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## (54) Improvements relating to sheet folding apparatus.

(57) Apparatus for quarter folding newspapers, books, magazines and the like which includes a pair of smoothing blades (12, 13) mounted on respective shafts 6, 7, the arcuate movement of which is controlled by cam rollers (2, 3) associated with a cam (1), via linkages (4, 8; 5, 9), the smoothing blades being arranged to wipe the surface of the newspaper etc. in synchronism with rotation of the folding blade (18) as the folding blade (18) pushes the newspaper between the folding rollers (16, 17) to thereby prevent the formation of dog-ears on the individual pages.

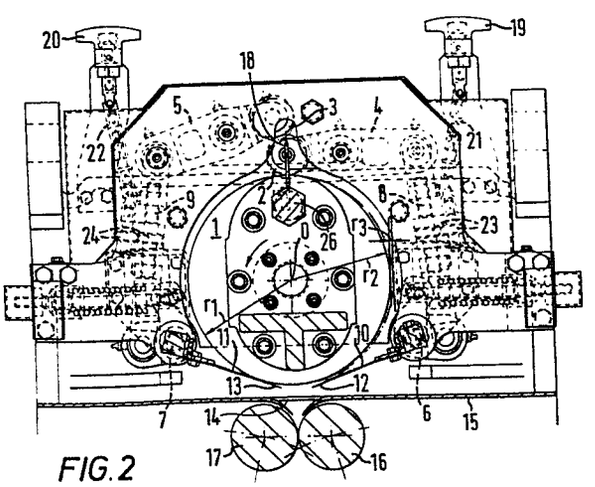


FIG. 2

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# "IMPROVEMENTS RELATING TO SHEET FOLDING APPARATUS"

## 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.

Accordingly, 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.

According to the invention there is provided apparatus for quarter folding a newspaper, book or

magazine (hereinafter termed 'the product') including smoothing means movable into contact with the surface of the product in synchronism with rotation of the folding blade as the latter conveys the product between the folding rollers located beneath a slot in the folding table of the apparatus, such as to wipe the edges of the product to prevent the formation of dog-ears.

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 of 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 O 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 19.

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') including a rotatable folding blade and rollers located beneath a folding table characterised by smoothing means (12, 13) movable into contact with the surface of the product in synchronism with rotation of the folding blade (18) as the latter conveys the product between the folding rollers (16, 17) located beneath a slot (14) in the folding table (15) of the apparatus, such as to wipe 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 means 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), said shaft means (6, 7) carrying smoothing blades (12, 13) 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 a 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).

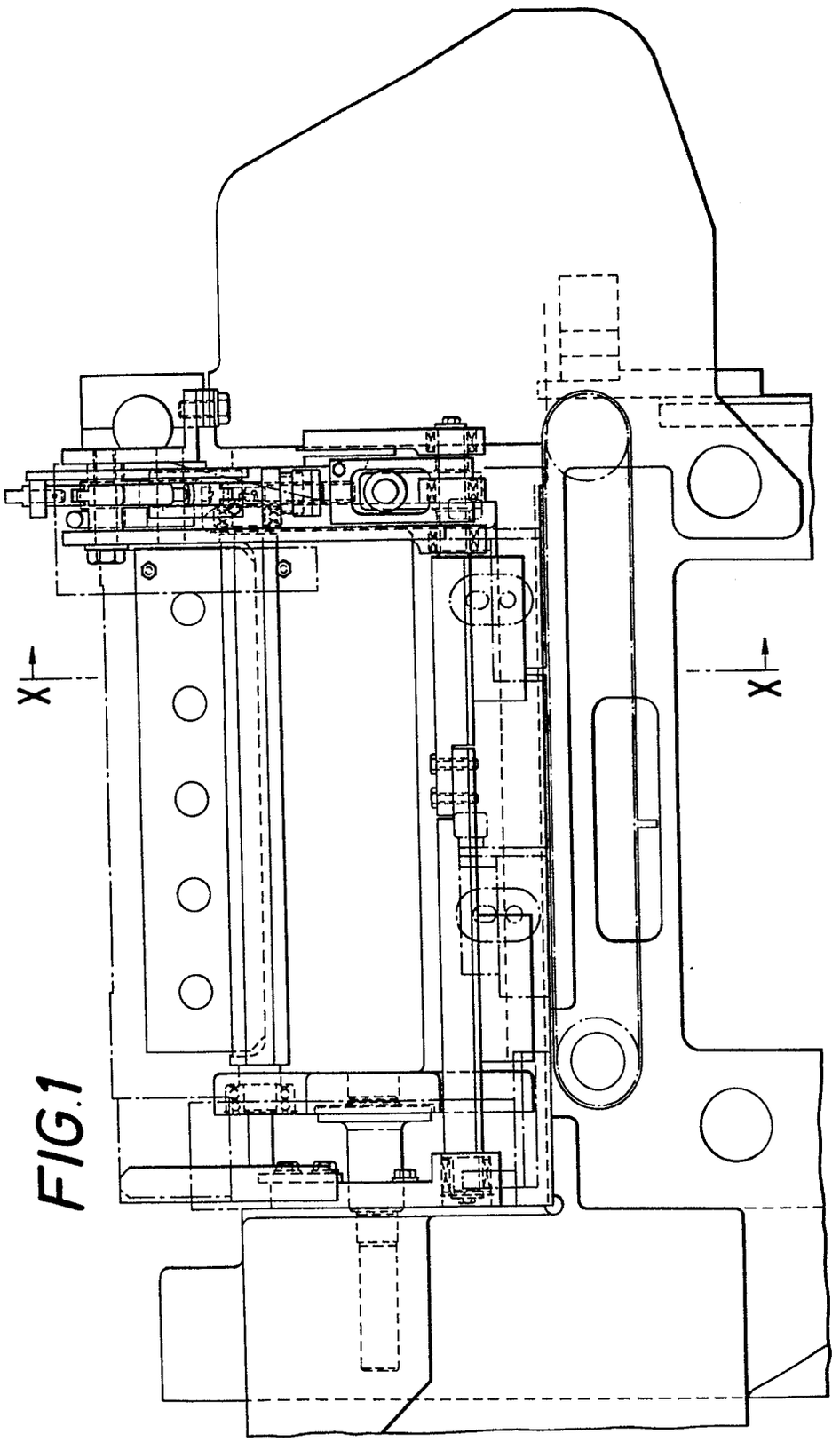


FIG.1

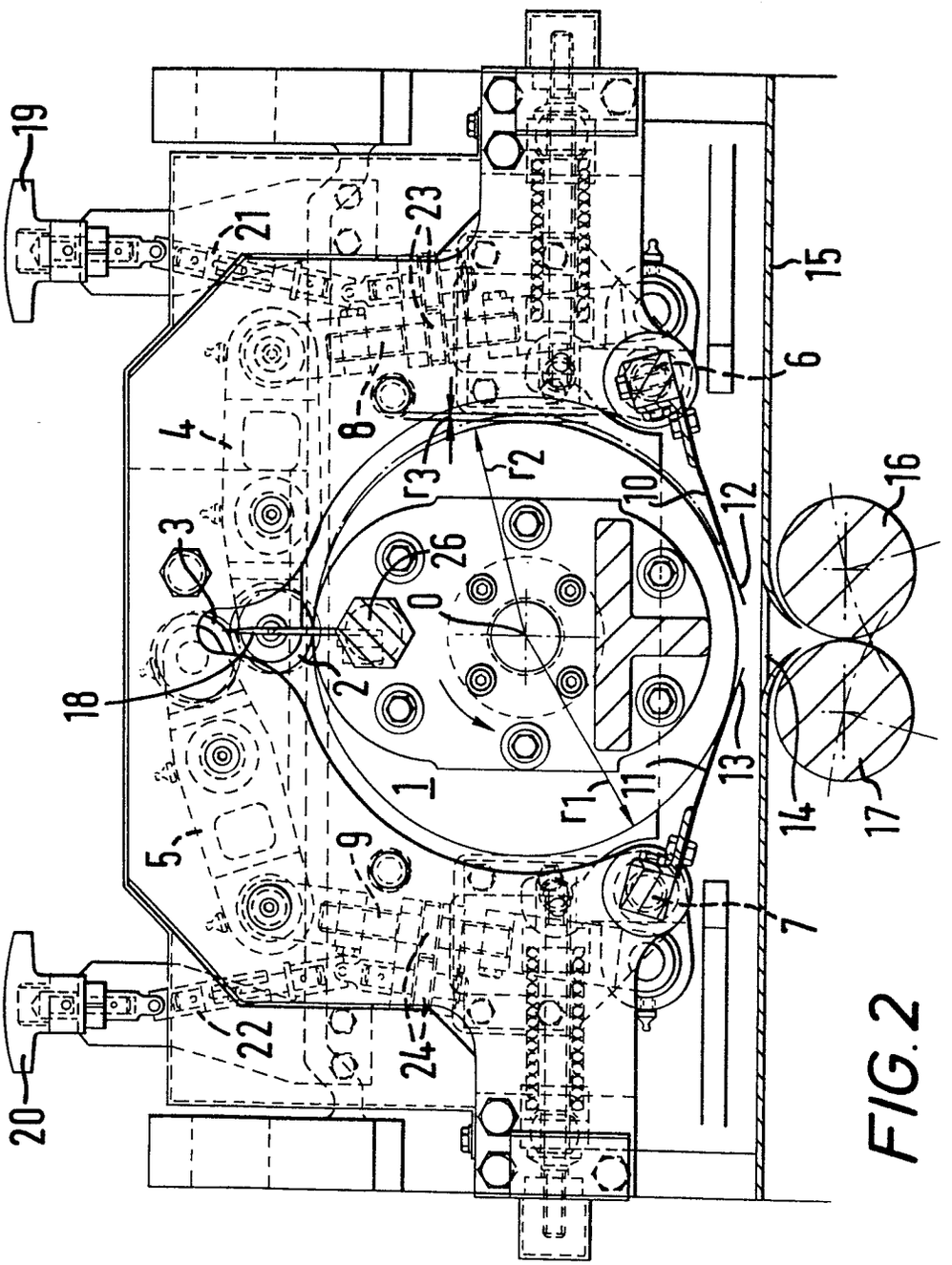


FIG.2

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# EUROPEAN SEARCH REPORT

0098069

Application number

EP 83 30 3369

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl. ³) |
|---|---|---|---|
| A | DE-B-2 837 392 (KOENIG & BAUER)<br>* Figure 1 * | 1 | B 65 H 45/16 |
| A | DE-B-2 634 108 (KOENIG & BAUER) | | |
| A | EP-A-0 001 962 (NOREN) | | |

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

B 65 H 45/00

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| BERLIN | 27-09-1983 | KLITSCH G |

CATEGORY OF CITED DOCUMENTS

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