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(54) **Creasing-folding machine for cardboard sheets**

(57) A creasing-folding machine comprises, in sequenced arrangement, a sheet-feeding unit (12), sheet-feeding driven rollers (20, 22), a first creasing unit (30) and a second creasing unit (130) similar to the first unit but turned upside down with respect to it, and a transfer

belt (42) for feeding the sheet to a subsequent folding station. Each creasing unit comprises a vertically movable, transverse shaping bar (32), connected to driving means, and an abutment bar (38), opposite to the first bar (32) and grooved complementarily to it.

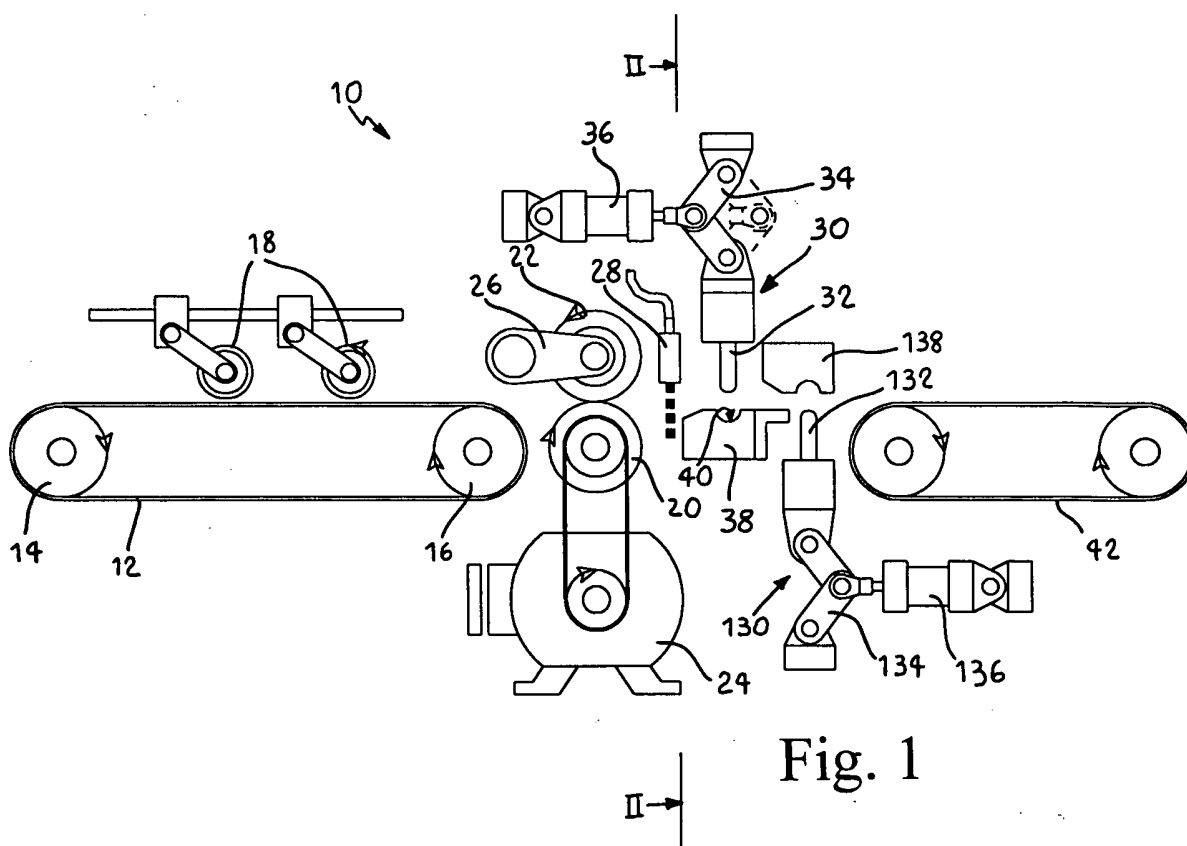


Fig. 1

Description

[0001] This invention is concerned with a creasing-folding machine for cardboard sheets for the manufacture of folders, covers and the like.

[0002] Creasing-folding machines are known where the sheets are forwarded by a sheet-feeder to a creasing station, where the sheets are pressed between a male shaping member and a corresponding female member in order to provide wrinkles or creases in the sheet, across its feeding direction. The sheets are then transferred to a folding station, e.g. using fold plates, where folds are made along the creases.

[0003] In connection with certain product sizes, the need has emerged to crease one sheet with creases having opposite directions of concavity, the concavity obviously depending on which of the two sides of the sheet is engaged by the male, and which by the female creasing member.

[0004] It is therefore the main object of the invention to provide a creasing-folding machine which can press the sheet in transit with transverse creases having different directions of concavity.

[0005] The above and other objects and advantages, such as will appear below, are attained by a creasing-folding machine having the features recited in claim 1, the dependent claims pointing out other advantageous features.

[0006] The invention will now be described in more detail, as shown by way of illustrative and non limiting example in the attached drawings wherein:

Fig. 1 is a diagrammatical side view of a creasing-folding machine according to the invention;

Fig. 2 is a view of the machine of fig. 1 in cross-section made along line II-II; and

Fig. 3 shows an example of a cover made with the machine of the invention.

[0007] With reference to the above listed Figures, a creasing-folding machine 10 comprises a feeding belt 12 supported on a pair of pulleys 14, 16, of which one is driven and the other is loose, with idle pressure rollers 18 acting to maintain the sheet against belt 12 during transport. At the output of belt 12 a pair of transport rollers 20, 22 are arranged one above the other. The lower roller 20 is driven by a motor 24 by belt or chain transmission, while the upper roller 22 is idle at the ends of rods 26 and rests on the lower roller. A sheet detector 28 is arranged at the output of rollers 20, 22. Downstream of detector 28 is arranged a first creasing unit 30 comprising a vertically movable, transverse shaping bar 32, and respective toggle linkages 34, hinged to the opposite ends of bar 32, are driven by respective hydraulic jacks 36 acting horizontally on the hinges between the rods of each toggle 34. An abutting bar 38 is arranged

opposite bar 32 and has a groove 40 complementary to bar 32.

[0008] According to the invention, a second creasing unit 130 is arranged downstream of the first creasing unit 30. The second creasing unit is equivalent to the first but is capsized with respect to it, so that the positions of transverse shaping bar 132, of the respective driving means 134, 136 and of the abutting bar 138 are inverted. In the example of Figs. 1 and 2, bar 32 is above bar 38 in the first creasing unit, while bar 132 is beneath bar 138 in the second creasing unit.

[0009] Downstream of the last creasing unit a driven transport belt 42 is arranged, which is able to pick a sheet and transfer it to a folding station of a known type, e.g. using fold plates, not shown.

[0010] The operation of the machine is controlled by a control unit, not shown, which may be programmed by an operator. Transport belt 12 feeds the sheet, which is then picked by transport rollers 20, 22. Detector 28 detects the exact position of the sheet and, depending on the operator's settings, adjusts the speeds and stops of the rollers and the timing of the strokes of shaping bars 32, 132, which, by abutting against bars 38, 138, form the creases. By suitably adjusting the strokes of one or the other of both creasing units, transverse creases can be obtained which are not only distanced by the desired length from each other, but also have concavities alternatively directed to one or the other side of the sheet, depending on requirements.

[0011] Fig. 3 shows, by way of example, a folder C made by the machine of the invention. The folder has a pair of inside creases 44, 46, defining its spine 48, and a pair of outside creases 50, 52, having opposite concavity and defining the boards 54, 56.

[0012] By the above described special arrangement of toggle linkage 34, 134 with respect to the respective driving jacks 36, 136 it is possible to obtain, by a single forward (or backward) stroke of the piston, a full downward and upward cycle of the respective bar 32, 132, with obvious advantages in the throughput of the machine. Moreover, by arranging two toggles at the ends of each shaping bar 32, 132, rather than a single, centrally-arranged toggle, the deformation of the bar during impact can be reduced, and the smoothness of the crease is consequently improved.

[0013] Due to the close positions of the two creasing units, the control unit can easily manage the creases by using one or the other creasing unit, since the units are distanced by a fixed length, for which it is easy to account in the adjustment of the speed and the stop times of the rollers and the timing of the strokes of the bars. Moreover, by arranging the creasing units as described, the driven rollers 20, 22 can drag the sheet during the entire creasing process, without having to provide further feeding means, and the machine has substantially the same size of known machines having a single creasing unit.

[0014] In practice, both the materials used and the di-

mensions may be arbitrary, depending on requirements.

Claims

1. A creasing-folding machine (10) comprising, in sequenced arrangement: a sheet-feeding unit (12); sheet-feeding driven rollers (20, 22); a first creasing unit (30) comprising a first, transverse shaping bar (32), vertically movable under the action of first driving means and a first abutment bar (38), opposite to said first shaping bar (32) and grooved complementarily to it; and a transfer belt (42) for sending the sheet to a subsequent creasing station, **characterized in that** it further comprises a second creasing unit (130) located between the first creasing unit (30) and the transfer belt (42), said second creasing unit comprising a second, transverse shaping bar (132), vertically movable under the action of second driving means (134, 136), and a second abutment bar (138), opposite to said second shaping bar (132) and grooved complementarily to it, the second creasing unit being arranged to form a crease in a direction opposite to a crease formed by the first creasing unit.
2. The machine of claim 1, **characterized in that** said first and second driving means comprise at least one vertically acting toggle linkage (34, 134) connected to a hydraulic jack (36, 136), horizontally acting on the hinge between the rods of each toggle linkage (34, 134).
3. The machine of claim 2, **characterized in that** it comprises, for each of said shaping bars (32, 132), two toggle linkages hinged to respective longitudinally opposite ends of the bars (32, 132).

