Jan. 12, 1960 V. E. HEYWOOD 2,920,748

CONVEYING MEANS FOR ENVELOPE DRYERS AND THE LIKE

Filed Dec. 26, 1957 4 Sheets-Sheet 1

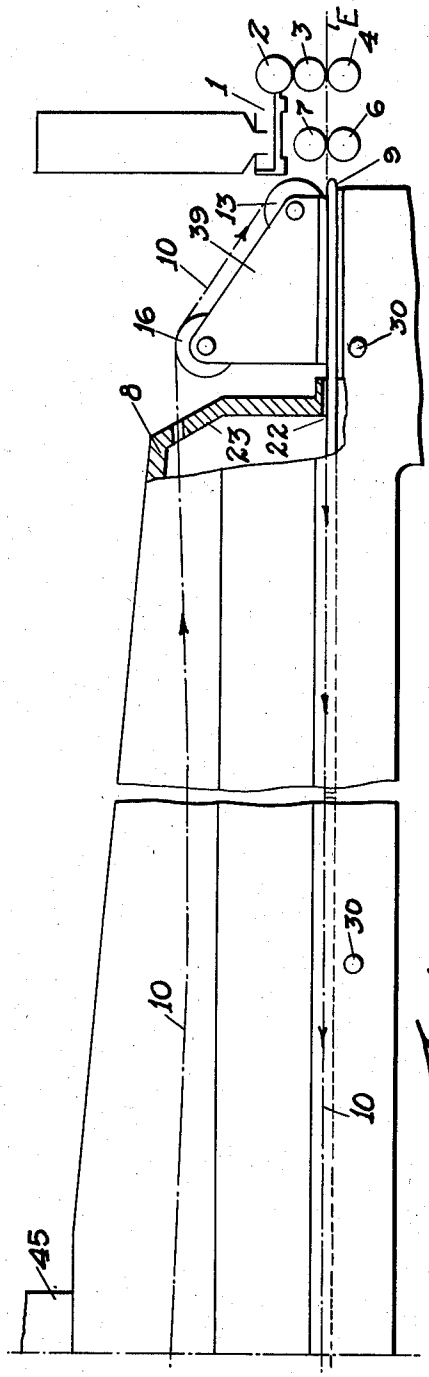


Fig. 1.

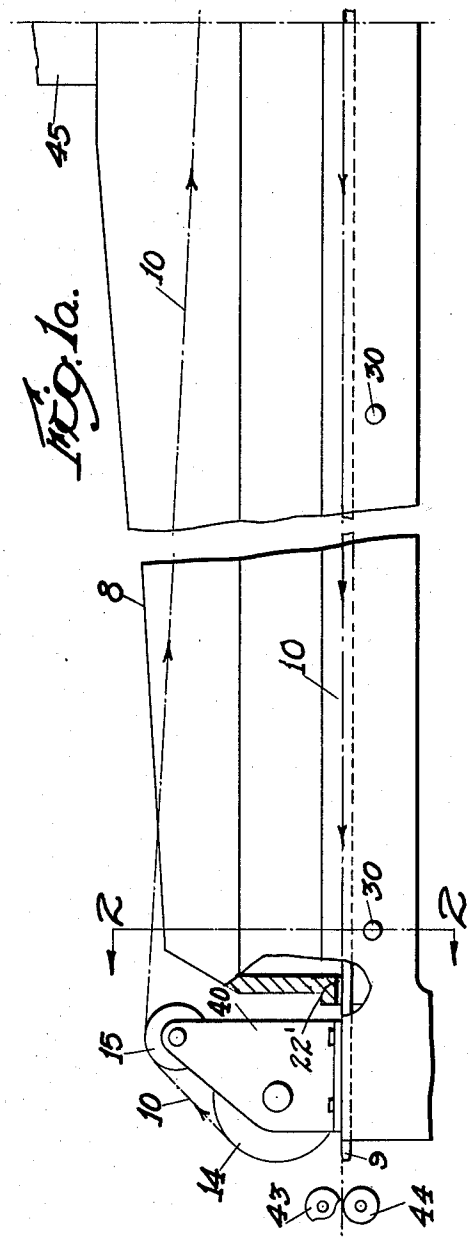


Fig. 1a.

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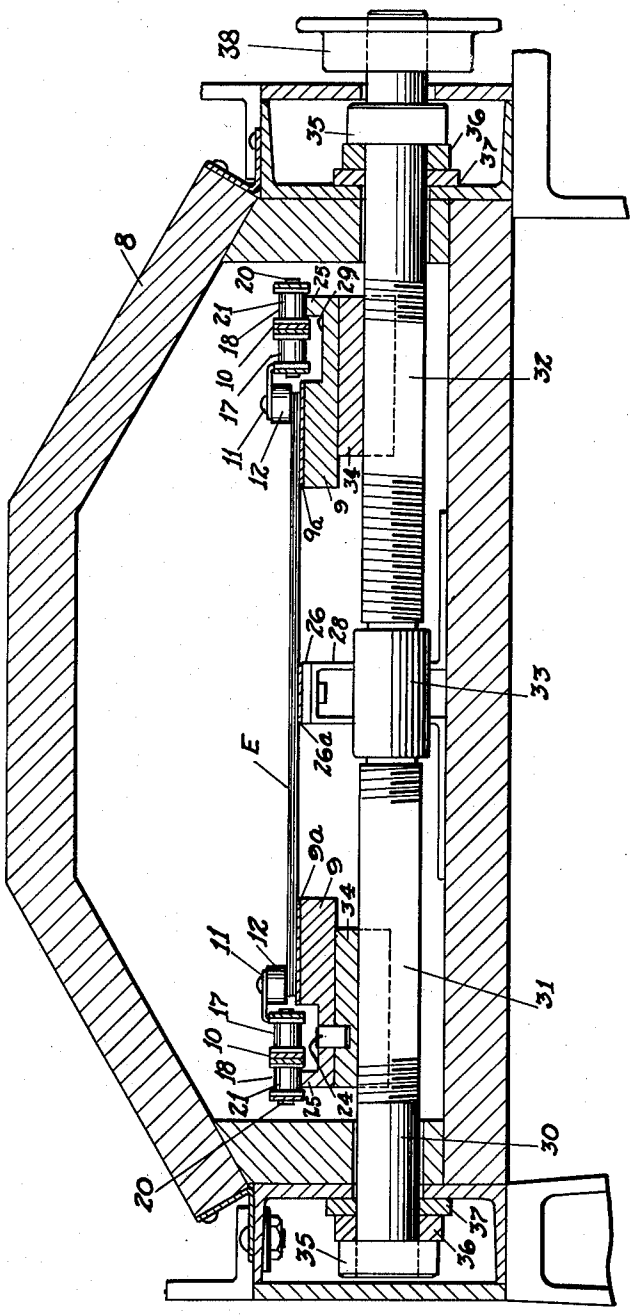


Fig. 2.

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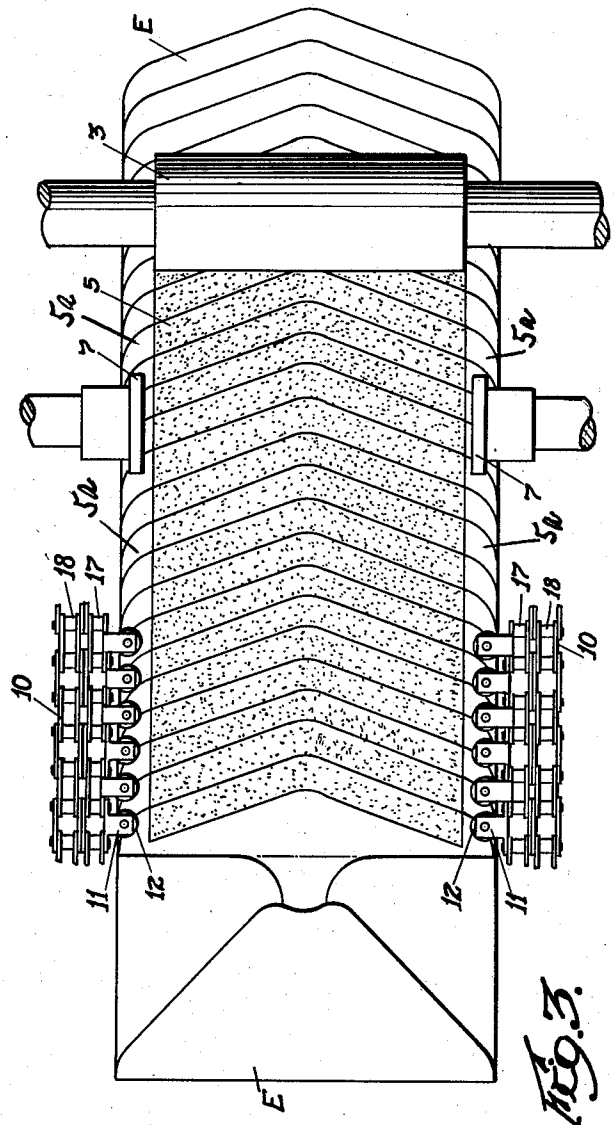
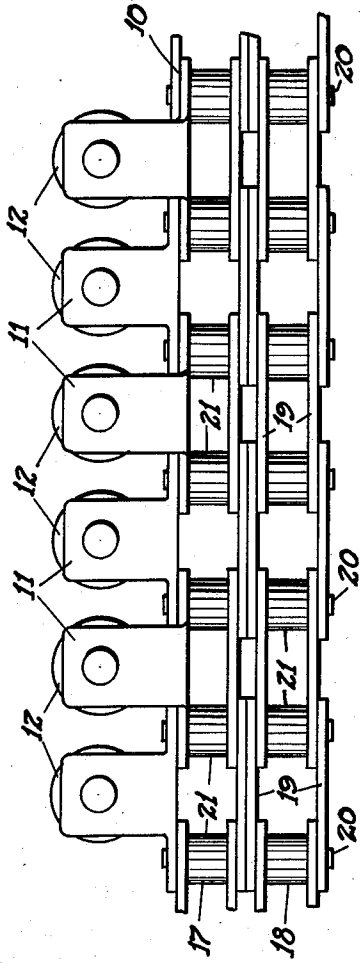


Fig. 3.

Fig. 4.



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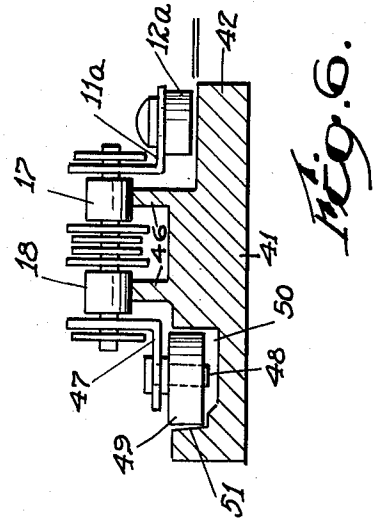


Fig. 6.

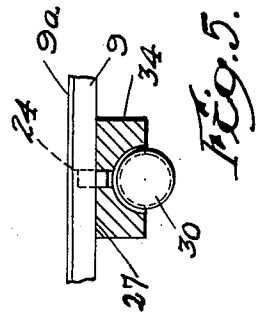


Fig. 5.

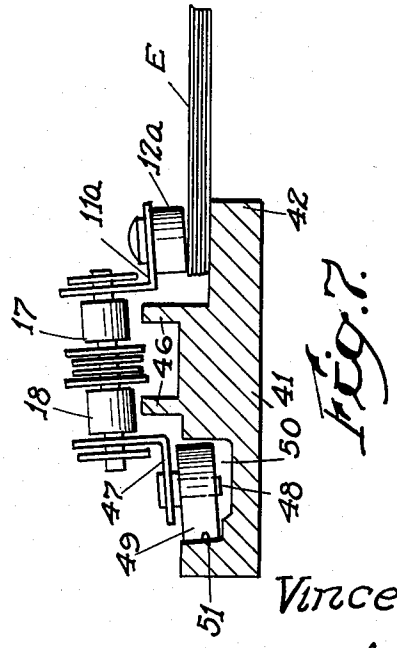


Fig. 7.

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2,920,748

CONVEYING MEANS FOR ENVELOPE DRYERS AND THE LIKE

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Application December 26, 1957, Serial No. 705,237

10 Claims. (Cl. 198—180)

This application is a continuation-in-part of my earlier copending application titled Conveying Means for Envelope Driers and the Like, Serial No. 446,455, filed July 29, 1954, which was allowed on July 11, 1957.

The invention relates to the flatwise conveyance through a drying tunnel or the like, of successive envelopes and/or envelope blanks, which, for seal flap gluing purposes, have been progressively collected into a slow moving closely overlapped or shingled assembly.

Such a closely shingled assembly, by reason of exposing only the marginal areas of the successive articles' trailing seal flaps, allows the seal flap gluing to be applied continuously or en masse, by the well-known coating or spreading process. It is highly advantageous, for economy of dryer length and space, to keep the articles, during their subsequent passage through a drying tunnel or the like, in substantially this same closely overlapped or shingled relation.

It has heretofore been the practice, for advancing such a shingled assembly of flat freshly-glued articles through a drying tunnel, to contact the assembly, top and bottom, by laterally spaced pairs of flexible traveling belts, substantially as disclosed by Winkler and Dunnebier Patent No. 2,132,227 of October 4, 1938.

If the freshly-glued articles, as in the aforesaid Winkler and Dunnebier patent, are flat unfolded envelope blanks, their shingled or overlapped relationship can usually be kept intact and undisturbed, when this conventional opposed belt arrangement is employed. This is because the blanks, being of single thickness and relatively flaccid, maintain with each other such large areas of contact, with virtual exclusion of air from these interface areas, as to effectively resist the tendency of any individual blank or blanks to shift, creep, or otherwise get out of parallelism with the other freshly-glued blanks of the advancing shingled blank assembly.

But these optimum conditions do not exist or prevail, when the shingled freshly-glued articles, instead of being flat unfolded blanks, are partly-folded blanks, as in Kennedy Patent No. 2,811,905 of November 5, 1957, or are virtually completed envelopes, as in Heywood Patent No. 2,851,934 of September 16, 1958. When the conventional opposed flexible belt arrangement is employed with shingled freshly-glued articles of this nature, many of them will creep out of parallelism with their fellows, entailing widespread and frequent fouling and wastage of the blanks and/or envelopes, as well as numerous interruptions of the manufacturing process. These difficulties stem, not only from the much greater stiffness imparted by these articles' folds, but also from the fact that their areas contacted by the opposed flexible belts consist of different numbers of thicknesses of the blank and/or envelope material.

The primary object of this invention is to overcome these difficulties, by providing for envelopes, envelope blanks and similar flat articles delivered in stepped or shingled relation, a conveying means that preserves said relation intact, and effectively resists all tendencies of

any individual article or articles to shift, creep or otherwise get out of parallelism with the other articles of the advancing shingled assembly.

Other and further objects and advantages of the invention will become apparent from the following detailed description thereof, taken in connection with the accompanying illustrative drawings, in which

Figs. 1 and 1*a* taken together provide a side view, partly in section, of an elongated drying tunnel for envelopes and the like, equipped with the conveying means of this invention.

Fig. 2 is a larger scale sectional view, substantially on the section line 2—2 of Fig. 1*a*.

Fig. 3 is a large scale plan view, with some parts omitted, of apparatus at the right-hand end of Fig. 1.

Fig. 4 is a fragmentary plan view, on a still larger scale than Fig. 3, of a short piece of one of the double roller conveyor chains used with this invention.

Fig. 5 is a fragmentary sectional view on the line 5—5 of Fig. 2, and

Figs. 6 and 7 are fragmentary sectional views, similar to Fig. 2, showing a modified form of the invention.

Referring first to Fig. 3, and to the right-hand end of Fig. 1, the reference character E designates a continuous succession of envelopes, as progressively collected for seal flap gluing in a closely overlapped or shingled assembly. Envelope assembly E moves at relatively slow speed, in the direction of arrow A, for the continuous or en masse gluing, by the well-known coating or spreading process, of the envelopes' trailing seal flaps. Conventional equipment for such gluing, as shown in Fig. 1, includes a glue supply tub 1 and a glue transfer roll 2, the latter supplying glue to an upper roll 3 which cooperates with a lower roll 4 to continue the slow speed advance of envelope assembly E. Roll 3 spreads glue in a band 5 of uniform width onto the exposed and adjacent marginal seal flap areas, the width of said band 5 being appreciably less than the seal flap length, such as to leave along both lateral edges of envelope assembly E, the narrow unglued areas that are designated in Fig. 3 by the reference characters 5*a*, 5*a*.

These unglued marginal areas 5*a*, 5*a* permit the advance of shingled assembly E to be continued, in conventional fashion, by a lower roll 6, and a cooperating pair of narrow upper rolls or discs 7, 7 contacting the unglued areas 5*a*, 5*a*, for the continuous slow speed delivery of the shingled freshly-glued envelopes to the apparatus of this invention. Said apparatus includes a drying tunnel, or like enclosure, designated generally in Figs. 1, 1*a* and 2 by the numeral 8. This invention is concerned with the progressive uniform advancement through the full length of said drying tunnel, of the continuous envelope assembly E, in such manner as to maintain intact, without displacement of any individual envelopes, the illustrated shingled or overlapped relationship. This permits the envelopes' freshly-glued seal flaps to be gradually dried, as by heated air introduced to the interior of tunnel 8, through any suitable inlet duct, as shown at 45, Figs. 1 and 1*a*.

As shown in Fig. 1, the shingled envelope assembly E passes into the tunnel through a narrow horizontal entrance slot 22 provided by the tunnel's end wall 23. The tunnel's opposite end wall provides a corresponding delivery slot 22' (Fig. 1*a*) through which the assembly E, with glued seal flaps fully dried, has continuous exit. For the assembly's horizontal support, before, during and after such drying, the invention provides (see Fig. 2) a central elongated skid 26, and a pair of laterally flanking elongated skids 9, 9, all with their upper surfaces in the same horizontal plane as the bite of the rolls 6, 7. These skids not only run for the drying tunnel's full length, but they project outwardly for a

considerable distance through said tunnel's entrance and exit openings **22** and **22'** respectively, as shown in Figs. 1 and 1*a*. The central skid **26** is suitably supported from the tunnel's floor by a series of spaced-apart brackets **28**, one of which is shown in Fig. 2. All three skids preferably have their upper material-supporting surfaces covered or coated with a layer of anti-friction material such as "Teflon," as indicated at **9***a*, **9***a* and **26***a*, in Fig. 2.

For the support of lateral skids **9**, **9** (and also for their sidewise adjustment to accommodate envelopes of different lengths) the drying tunnel is equipped with a plurality of transverse spaced apart shafts **30**, **30**, here shown as four in number. Each shaft **30**, as shown in Fig. 2, is suitably journalled in the tunnel's side walls, and at its opposite ends carries suitable washers **37**, nuts **36** and lock nuts **35**, by which to hold it from any endwise or axial displacement. Within the tunnel interior, each shaft **30** has oppositely threaded portions **31** and **32** respectively, which are separated by a central unthreaded portion **33**. Topside of each such threaded portion **31** or **32** is mounted a correspondingly threaded half-nut, as shown respectively at **34** and **34'** in Fig. 2. Each so-mounted half-nut, as shown in Fig. 5, presents a flat horizontal upper surface **27**, by which to provide one of a series of supporting surfaces, all at the same level, for each of the elongated lateral skids **9**, **9**. The latter, as shown in Fig. 2, are attached to each underlying half-nut by a suitable pin **24**.

Along one side of drying tunnel **8**, the projecting end of each of the shafts **30**, **30** carries a sprocket-wheel **38**. These several alined sprocket wheels are rotatable in unison in either direction by a common endless chain, not shown. By this arrangement, the two elongated lateral skids **9**, **9**, along whose outside edges move the unglued marginal areas **5***a*, **5***a* of the shingled envelope assembly E, can be made to move toward each other, or away from each other, as desired, in order to conform the width of assembly's elongated supporting surface to the length dimension of the envelopes that are being advanced in shingled relation, through the drying tunnel **8**.

For effectively procuring such advance, along the full length of the elongated supporting skids **9**, **9** and **26**, this invention employs, for cooperating with the material-supporting outside edge areas of the two lateral skids **9**, **9**, a pair of suitably equipped parallel double-width endless metal roller chains, as illustrated in Figs. 3 and 4. This cooperation is provided by the two chains' lower courses which extend over said edge areas for the tunnel's full length and which are of sufficient slackness for substantial portions of their weight to be sustained, as hereinafter described, by such material-supporting edge areas of the skids **9**, **9**. The two chains are driven in unison, each through the travel path indicated by the arrowed dot-and-dash lines **10**, **10** of Figs. 1 and 1*a*. This path requires the lower course of each chain to run alongside to and parallel with the envelope supporting surface of its associated skid **9** for substantially the latter's full length—with said lower course entering the tunnel **8** through slot **22** and leaving said tunnel by way of exit slot **22'**.

Each chain is given this path **10**, **10** by being trained, outside the tunnel's entrance end, about suitable driving and idler sprockets **13** and **16** respectively, and by being similarly trained, outside the tunnel's exit end, about suitable driving and idler sprockets **14** and **15** respectively. Sprockets **13** and **16** are carried by an upright or bracket **39** that is permanently attached to the portion of skid **9** that extends outwardly from entrance slot **22**. Similarly, the sprockets **14** and **15** are carried by an upright or bracket **40** that is permanently attached to other extreme end of skid **9**, beyond the tunnel's exit slot **22'**. Thus it is that whenever the two skids **9**, **9** are adjusted toward or away from each other, as above described, to change the width of the shingled assembly's material-supporting surface, each chain is bodily shifted sidewise in

unison with its associated skid **9**, so as to maintain in every case the positional relationship of each chain's skid-supported lower course to its associated skid's envelope supporting surface.

Both chains are preferably of the conventional double-roller construction shown by the lower half of Fig. 4, this giving each chain an inner section **17**, and an outer section **18**. Each section provides the usual links **19**, pins **20** and rollers **21**, the pins **20** being common to both sections **17** and **18**, so that the double width chain, as far as articulation is concerned, functions in the same fashion as a roller chain having a single row of rollers.

The always-maintained positional relation of each chain's lower course with the envelope supporting surface of its associated skid **9** is shown by Fig. 2. As therein shown, each skid **9**, outwardly of its envelope supporting surface, has an extension **29** of reduced thickness, that terminates in a narrow upright guide rail **25**, running the full length of said skid. Each rail **25**, slightly narrower than the chain rollers **21**, **21**, is surmounted and engaged, as shown, by the outer section **18** of the associated chain's lower course, thus to provide full length guidance for, and to partially support the weight of, said chain's lower course. The balance of the weight of each chain's lower course is received, as shown by Fig. 2, upon the unglued marginal areas **5***a*, **5***a* of envelope assembly E, that lie along the outer edge of each skid's support surface, said chain weight being transmitted to these unglued assembly areas by a multiplicity of closely adjacent resilient pads or cushions **12**, **12** (see Fig. 4), each secured to and depending from a suitable lateral bracket **11** extending inwardly from the inner section **17** of the chain, between the latter's articulations.

The effect of the thus-transmitted weight of each traveling chain's lower course is to strongly compress the unglued marginal edges of shingled envelope assembly E between the pads **12** and the underlying outer edge support areas of the associated skid **9**. In consequence of this compression, distributed evenly throughout the full length of each skid, there is no tendency or opportunity for any individual envelope or envelopes, during the chains' dragging of assembly E along the skids, to creep, slip, or otherwise move out of parallelism with its fellows. Such movement of assembly E, always in unison with the chains' lower courses, is certain to transpire. This is because the smooth flat unbroken skid surfaces offer much less frictional resistance to said assembly's under surface than the topside frictional resistance that exists between said assembly E and the spaced gravity-urged pads or cushions **12**, **12**. Beyond said tunnel each successive foremost envelope of assembly E is seized by suitable high speed rolls **43**, **44**, Fig. 1*a*, and so accelerated as to separate it from said assembly, preparatory to any desired further operations thereon.

Figs. 6 and 7 illustrate a somewhat different construction for the laterally adjustable skids, from that shown by the laterally adjustable skids **9**, **9** of Fig. 2. With the lateral skid **41** shown by Figs. 6 and 7, the elongated support for the unglued marginal areas **5***a*, **5***a*, of envelope assembly E is provided by an inwardly directed shelf **42**. Outwardly of said shelf, each skid **41** has a pair of narrow spaced-apart upright rails **46**, **46** which underlie the respective inner and outer sections **17** and **18** of the above-described double roller chain. Said chain's inner section **17** between its articulations, provides suitable laterally extending brackets **11***a*, **11***a*, each carrying, in overhanging relation to the skid's shelf **42**, a suitable pad or cushion **12***a* for transmitting a substantial portion of the traveling chain's weight to the assembly's unglued marginal areas **5***a*, **5***a*.

In this case, however, the double roller chain's outside section **18** is also equipped with a set of laterally extending brackets **47**, **47**. Each of these brackets **47** provides a downwardly extending pin **48** on which is journaled

a roller **49**. These rollers **49**, **49** of the traveling chain's lower course enter and move with ample clearance along and through an open relatively wide groove or recess **50** which runs the full length of skid **41**, outwardly of the latter's rails **46**, **46**. Said elongated groove or recess **50** thus serves for the lateral guidance of the roller chain's lower course, for the full length of skid **41**.

In the absence of envelope assembly E, as shown in Fig. 6, the support of said roller chain's lower course is by the two rails **46**, **46** of elongated skid **41**. These rails are of sufficient height, such that, under these conditions, the lower surfaces of pads or cushions **12***a*, **12***a* will just clear the supporting surface provided by the skid's shelf **42**. But when the envelope assembly E is present on the skids, as shown in Fig. 7, the chain's lower course tilts slightly into the position shown by Fig. 6. In that situation, wherein the two chains' lower courses are dragging envelope assembly E along the skids, the weight of both lower courses is taken off the rails **46**, **46**, and put, in large measure, upon the unglued marginal areas **5***a*, **5***a* of said envelope assembly, substantially as in the first described form of the invention. Under these conditions, rollers **49**, **49** continue to provide lateral guidance for each chain's lower course, by virtue of their rolling contact with the outer wall **51** of the skid's groove or recess **50**, said outer wall, to accommodate this slight tilting of each chain's lower course, being preferably given a slight outward slope from the bottom of recess **50**, as best shown in Fig. 7.

I claim:

1. Apparatus for conveying envelopes in stepped or shingled assembly through a drying tunnel or the like and for maintaining intact their stepped or shingled relationship, comprising an elongated horizontal smooth-surfaced support onto which the shingled envelope assembly is progressively delivered, a pair of spaced parallel endless metal chains, having relatively slack lower courses adjacent to and coextensive with opposite marginal areas of said envelope assembly that are underlain by said support, means for driving said chains in unison, and a plurality of devices projecting inwardly from each chain, which are carried by its lower course into topside frictional contact with said assembly's proximate marginal

area, to compress the latter by portions of said lower course's weight, and to advance said assembly by frictional forces in excess of the frictional resistance to assembly movement imposed by said smooth-surfaced support.

2. Conveying apparatus as claimed in claim 1, in which the support for said envelope assembly is a pair of spaced elongated skids, in underlying relation to the respective marginal areas of said assembly.

3. Conveying apparatus as claimed in claim 2, in which the skids are laterally adjustable, to conform their spacing to the length dimensions of the assembly's envelopes.

4. Conveying apparatus as claimed in claim 3, in which the chains are carried by and are laterally adjustable with the skids.

5. Conveying apparatus as claimed in claim 1, in which the devices projecting inwardly from each chain are a multiplicity of resilient pads or cushions.

6. Conveying apparatus as claimed in claim 1, in which each chain is a double roller chain, whose inner section carries the devices for compressing and frictionally engaging the envelope assembly's proximate marginal area.

7. Conveying apparatus as claimed in claim 6, in which each double roller chain's outer section, along the chain's lower course, is guided and supported by an underlying elongated rail.

8. Conveying apparatus as claimed in claim 7, in which each chain's lower course has pivotal movement on said rail in accommodating itself to changes in the thickness of said shingled envelope assembly.

9. Conveying apparatus as claimed in claim 2, in which additional support for said shingled envelope assembly is provided by a central elongated skid midway of said spaced skids.

10. Conveying apparatus as claimed in claim 9, in which the skids' material-supporting upper surfaces are coated or covered with an anti-friction material.

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