United States Patent

Pahlitzsch

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[54] APPARATUS FOR STAGGERING BLANKS OF SHEET MATERIAL

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[30] **Foreign Application Priority Data**

July 17, 1969 Germany ..... P 19 37 082.2

[52] **U.S. Cl.** **271/74,** 93/61, 198/35, 271/76, 271/DIG. 8

[51] **Int. Cl.** **B65h 29/24**

[58] **Field of Search** 93/62; 198/35; 271/77, 74, 271/78, 76

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[57] **ABSTRACT**

Blanks of sheet material, to be assembled in staggered relationship for the application of glue to overlapping flaps thereof, are horizontally fed at a relatively high speed to the upper run of an endless conveyor moving at the same speed and carrying at least one wedge-shaped cam in whose wake the blanks are entrained by suction toward a pair of exit rollers moving at a relatively low speed. The rear part of each blank, forming a flap, is thereby caused to ride up the inclined leading flank of the next oncoming cam, thus overlapping the front part of the next-following blank. The feeding of the blank to the exit rollers is facilitated by a transfer roller closely spaced from the upper conveyor surface so as to hold the raised flap down onto the cam.

4 Claims, 3 Drawing Figures

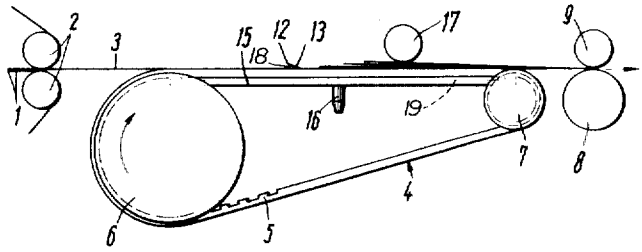

Fig. 1

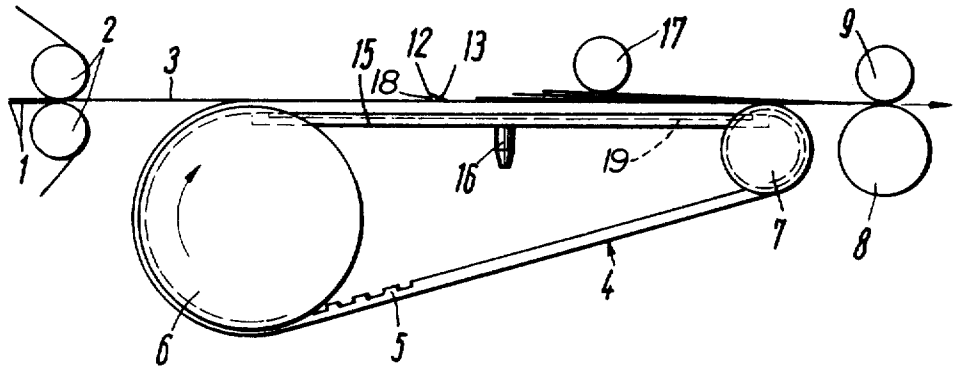

Fig. 3

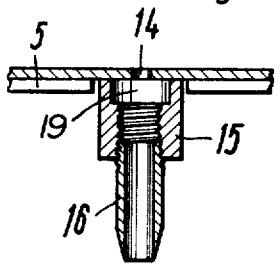

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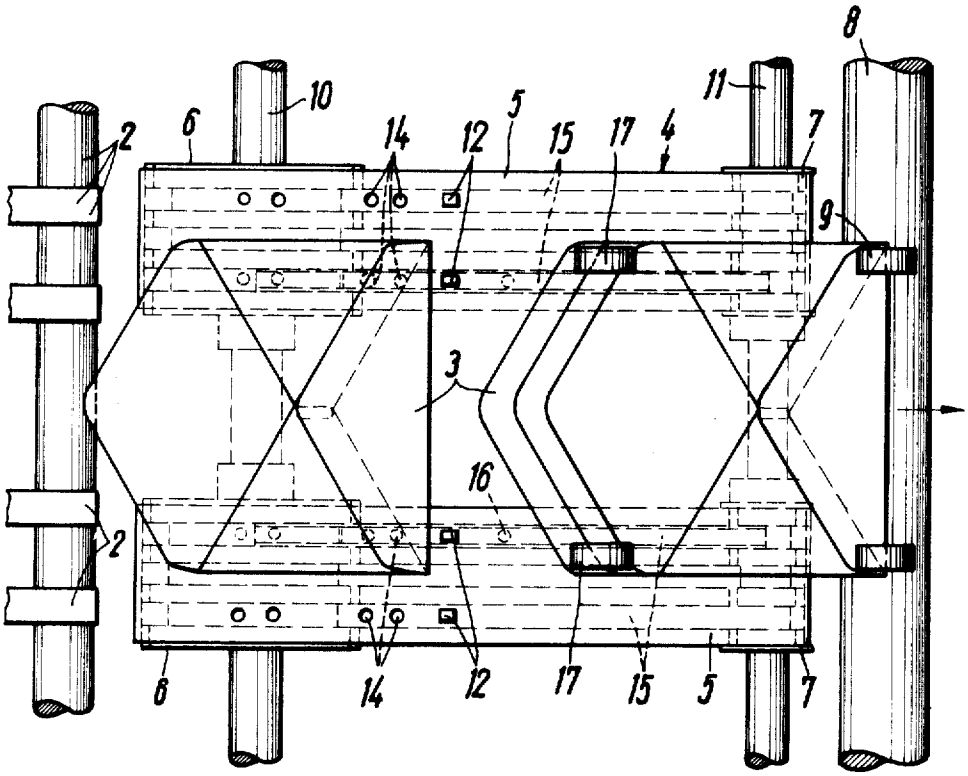
Fig. 2



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APPARATUS FOR STAGGERING BLANKS OF SHEET MATERIAL

The present invention relates to an apparatus for manufacturing articles from blanks of sheet material, particularly such articles as letter envelopes, bags and similar items.

In the manufacture of envelopes, bags and similar items, one may start with a reel of paper from which the individual blanks are cut; if prepared blanks are used, the starting point is a plurality of such blanks in a stack. The individual blanks are manufactured in a single operation and then converted in successive steps to form envelopes. In so doing, portions of the envelope blanks taken from the paper reel or the stack are first of all folded and pasted, and then, during the course of their further transit through the system, arranged with another portion forming an unfolded and ungummed flap in the trailing direction, being then lined up in staggered fashion one beneath the other, whereupon the glue layer is applied to the flap and the envelope is subsequently folded.

The object of the present invention is to provide an apparatus in which, in a conveyor path located in one plane, proper overlapping stagger is ensured without requiring the constructional outlay hitherto involved. According to one aspect of the invention, a series of blanks each having at least one portion already folded and pasted are supplied one-by-one by feed means, including a pair of entrance rollers to a driven conveyor-belt assembly with an unfolded and ungummed flap of each blank trailing, the conveyor-belt assembly advances the blanks at predetermined speed to a pair of exit rollers transporting the blanks at a lower speed to a device by means of which adhesive is applied to a rearward part of each flap, a wedge-shaped cam on an outer surface of the conveyor-belt assembly causes the flap of each blank, moving at the reduced speed of the exit rollers, to be raised so that a leading end portion and a forward part of the flap of the following blank passes thereunder to be covered thereby, leaving the rear part of the flap of the following blank exposed for the application of the adhesive.

Preferably, a suction source is connected to a hollow member bearing against the underside of a top run of the or each conveyor belt, this member having an upwardly open longitudinal groove closed at its ends and passing beneath one or more openings in the belt to apply, continuous suction to the overlying flanks. These openings precede, in the direction of conveyor motion, the wedge-shaped cam which is advantageously duplicated at two opposite locations on the belt periphery.

Furthermore, the or each conveyor belt is preferably toothed on its inner surface for positive engagement with supporting rollers or pulleys.

Also, the belt preferably is so coupled to the entrance rollers upstream of the conveyor that the speed of the conveyor belt corresponds to half the feeding speed of these rollers.

Finally, a transfer roller confronting the upper run of the conveyor belt forms part of the transport-roller means at the downstream end of the conveyor path and is spaced from the outer belt surface by a distance corresponding to the height of the cam. With this transfer roller tangent to a plane which passes between the counterrotating entrance and exit rollers, the envelope blanks are thus delivered directly to the exit rollers downstream of the conveyor which operate at a corresponding lower speed designed to produce the desired stagger. Because of the suction opening provided behind each cam, the envelope is drawn onto the top run of the belts and entrained thereby. When the cam passes over the return of the roller at the end of the conveyor path, the envelope has its leading edge entered directly into the nip of the counter-rotating exit rollers where the transport speed is reduced to such an extent that the next-arriving envelope is fed in underneath it to produce an overlapped arrangement. Adjustment of the exit rollers with reference to the conveyor path is not necessary because, thanks to the coupling of the entrance rollers with the toothed pulleys, of any size is thrust against the substantially perpendicular trailing flank of a cam on the toothed belt for delivery with its front edge past the transfer roller to the exit rollers. The interval between the cams and the length of the toothed belts are designed for the maximum envelope size to be dealt with; different envelope sizes can thus be handled without requiring any alteration or adjustment.

In the accompanying drawing:

FIG. 1 schematically shows a side elevation of an apparatus embodying my invention;

FIG. 2 is a plan view of the assembly of FIG. 1; and

FIG. 3 is a fragmentary view, in section, of a channeled member of a suction device forming part of the apparatus.

Envelope blanks are supplied by feed means, including a conveyor stage of which only the terminal rollers **2** have been illustrated, along an input path **1** where portions of the blanks are first of all folded and glued, each blank then advancing with an unfolded and ungummed flap pointing toward the rear. The rollers **2** serve as entrance rollers delivering the partially prepared envelope blanks **3** directly to a conveyor section **4** by which they are supplied directly to exit rollers **8, 9** operating at a lower speed, corresponding to the desired degree of overlap of the blanks, so that the arriving envelope blanks are properly staggered. The input path **1**, the belt section **4** and the rollers **8, 9** are all located at the same level along a conveyor plane p. The conveyor section **4** bridges a space between the entrance rollers **2** and the exit rollers **8,9**. As FIGS. **1** and **2** show, the conveyor section **4** consists of two endless, internally toothed belts **5** which are driven by a toothed pulley **6** whose speed is so controlled, with reference to that of the rollers **2**, that on the conveyor section **4** the envelope blanks **3** move at a lesser speed than along input path **1**. The toothed belts **5** mesh with complementary toothed pulleys **6** mounted on a shaft **10** which, in a manner not illustrated here, is driven in synchronism with the feed-in rollers **2**. The belts also pass around return rollers **7** which are secured to an idle shaft **11**. As FIGS. **1** and **2** show, each toothed belt is provided with two equidistantly spaced outwardly projecting wedge-shaped cams **12** with leading flanks **13** inclined to the conveyor surface and with trailing flanks **18** substantially perpendicular to that surface. As FIG. **2** shows, each toothed belt **5** carries two mutually parallel rows of cams **12** in order that one and the same belt **5** can handle envelopes **3** of differing widths. As shown in FIG. **3**, the toothed belts **5** are provided upstream of each cam **12** with openings **14** beneath which a fixed bar **15** extends along the transport path, this strip having an open-topped groove **19** communicating with the openings **14**. The grooved or channeled strip **15** is closed off at the sides and ends and has a connection **16** leading to a suction source so that the groove **19** is continuously under partial vacuum. Above the top run of each toothed belt **5**, a transfer roller **17** is located which is spaced from the top surface of that run by the height of the cams **12** and coacts therewith to supply the envelopes **3** to the exit rollers **8, 9**. It will be noted that channel **19** extends past the transfer roller **17**, so that the applied suction remains effective along part of the stretch separating that roller from the associated exit rollers **8,9**.

The mode of operation of the device in accordance with the invention is as follows.

The partly folded and glued envelope blanks **3** pass, as FIG. **2** shows, with their trailing open flaps, from the input path **1** onto the conveyor-belt section **4**, each envelope blank **3** comes up against the back of a cam **12**, and is aspirated onto the belts **5** through the openings **14** so as to be entrained by the belts. Because of the inclined wedge flanks **13**, sliding underneath the flap of the preceding envelope blank, the latter blank **3** already entering between the rollers **8, 9** is raised so that the new blank **3** carried on the belts **5** is passed beneath the bottom-most preceding envelope until the cam **12** reaches the return roller **7** and the openings **14** are deflected from the envelope **3**.

In the embodiment illustrated, the toothed belts **5** each have two cams **12**; they run at half the speed of the feed-in rollers **2** so that each envelope coming from the input path **1** comes to rest against a cam **12**.

I claim:

1. An apparatus for staggering blanks of sheet material, comprising:

an endless conveyor carrying at least one wedge on the outer surface thereof, said wedge having a leading flank inclined to said surface;

feeding means upstream of said conveyor for delivering a succession of blanks of sheet material to a substantially horizontal upper run of said conveyor in the wake of said wedge;

transport means downstream of said feeding means for removing said blanks from said conveyor at a speed less than that of said conveyor, thereby causing the rear end of each of said blanks to ride up the leading flank of said wedge to overlap the following blank, said transport means including a transfer roller in the path of said wedge at a distance from said upper run substantially equal to the height of said wedge for compressing the overlapping blanks therebetween; and

a stationary member extending along said upper run adjacent the inner surface of said conveyor beneath said upper run and having an upwardly open channel communicating with a vacuum source, said conveyor having at least one aperture upstream of said wedge effective to apply suction to an overlying blank upon registering with said channel, said channel extending past the location of said transfer roller.

2. An apparatus as defined in claim 1 wherein said wedge is duplicated with uniform spacing along said conveyor.

3. An apparatus as defined in claim 1 wherein said feeding means includes two counter-rotating entrance rollers located on opposite sides of a horizontal plane tangent to the transfer roller, said transport means comprising two counter-rotating exit rollers located on opposite sides of said plane.

4. An apparatus as defined in claim 3 wherein said wedge has a trailing flank substantially perpendicular to said surface, said entrance rollers being arranged to operate at a sufficiently high speed relative to that of said conveyor to thrust each oncoming blank into contact with said trailing flank.

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