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- (54) Benævnelse: **FALSEMASKINE**
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The invention relates to a folding machine having at least one folding unit, in which a plurality of folding rollers are mounted, and having an additional apparatus, arranged downward of the folding unit, in which at least one pair of knife rollers is arranged.

5 From EP 1 156 004 B1 it is already known to fit a folding unit, which already has at least one pair of knife rollers, at the outlet with additional processing stations, for example out-feed rollers. The additional processing stations can be pivoted upwards away from the folding unit for easy access to the knife rollers of the folding unit.

10 Indeed, the additional processing stations in this known folding machine can easily be exchanged and/or adapted to the respecting folding task. However, the knife rollers of the folding unit are difficult to access. The upwardly pivoted apparatus needs to be locked in this position. The knife rollers are then only accessible from underneath the additional processing stations, which is inconvenient. In addition, the view of the knife rollers through the processing stations is restricted even when the processing stations are
15 pivoted upwards.

EP 1 475 334 A1 discloses the preamble of claim 1 and describes a folding machine having at least one pair of blade shafts, wherein the blade shafts are arranged in a cassette which can be pulled out laterally from the machine. This machine therefore requires sufficient space next to the machine in order to be able to remove the cassette.

20 From DE 41 23 130 A1 a folding machine is known, which has a plurality of folding units, partly with blade shafts, wherein the folding units, can be pivoted completely out of the folding unit assembly in order to be able to make adjustments to the folding units. However, the pivot angle is only 60°, so that the replacement of blade shafts of the folding units is not possible or only possible with great difficulty. The present invention is based
25 on the problem of making knife rollers of a folding machine easily accessible and easy to replace. The problem is solved by a folding machine having the features of claim 1.

In the folding machine according to the invention, all knife rollers are arranged in the additional apparatus relative to the folding unit. Therefore, for replacing the knife rollers, access to the folding unit itself is not necessary, only to the additional apparatus.
30 The pivoting of the additional apparatus about a horizontal axis at the bottom is more advantageous than pivoting about an axis at the top due to the possibility of using gravity for pivoting.

The additional apparatus is pivoted between a position of rest and a working position. In the working position the knife rollers of the additional apparatus are active, i.e. the additional apparatus is in an at least approximately vertical position. In the position of rest, which is approximately horizontal, when the additional apparatus can be pivoted by about 90°, the knife rollers are easily accessible from above and can thus be easily repaired or replaced, provided that they are arranged to be replaceable in the additional apparatus. The additional apparatus also does not need to be locked in the position of rest.

There are further crucial advantages when the knife rollers are driven by the folding unit. A separate drive for the knife rollers or the additional apparatus is then unnecessary.

The knife rollers can be coupled to the folding unit, preferably automatically, by pivoting the additional apparatus. One way of achieving this is that one of folding rollers or a drive roller for the folding rollers is provided with a gearwheel, which meshes with a gearwheel drive-coupled to the knife rollers, when the additional apparatus is in working position. In this way there is a direct and automatic coupling of the knife roller drive to the folding roller drive without any further coupling steps.

The knife rollers can be connected to each other by a belt drive so that they can be driven together and synchronously. Preferably, the additional apparatus can have two pairs of knife rollers. However, depending on the desired processing of the folding products, only one pair or several pairs can be provided.

It is also advantageous if the additional apparatus projects in the pivoted state into recesses in a frame of the folding unit. The additional apparatus therefore does not widen the structure of the folding machine. The knife rollers can have the same length as the folding rollers and be driven by them.

The structure of the folding unit is irrelevant to the invention. Preferably however, it can be a buckle plate folding unit. In addition to the folding rollers, transport rollers can also be arranged in the folding unit. In addition to knife rollers, transport rollers can also be provided in the additional apparatus.

In the following, a preferred exemplary embodiment of a folding machine according to the invention is described in more detail with reference to the drawings.

In the figures:

Fig. 1 shows a perspective view of the outlet area of a folding unit of a folding machine with a downwards pivoted additional apparatus (position of rest);

Fig. 2 shows a representation corresponding to Fig. 1 with additional apparatus pivoted upwards (working position);

Fig. 3 shows a partial cross-section of the folding unit with an upwardly pivoted additional apparatus from Fig. 2;

5 Fig. 4 shows a partial side view of the folding unit with an upwardly pivoted additional apparatus from Fig. 2.

Fig. 1 shows a folding unit 10 with a plurality of folding rollers 11, the ends of which are mounted in a frame 12. An additional apparatus 13 is also arranged on the frame 12. This additional apparatus 13 can be pivoted about a horizontal axis 14, as shown in particular in Fig. 3. The axis 14 is arranged below and downward with respect to the last
10 folding rollers 11 and thus the outlet area of the folding unit 10. Two pairs of knife rollers 15, 16 and 17, 18 are mounted in the additional apparatus. The additional apparatus is pivoted downwards in Fig. 1, i.e. inactive. In this - horizontal - position of the additional apparatus 13 the knife rollers 15 to 18 are easily accessible from above and can be easily
15 repaired or replaced. The outlet of the folding unit 10 is also freely accessible and easily visible.

Fig. 2 shows the additional apparatus in its active, upwardly pivoted position. In this position the knife rollers 15 to 18 are driven by the folding unit 10 as well, as explained in more detail below reference to Fig. 4. In the active state, the additional apparatus 13
20 assumes an at least approximately vertical position. The pivot movement from the horizontal position of rest to the vertical working position is guided by a control cam 19 in the frame 12 which can be seen from the cross-sectional view of Fig. 3. A bolt 20 connected to the additional apparatus 13 projects into the quarter-circle-shaped control cam 19 and thereby guides the rotary movement of the apparatus 13 about the axis 14.
25 At the same time the control cam 19 represents an end stop for both the position of rest and the working position of the additional apparatus 13.

The side view from Fig. 4, together with the view in Fig. 2, shows that in the working position of the additional apparatus 13 a drive shaft 21 of the folding unit 10 drives a gear wheel 24 of the additional apparatus 13, via gears 22 and 23, which gear wheel sits on a
30 shaft 25, drives said shaft 25. The shaft 25 in turn is connected to the knife rollers 15 to 18 via a toothed belt drive 26. On pivoting the additional apparatus 13 into its working position the gears 23 and 24 automatically engage so that the knife rollers 15 to 18 are driven by the folding unit 10 without any further action.

The additional apparatus 13 can be easily dismantled from the frame 12 when not in use. It can also be replaced by another additional apparatus with for example more than two pairs of knife rollers 15, 16 and 17, 18. In addition, the knife rollers 15 to 18 can be easily exchanged for others. This allows the folding unit 10 and thereby the whole folding machine to be adapted easily to different tasks.

Patentkrav

1. Falsemaskine med mindst en falseenhed (10), i hvilken en flerhed af falsevalser (11) er monteret, og med en hjælpeenhed (13) indrettet nedstrøms for falseenheden (10), i hvilken hjælpeenhed mindst et par knivvalser (15, 16; 17, 5 18) er indrettet, hvor ingen knivvalser (15 til 18) er indrettet i falseenheden (10), **kendetegnet ved, at** hjælpeenheden (13) er indrettet drejeligt omkring en horisontal akse (14), hvor den horisontale akse (14) er indrettet under og nedstrøms for et udløbsområde af falseenheden (10), hvor hjælpeenheden (13) er indrettet drejeligt mellem en arbejdsposition, som er næsten vertikal, og en 10 hvileposition, som er næsten horisontal.
2. Falsemaskine ifølge krav 1, **kendetegnet ved, at** hjælpeenheden (13) er drejelig med en vinkel på 90° omkring den horisontale akse (14).
- 15 3. Falsemaskine ifølge krav 1 eller 2, **kendetegnet ved, at** det mindst ene par af knivvalser (15, 16; 17, 18) er indrettet udskifteligt i hjælpeenheden (13).
4. Falsemaskine ifølge et af de foregående krav, **kendetegnet ved, at** knivvalserne (15 til 18) drives af falseenheden (10). 20
5. Falsemaskine ifølge krav 4, **kendetegnet ved, at** drejningen af hjælpeenheden resulterer i en driftsmæssig kobling af knivvalserne med falseenheden.
- 25 6. Falsemaskine ifølge krav 4 eller 5, **kendetegnet ved, at** en af falsevalserne (11) eller en drevvalse (21) til falsevalserne (11) er forsynet med et tandhjul (22), som driver et med knivvalserne (15 til 18) driftsmæssigt koblet tandhjul (24), når hjælpeenheden (13) befinder sig i arbejdspositionen.
- 30 7. Falsemaskine ifølge et af de foregående krav, **kendetegnet ved, at** knivvalserne (15 til 18) er forbundet med hinanden gennem et remdrev (26).

8. Falsemaskine ifølge et af de foregående krav, **kendetegnet ved, at** hjælpeenheden (13) har to par knivvalser (15, 16; 17, 18).

9. Falsemaskine ifølge et af de foregående krav, **kendetegnet ved, at**
5 hjælpeenheden (13) i inddrejet tilstand rager ind i udsparinger i en ramme (12) af falseenheden (10).

10. Falsemaskine ifølge et af de foregående krav, **kendetegnet ved, at** den
mindst ene falseenhed (10) er en lommefalsenhed.
10

11. Falsemaskine ifølge et af de foregående krav, **kendetegnet ved, at** transportvalserne er indrettet i falseenheden (10) og/eller i hjælpeenheden (13).
15

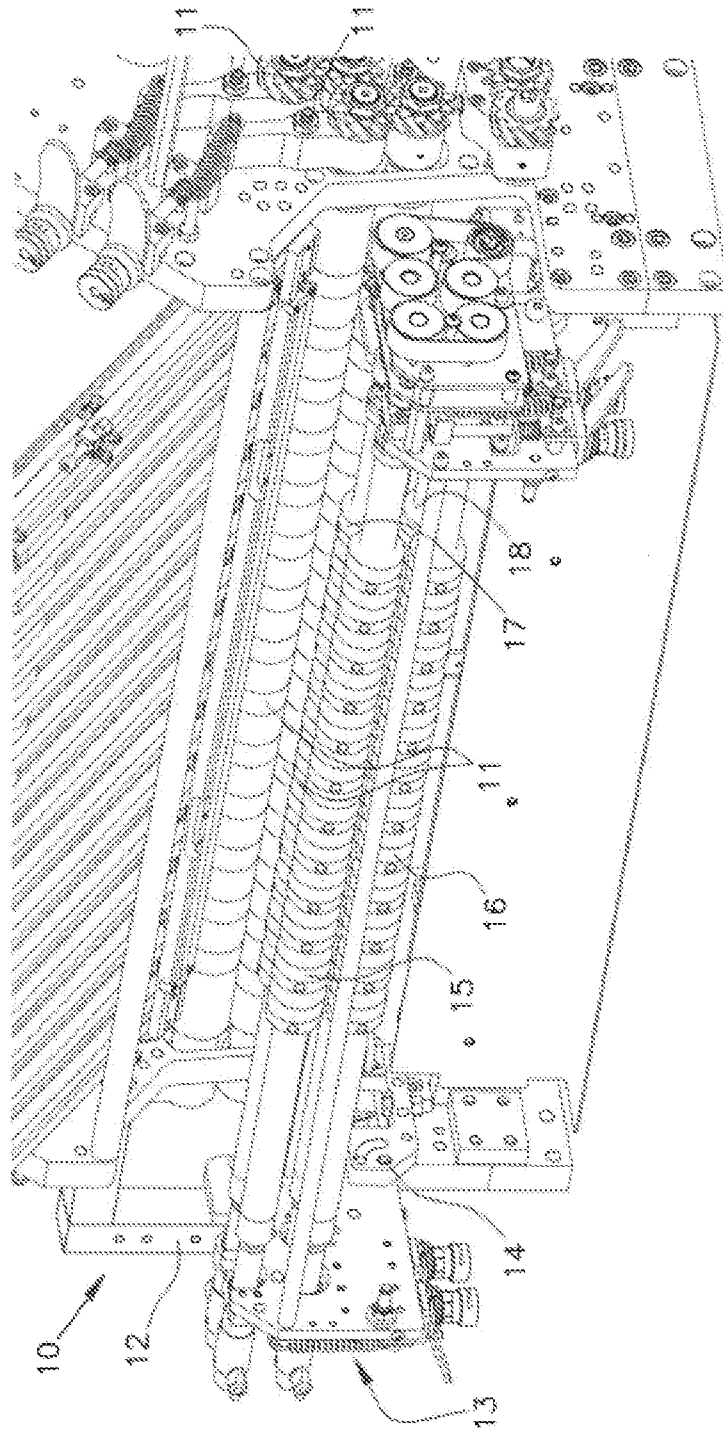


Fig. 1

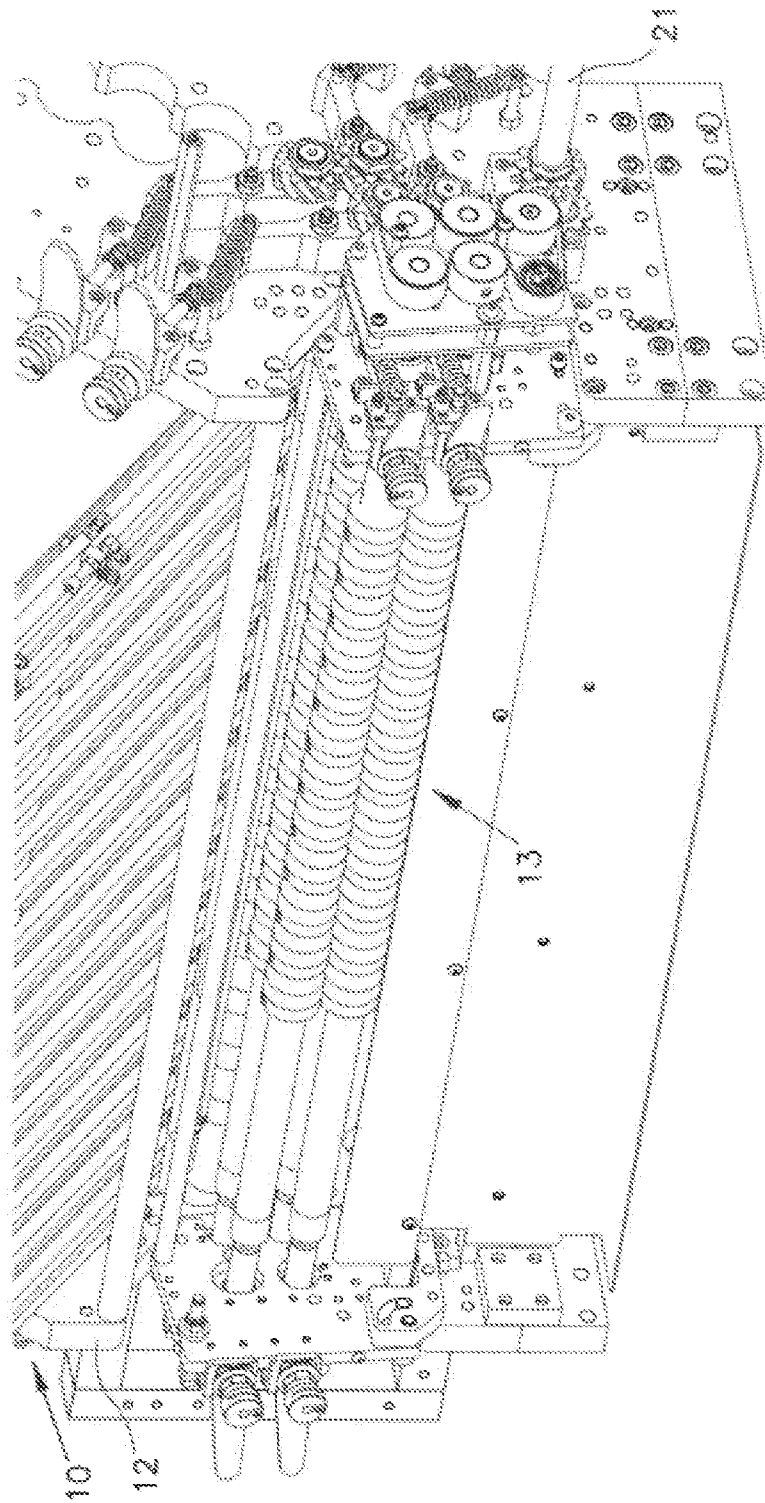


Fig. 2

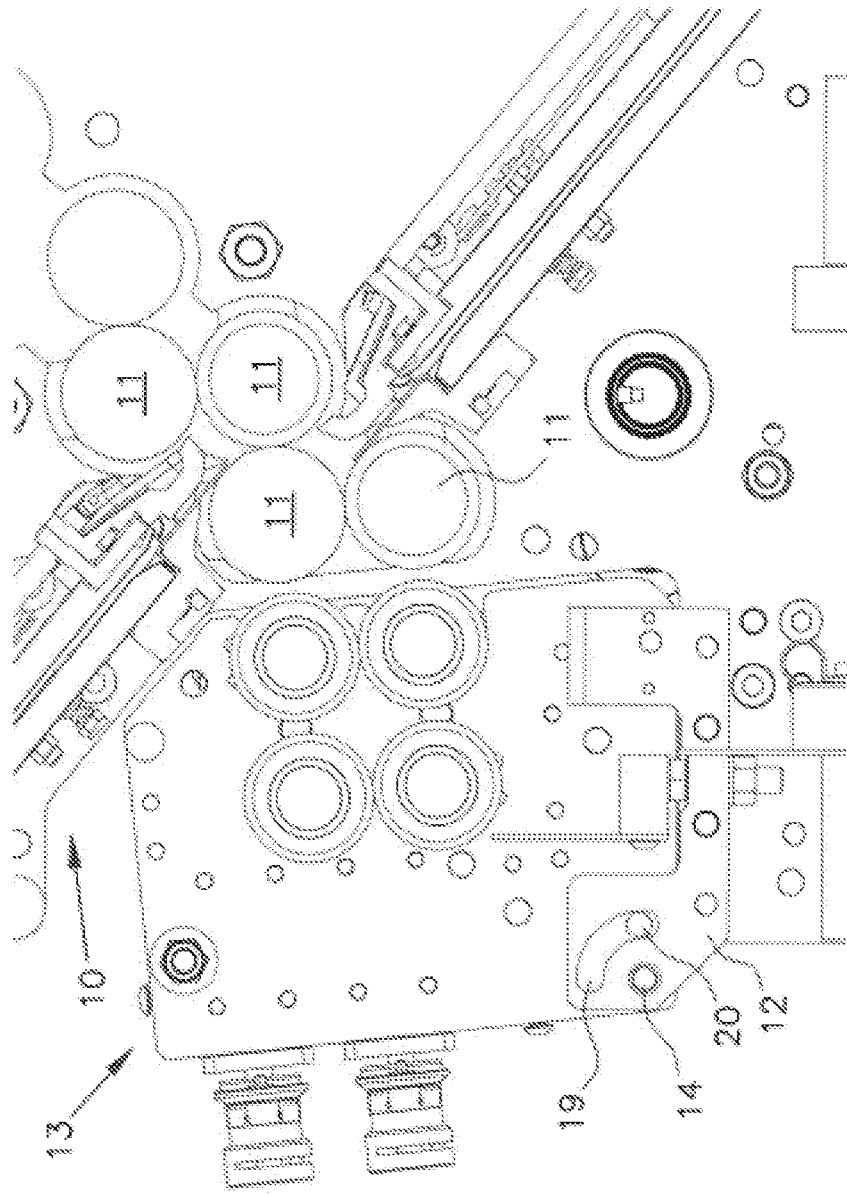


Fig. 3

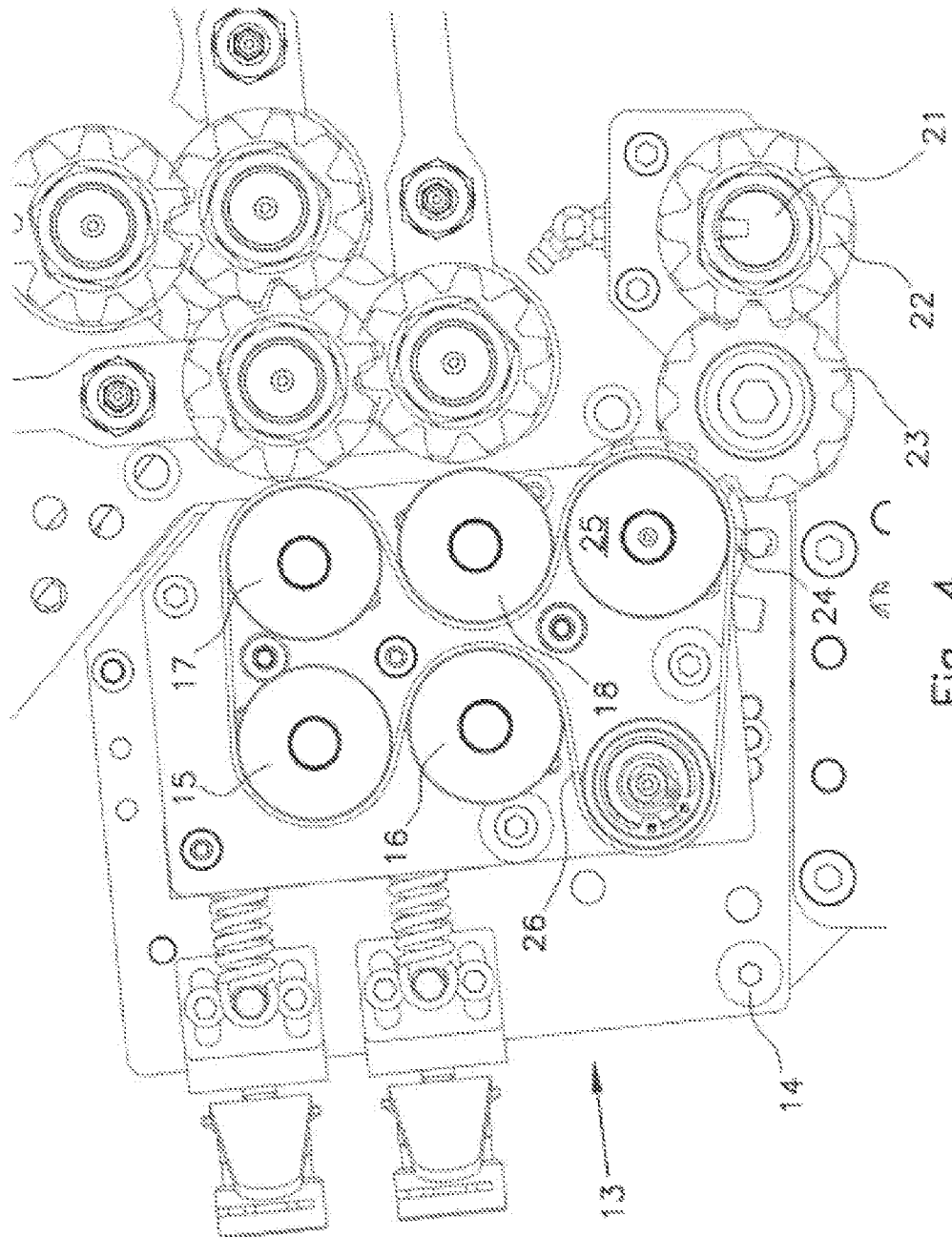


Fig. 4