 12, 13, remain in contact with the product until the latter has been removed from the table 15 by the folding rollers 16, 17, and thus the surfaces of the product moving under the blades 12, 13, are smoothed free of dog-ears.

The blades 12, 13, by the action of the roller 2 riding on the eccentric surface of cam 1 and via the lever linkages 4, 8; 5, 9; are lifted clear of the table 15 to allow the next product to move into a position to be folded. It is necessary to vary the pressure applied by the smoothing blades 12, 13 to the product whilst the mechanism is operating. This is accomplished by means of manually operable wheels 19, 20 shown in Figure 2. The rotation of these wheels 19, 20 is transmitted to the linkage 8, 9 by the adjusting shaft drive 21, 22 and thence to the gears 23, 24.

Claims

1. Apparatus for quarter folding a newspaper, book or magazine (hereinafter termed 'the product'), the apparatus comprising a rotatable folding blade (18), folding rollers (16, 17) located beneath a slot (14) in a folding table (15), and smoothing means (12, 13) located to act on the product during folding characterized in that the smoothing means comprises smoothing blades movable into contact with the surface of the product in synchronism with the rotation of the folding blade (18) urging the product between the folding rollers (16, 17) to wipe thereby the edges of the product to prevent the formation of dog-ears.

2. Apparatus as claimed in claim 1 wherein the mechanism for moving said smoothing blades includes a cam member (1), cam follower means (2, 3) arranged to impart movement to shaft means (6, 7) via lever linkages (4, 8; 5, 9) connected between said cam follower means (2, 3) and said shaft means (6, 7), the shaft means (6, 7) carrying the smoothing blades (12, 13) which are arranged to be moved towards and away from the surface of said folding table (15) as said cam follower means (2, 3) follows the profile of said cam member (1) and in synchronism with rotation of said folding blade (18).

3. Apparatus as claimed in claim 2 wherein said cam follower means (2, 3) includes a first roller (2) arranged to contact the surface of the cam (1) to impart movement to first lever linkage (4) and to impart movement to a second lever linkage (5) via a further cam roller (3) associated with said second lever linkage (5), each lever linkage (4, 5) being connected to a respective shaft (6, 7) to impart arcuate movement thereto in response to the movement of said first roller (2) by passage of the cam (1) therepast, and a smoothing blade (12, 13) being mounted on each of said shafts (6, 7) and movable towards and away from the folding table (15) in response to said arcuate movement of the shafts (6, 7).

Patentansprüche

1. Bogenfaltvorrichtung zum Falten einer Zeitung, eines Buches oder eines Magazins (nachfolgend als "das Produkt" bezeichnet), umfassend eine drehbar angeordnete Faltklinge (18), Faltwalzen (16, 17), die unterhalb eines Schlitzes (14) in einem Falttisch (15) angeordnet sind, und eine Glättungseinrichtung (12, 13), die zum Einwirken auf das Produkt während des Faltvorganges angeordnet ist, dadurch gekennzeichnet, daß die Glättungseinrichtung Glättungsklingen aufweist, die synchron mit der Drehung der das Produkt zwischen de Faltwalzen (16, 17) pressenden Faltklinge (18) in Kontakt mit der Produktoberfläche bewegbar sind, um dadurch die Ränder des Produktes glatt zu streichen und die Bildung von Eselsohren zu verhindern.

2. Bogenfaltvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß der Mechanismus zum Bewegen der Glättungsklingen ein Nockenelement (1) und eine Nockenfolgeranordnung (2, 3) umfaßt, die dafür angeordnet ist, einer die Glättungsklingen (12, 13) tragenden Wellenanordnung (6, 7) über diese mit der Nockenfolgeranordnung (2, 3) verbindende Gelenkhebel (4, 8; 5, 9) eine Bewegung zu verleihen, wobei die Glättungsklingen (12, 13) derart angeordnet sind, daß sie sich synchron mit der Drehung der Faltklinge (18) in Richtung auf die Oberfläche des Falttisches (15) und von dieser weg bewegen, wenn die Nockenfolgeranordnung (2, 3) der Kontur des Nockenelementes (1) folgt.

3. Bogenfaltvorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die Nockenfolgeranordnung (2, 3) eine zur Anlage an der Oberfläche des Nockenelementes (1) angeordnete erste Rolle (2) aufweist, um einen ersten Gelenkhebel (4) zu bewegen und um einen zweiten Gelenkhebel (5) über eine mit diesem verbundene weitere Nockenfolgerrolle (3) zu bewegen, wobei jeder Gelenkhebel (4, 5) derart mit einer ihm zugeordneten Welle (6, 7) verbunden ist, daß er dieser bei einer Bewegung der ersten Rolle (2) infolge des Vorbeilaufens des Nockenelementes (1) eine Drehbewegung verleiht, und wobei an jeder der Wellen (6, 7) eine Glättungsklinge (12, 13) befestigt ist, die infolge der Drehbewegung der Wellen (6, 7) in Richtung auf den Falttisch (15) und von diesem weg verstellbar ist.

Revendications

1. Dispositif pour plier en quatre un journal, livre ou magazine (ci-après dénommé "le produit"), le dispositif comprenant une lame de pliage rotative (18), des rouleaux de pliage (16, 17) situés en dessous d'une fente (14) dans une table de pliage (15), et des moyens de lissage (12, 13) situés pour agir sur le produit pendant le pliage, caractérisé en ce que les moyens de lissage comprennent des lames lissantes mobiles en contact avec la surface du produit en synchronisme avec la roatation de la lame de pliage (18) pressant le produit entre les rouleaux de pliage (16, 17) pour ainsi essuyer les bords du produit pour empêcher la formation de cornes.

2. Dispositif selon la revendication 1 où le mécanisme pour déplacer les lames lissantes précitées comprend un élément formant came (1), des moyens suiveurs de came (2, 3) agencé pour impartir un mouvement à des moyens formant arbres (6, 7) via des liaisons à leviers (4, 8; 5, 9) reliées entre lesdits moyens suiveurs de cames (2, 3) et lesdits moyens formant arbres (6, 7) les moyens formant arbres (6, 7), portant les lames lissantes (12, 13) qui sont agencées pour être déplacées vers et au loin de la surface de ladite table de pliage (15) comme lesdits moyens suiveurs de came (1) suivent le profil dudit moyen formant came (1) et en synchronisme avec la rotation de ladite lame de pliage (18).

3. Dispositif selon la revendication 2 où lesdits moyens suiveurs de came (1) comprennent un premier rouleau (2) agencé pour contacter la surface de came (1) pour impartir un mouvement à une première liaison à levier (4) et impartir un mouvement à une seconde liaison à levier (5) via un autre rouleau à came (3) associé à ladite seconde liaison à levier (5), chaque liaison à levier (4, 5) étant reliée à un arbre respectif (6, 7) pour impartir un mouvement arqué à celle-ci en réponse au mouvement dudit premier rouleau (2) par passage de la came (1) au-delà de cela, et une lame lissante (12, 13) étant montée sur chacun desdits arbres (6, 7) et mobile vers et au loin de la table de pliage (15) en réponse audit mouvement arqué des arbres (6, 7).

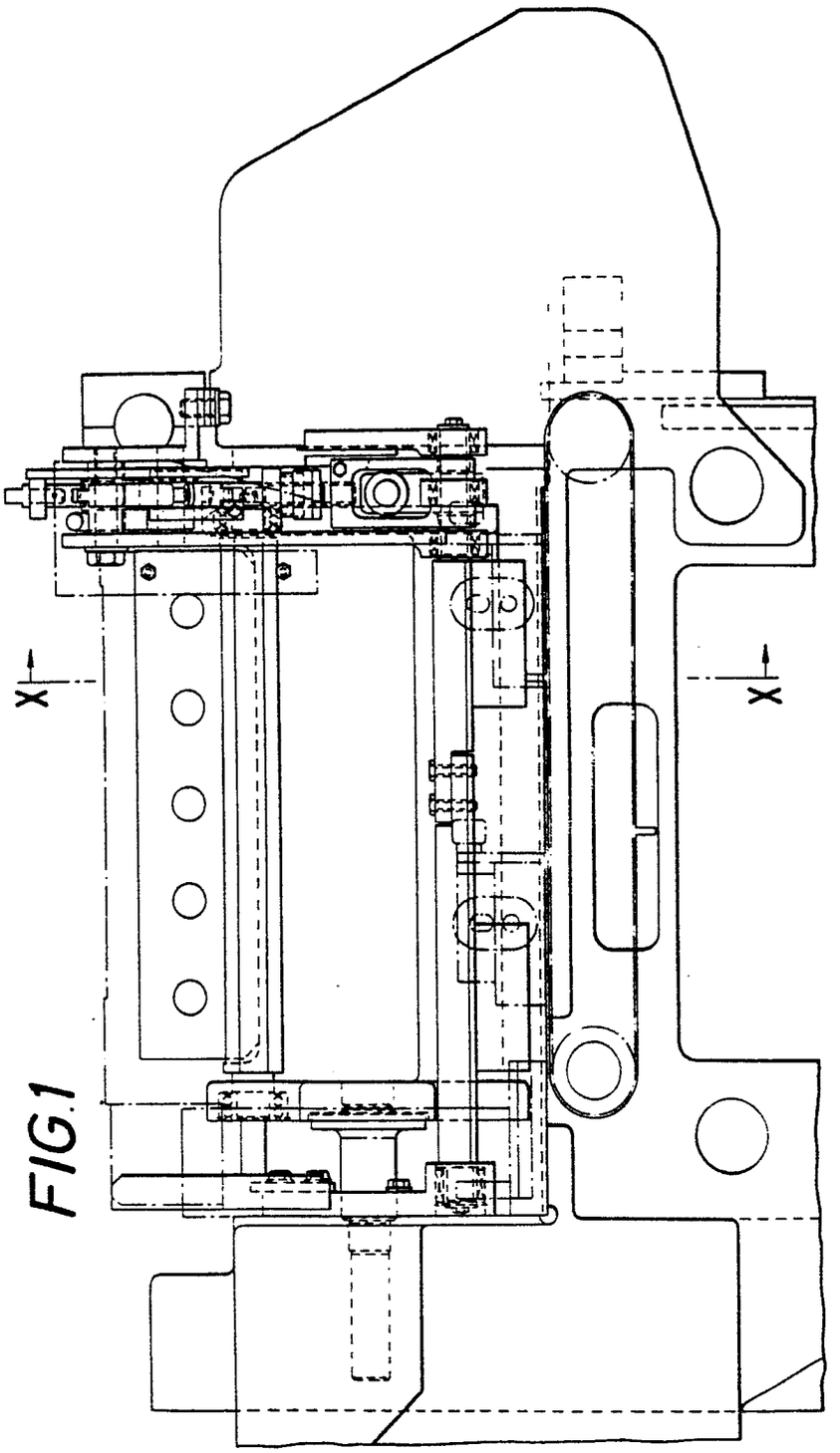

FIG.1

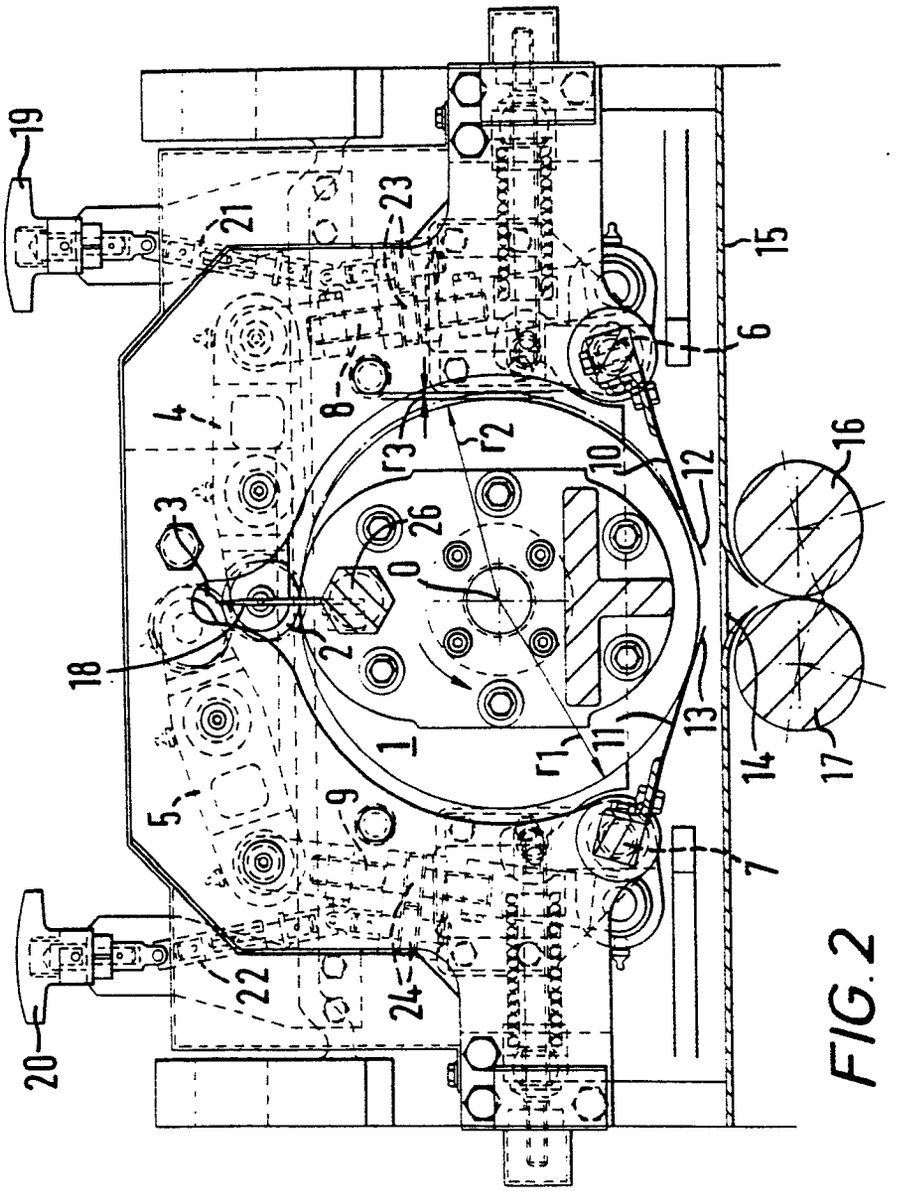

FIG. 2