

This invention concerns an enveloping device with a container for empty envelopes, and a process for operating this enveloping device.

In prior art enveloping machines the envelope is withdrawn from a stack, brought into position, opened and the content is then inserted, leading to a pause which delays the packing rate. In this prior art machine, various elements carry out to and fro movements, and this restricts the packing rate of this prior art enveloping machine.

Known from US-A-2 915 863 is an enveloping device with a container for empty envelopes. This device has, disposed below the container, a pivotably supported envelope opening element to open the envelope flap and first rotatable conveyor elements to convey the envelope to a packing trap and to pull up the aforementioned at least partially onto the packing trap, as well as conveyor elements for pushing the envelope contents into the packing trap and conveyor elements for further conveyance of the packed envelope.

Also known from US-A-2 915 863 is a method to operate an enveloping device, wherein the flap of the undermost envelope of a stack of envelopes is opened with a rotating envelope opening element, and is led to a packing trap by means of rotating first conveyor elements, and drawn at least partially onto the packing trap, while the contents are conveyed into the packing trap by conveyor elements and the envelope including contents is removed from the packing trap by the conveyor elements and is conveyed further.

It is an object of this invention to avoid the disadvantages of the state of the art and to provide an enveloping device with which the packing rate can be approximately doubled. A further object is to design the enveloping machine in such a way that even at high packing rates, the envelopes can be suitably deformed to some degree, or opened, respectively, whilst they are being conveyed from the envelope stack to the packing trap and before they reach the latter, so that the envelopes can be reliably

manoeuvred onto the packing trap. This is achieved through the characterizing features of claims 1 and 12 <sic. 11>.

Preferred embodiments ensue from the dependent claims.

- 5 An example of an embodiment will be described below in more detail with reference to the drawings, in which:
 Fig. 1 is a side view of the enveloping device,
 Fig. 2 is a view of the drive for the opener claw,
 Fig. 3 is a cross-section along the line III-III of Fig. 2,
 10 Fig. 4 shows the transport of an envelope in the direction of the packing trap,
 Fig. 5 shows how an envelope is drawn onto the packing trap,
 Fig. 6 shows how the envelope content is inserted into the
 15 packing trap,
 Fig. 7 shows how the packed envelope is removed, and
 Fig. 8 shows a perspective view of the packing trap.

The basic construction and the operating sequence of the process of the enveloping device for an enveloping
 20 machine will be described with reference to Figure 1. The enveloping device or unit forms the central part of an enveloping machine. Pre-treatment of the contents of the envelope, i.e. of the sheets of paper, or rolls or stacks of pre-printed forms, brochures, etc., in the form of
 25 cutting, grouping, folding, etc., and, likewise, post-treatment of the packed envelopes in the form of closing, sealing, prepaying, bundling, etc., do not take place within the scope of the enveloping device described here.

From a vertical stack 1 of empty, unsealed envelopes
 30 arranged with their bent-over flap downwards, the flap 2 of the bottom envelope 3 is opened with one of three opener claws 5, 6 or 7 disposed on a shaft 4. As soon as the flap 2 is sufficiently open, it is seized by two conveyor elements 8, 9 and pressed against two conveyor rollers 10, 11.
 35 The conveyor elements 8, 9 and the conveyor rollers 10, 11 have the same peripheral speed. The opener claws 5, 6 and 7 and the conveyor elements 8 and 9 are disposed on the

same shaft 4, but are supported and driven independently of each other. In order to prevent the opener claws 5, 6 and 7 from damaging the envelope at high processing speeds, i.e. by perforating the flap, the opener claws 5, 6 and 7 rotate in a whole number ratio slower than conveyor elements 8 and 9. Opener claws 5, 6 and 7 are disposed at regular intervals on the periphery. The number of opener claws and therefore the rotation ratio opener claws : conveyor elements is dependent on the envelopes used. The opener claws are only operated from a coupling 12 when a packing operation is to be carried out. The conveyor elements 8, 9 and the conveyor rollers 10, 11 run continuously.

Whilst the opened envelope is conveyed onwards towards a packing trap 13, holding down elements 14 and 15 ensure that the envelope is fed along a guide plate 16. Two further pairs of transport rollers 17, 18; 19, 20 ensure that the envelope is reliably conveyed. As soon as the envelope has been conveyed so far that its flap is positioned under a holding down roller 21, the latter begins to descend. Simultaneously, the packing trap 13 begins to pivot around a point of rotation 22 towards the envelope. The linear movement of the holding down roller 21 and the pivot movement of the packing trap 13 are guided through a curve 23 and transferred to the holding down roller and the packing trap by means of a system of levers 24, 25, 26, 27, 28, 29. As soon as the packing trap has reached the uppermost position and the envelope opening has been drawn over the trap, conveyor rollers 30 begin to convey the envelope into the final position on the packing trap 13 (see also Figure 5). As soon as this position has been reached, the packing trap 13 pivots downwards and the holding down roller 21 is pushed upwards. Whilst the envelope is being pushed onto the packing trap 13, from the opposite side, conveyed by transport fingers 34 affixed to a toothed belt 33 guided over rollers 31 and 32, the prepared contents 38 of the envelope is conveyed into the

axially in side plates 50 and 51. The conveyor elements 8 and 9 are rotation-tightly connected with shaft 4. Via a further toothed wheel 52, which is rotation-tightly connected with shaft 4, a toothed belt 53 and a toothed wheel 55 which is rotation-tightly connected with a second shaft 54, the drive for the opener claws 5, 6 and 7 is brought about via a coupling 12. A toothed wheel 56 is rotation-tightly connected with shaft 54 and the former drives another toothed wheel 58 connected with the opener claws 5, 6 and 7, via a toothed belt 57. The toothed wheel 58 and the opener claws 5, 6 and 7 are rotatably supported on shaft 4 with ball bearings. Toothed wheels 56 and 58 form a stepdown gearing, so that the opener claws rotate slower than the conveyor elements 8 and 9. Shaft 54 is also supported and axially held in the side plates 50 and 51.

Fig. 4 shows a section of the enveloping device, in particular the area of the packing trap. The position of the envelope 3 is as shown in Fig. 4 with its flap below the holding down roller 21. The end of the flap abuts the front portion 61 of the packing trap 13.

Fig. 5 shows the same section of the enveloping device as in Fig. 4. The holding down roller 21 has descended and the packing trap 13 has been pivoted around its point of rotation 22 and upwards with its front portion 61 towards the holding down roller 21. The envelope is thereby deformed and opened and can be pushed over the packing trap 13. The conveyor rollers 30 convey the envelope into its final position on the packing trap.

Fig. 6 shows the same part of the enveloping device as Figs. 4 and 5. In Fig. 6, the envelope is shown in its final position on the packing trap 13. The packing trap is pivoted downwards around the point of rotation 22 and the holding down roller 21 is pushed upwards. Whilst the envelope is pushed onto the packing trap, the contents 38 of the envelope are conveyed by the transport fingers 34

into the packing trap. Two parallel toothed belts 33 with transport fingers 34 attached thereto are provided.

Fig. 7 shows the same part of the packing device as Fig. 6. The contents 38 are pushed out of the packing trap by the transport fingers 34 together with the envelope. The envelope is conveyed over a transfer plate 59 by the conveyor rollers 45 to the conveyor belts 43 and 44 and is then transported out of the enveloping unit, where the envelope is finished for dispatch by other units.

Fig. 8 shows a perspective view from below of the packing trap. It has two bent over edges 62 and 63, between which the contents are pushed. The end 61 of the packing trap closest to the stack of envelopes is also bent. The opposite end 37 is funnel-shaped for optimal reception of the contents of the envelope. Two slots 64 and 65 are provided, through which the transport fingers 34 can protrude. The projections 35 and 36 serve to lift slightly the envelope pushed over the flap so that the transport fingers do not get blocked by the flap.

The enveloping device has only very few translationally moving or oscillating parts in order to keep small the thereby occurring forces of inertia. With the exception of the holding down roller 21, the packing trap 13 and the lever system acting on the latter, only rotational movements occur. In the holding down roller and the packing trap only small displacements or pivot angles occur.

The enveloping device according to the invention permits up to 26,000 packing operations per hour, which corresponds to a doubling of the capacity of the prior art enveloping machines.



8. Device according to one of the preceding claims, characterized in that the packing trap (13) is provided with projections (35, 36) for the envelope (3).

9. Device according to one of the preceding claims,
5 characterized in that the packing trap (13) is rotatably supported.

10. Device according to one of the preceding claims, characterized by conveyor belts disposed in the region of the end of the packing trap closest to the stack of en-
10 velopes, for conveying the packed envelope out of the enveloping device.

11. Process for operating the device according to one of the claims 1 to 11, whereby the flap (2) of the bottom envelope (3) of a stack of envelopes (1) is opened with a
15 rotating envelope opening element (5, 6, 7), is fed into a packing trap (13) by rotating conveyor elements (8) and is at least partially drawn onto the packing trap (13), whilst the contents (38) are conveyed by conveyor elements (34) into the packing trap (13), and the envelope (3) including
20 contents (38) is drawn off the packing trap (13) by the conveyor elements (34) and transported further characterized in that a holding down roller (21) is provided, which descends before the envelope is drawn onto the packing trap (13) in order to open the envelope slightly.