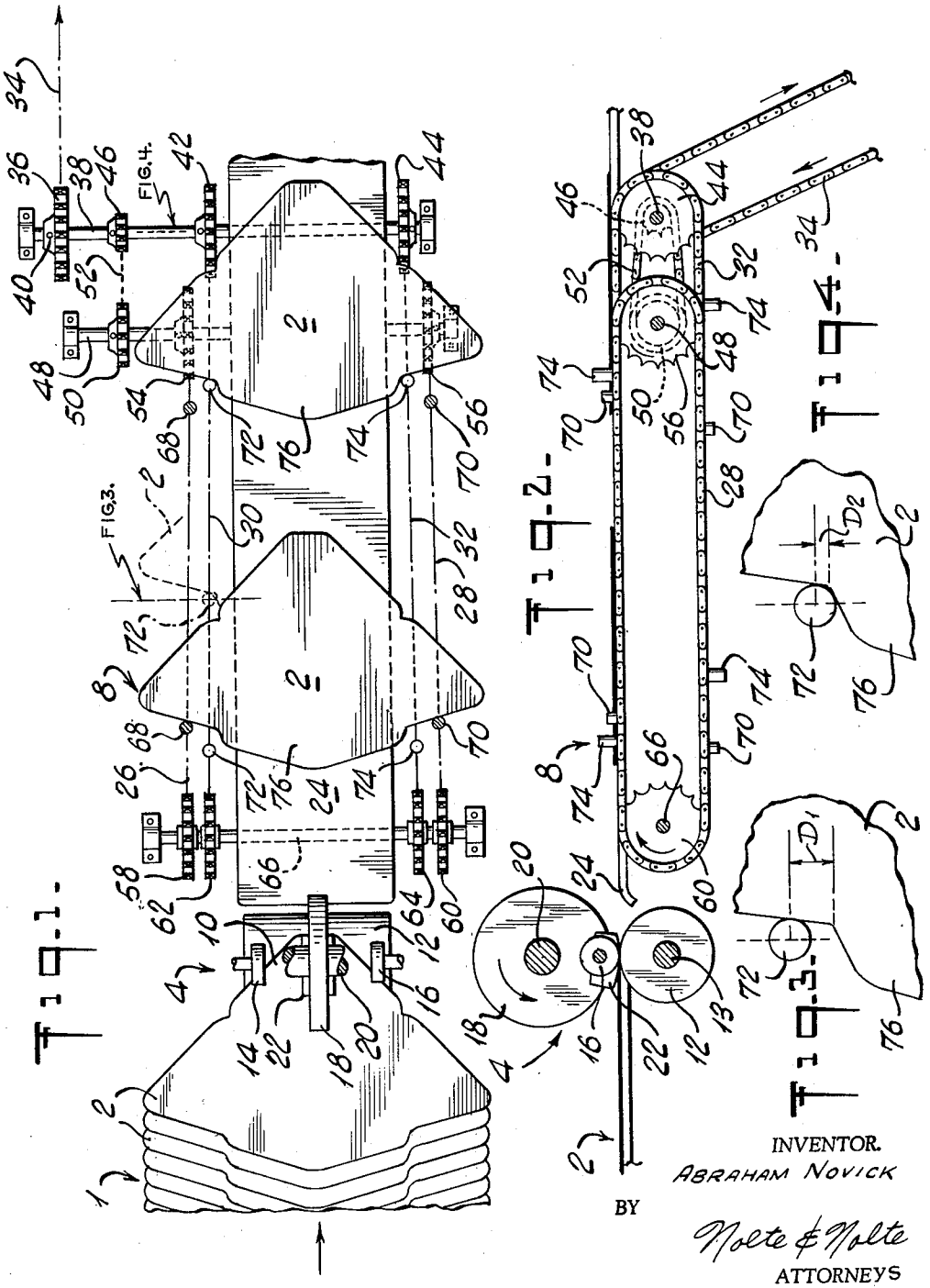
Oct. 20, 1964 A. NOVICK 3,153,533

ENVELOPE MACHINE

Filed Feb. 19, 1963 2 Sheets-Sheet 1

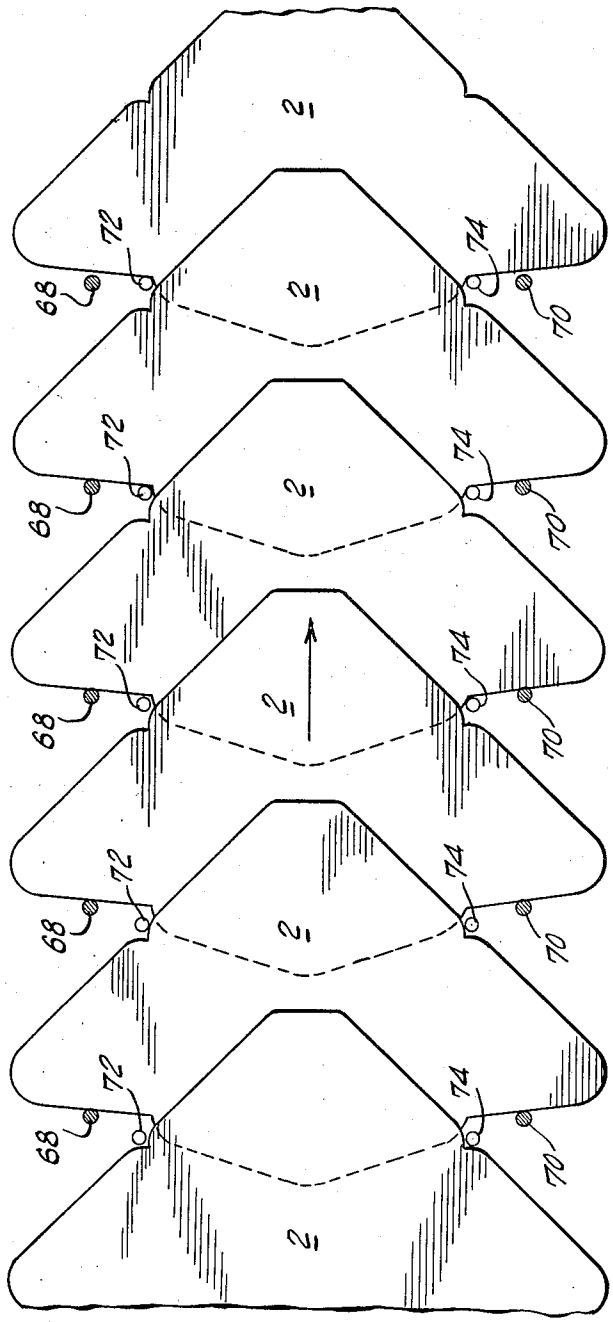


Oct. 20, 1964 A. NOVICK 3,153,533

ENVELOPE MACHINE

Filed Feb. 19, 1963 2 Sheets-Sheet 2

FIG. 5.




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1

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# ENVELOPE MACHINE

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2 Claims. (Cl. 271—2)

This invention relates to envelope making machinery, and more particularly to improvements in pin feed conveyors used in machinery of the above type.

The rapid feeding of a multiplicity of fanned out envelope blanks and the withdrawal thereof was accomplished heretofore by a separating apparatus such as shown and described in Patent No. 3,012,774, having an assignee and inventor in common with the present invention. In the above referred to apparatus, the foremost one of a group of notched lapped envelope blanks is separated from the group and accelerated in linear speed into a reduced overlap, aligned relationship for subsequent operations. The alignment and timing at the accelerated rate of speed is accomplished by means of a double conveyor chain having pairs of pins projecting therefrom for pushing the envelope blank by its trailing flap. The pins of the two conveyor chains contact the envelope blank closely adjacent the area of the fold notches in the trailing edge of the blanks and converge towards the notches to accomplish the simultaneous transport and alignment of the blanks. The words "reduced overlap" as used in the specification and the claims are intended to encompass the range from a partial overlapping of the blanks to their being spaced apart. The term "reduced" indicates that the degree of overlap of the separated blanks in any case is less than the degree of overlap of the group of blanks before separation.

With increased production rates and a corresponding speed increase of the envelope making machinery, it was found that the increased aligning pin impact against the envelope blank tended to damage the trailing edge in the notch area. The prior art discloses envelope machines designed to alleviate the damage. In particular, such an apparatus is shown and described in Patent No. 2,101,268, issued December 7, 1937, and having an assignee and inventor in common with the present invention. The present invention is an improvement over the prior art, as best represented by Patents 2,101,268 and 3,012,774.

It is an object of the present invention to provide an improved envelope blank aligning and transporting apparatus for envelope-making machinery, suitable for high-speed operation without damaging the envelope blanks.

Another object of the invention is to provide a two-stage alignment and acceleration of the envelope blanks to the desired high rate of speed required thereof when traveling through the envelope making machine in a reduced overlap relation.

Another object of the invention is to provide improved means of the character described wherein impact damage to the blank, if at all, occurs in a non-critical area of the blank substantially outboard of the trailing edge notch area.

Accordingly, an envelope blank separated from a stack of envelope blanks, or a group of fanned-out envelope blanks is positioned in the path of a plurality of differential speed timing pins which sequentially engage the trailing edge of the blanks. A first set of outer timing pins engage

2

the outer portion of the trailing edge of the envelope blanks and move it forward at a given initial rate. Subsequently a second set, or inner timing pins, moving at a speed faster than the first set of timing pins, takes over and completes the alignment of the blanks while bringing its speed to the desired rate.

In the apparatus of the invention, the speed rate differential between the first set of timing pins and the second set of timing pins is adjusted by means of the cooperation of suitable drive transmission mechanisms and the relative placement of the various timing pins on their respective conveyors.

The various features and advantages of the present invention are to be described in greater detail in the following specification, with reference to the appended drawing, wherein:

FIG. 1 is a fragmentary top plan view of the improved apparatus according to the invention; showing the envelope blanks spaced apart during the alignment thereof;

FIG. 2 is a fragmentary side elevational view, partly in section, of the apparatus shown in FIG. 1;

FIG. 3 is an enlarged schematic representation of the position of an inner timing pin during initial contact with the envelope blank as indicated in FIG. 1;

FIG. 4 is a schematic representation similar to the one shown in FIG. 3, at a later stage of the alignment and acceleration process as indicated in FIG. 1; and

FIG. 5 is a fragmentary plan view of a plurality of envelope blanks in a partial overlap during the alignment thereof.

As shown in the figures, a group 1 of fanned-out envelope blanks 2 is positioned by a mechanism (not shown) from the direction indicated by the arrow on the left hand side of FIG. 1, where a blank separating apparatus 4 is adapted to separate the topmost blank 2 from the group 1 and forward it to the aligning apparatus 8, to be discussed in greater detail below.

The blank separating apparatus 4 can be of any desired type. A simplified, preferred embodiment is shown in the present application, however, for example, alternate separating means are shown in the aforementioned patent. In the present, preferred embodiment, the forward edge 10 of the topmost blank 2 is partially resting on a backing roller 12, mounted on a shaft 13, and the blank 2 is maintained against the backing roller by holding rollers 14 and 16.

A segment roller 18 is firmly mounted on a shaft 20 and rotated thereby. At a point, adjacent the perimeter of the segment roller 18 a pull-out segment 22 is attached to the roller.

As the segment roller 18 rotates in the direction of the arrow in FIG. 2, at every turn thereof the pull-out segment 22 contacts the forward edge 10 of the foremost blank 2, presses it against the backing roller 12 and moves the blank in the right hand direction in FIGS. 1 and 2 onto the aligning apparatus 8.

Since the group 1 of envelopes is delivered to the separating apparatus 4 in an overlapped relationship, and the aligning apparatus 8 transports these envelopes in a non-lapped relationship, the linear speed of the envelopes on the aligning apparatus is considerably greater than the linear speed thereof while still in the lapped relation.

The aligning apparatus 8 is built around a central supporting plate 24 on which an envelope blank 2 comes

to a short, temporary rest after having been separated from the group 1 by the blank separating apparatus 4 as previously described. Beside each side of the elongated central supporting plate 24 an aligning and transporting chain system is mounted. The aligning chain mounting system consists of a pair of outer aligning chains 26 and 28 and a pair of inner aligning chains 30 and 32. The inner aligning chains 30 and 32 are driven from a motor (not shown) by a drive chain 34 (FIG. 2) engaging a drive sprocket 36 (FIG. 1) fastened to a drive shaft 38 by any convenient means, such as a set screw 40. Similarly attached to the drive shaft 38 are inner aligning chain drive sprockets 42, and 44. Also attached to the drive shaft 38 is a transmission sprocket 46. Mounted adjacent the drive shaft 38 is a drive shaft 48 for the outer aligning chains 26 and 28. Affixed to the shaft 48 is a sprocket 50, which is larger than and connected to the transmission sprocket 46 by a transmission chain 52. The sprocket 50 contains a larger number of teeth than the transmission sprocket 46, so that the rotation of the shaft 48 is proportionately slower than the rotation of the drive shaft 38. Also mounted on the shaft 48 are drive sprockets 54 and 56 for the outer aligning chains 26 and 28.

The outer aligning chains 26 and 28, and the inner aligning chains 30 and 32 are endless chains supported on their other ends respectively by idler sprockets 58, 60, 62 and 64, floatingly mounted for rotation on an idler shift 66.

Outer aligning pins 68 and 70 are attached to the outer aligning chains 26 and 28 in a parallel spaced relationship. Similarly, inner aligning pins 72 and 74 are mounted onto the inner aligning chains 30 and 32. As can be readily seen, the outer aligning chains 26 and 28 move at a somewhat slower rate than the inner aligning chains 30 and 32, as determined by the size difference between the transmission sprocket 46 and the sprocket 50.

To assure that at all times an envelope blank is positioned into the aligning apparatus and that the first contact is by the outer aligning pins 68 and 70 and only subsequently contacted and accelerated by the inner aligning pins 72 and 74, the outer aligning pins 68 and 70 are spaced closer to each other on their conveyor chains 26 and 28 than the inner aligning pins 72 and 74 on their respective faster moving conveyor chains 30 and 32. By this provision it can be accomplished that the outer aligning pins 68 and 70 of the slower moving conveyor chains 26 and 28 will first contact the envelope blank to be accelerated and aligned.

It can also be seen by reference to FIG. 1, that the chains 26 and 30 on one side of the plate converge as they move in the right hand direction towards the chains 28 and 32 on the other side of the plate 24 (i.e., the respective distances between the respective idler sprockets 58–64 are greater than the respective distances of the drive sprockets 42, 44 and 54, 56). This means that the aligning pins 67, 70, 72, 74 are constantly converging in their move in the right hand direction towards the central plate 24. The degree of converging can be adjusted either by shifting the driving sprockets 42, 44 and 54, 56 on the respective shafts 38 and 48, or by shifting the floating idler sprockets 58–64 sideways on their shaft 66.

As an envelope blank 2 is ejected onto the central supporting plate 24 by the blank separating apparatus 4, it is not easy to assure that the blank 2 will land in a perfectly aligned position. It may deviate from the ideal aligned position in two aspects, by being laterally displaced, i.e., the centerline of the blank is parallel spaced from the centerline of the plate 24 or by being angularly misaligned, i.e., the centerline of the blank intersects the centerline of the plate 24.

The outer aligning pins 68 and 70 first contacting an envelope blank 2 ejected onto the center supporting plate 24 have the primary purpose of providing an initial acceleration for the stationary or slightly moving envelope blank 2. This is accomplished without any damage to



the trailing edge of the envelope blank due to the impact of the pins 68 and 70 upon the trailing edge of the envelope blank 2, since they contact the blank with such a small impact so as to avoid damage thereto. The pins 68 and 70 contact the blank 2 only for a relatively short period, during which the initial acceleration is accomplished. During this period a certain degree of pre-alignment of the blank 2 may be accomplished. As the faster moving inner aligning pins 72 and 74 take over, their impact upon the accelerated envelope blank will not result in any damage due to the blank having been already initially accelerated by pins 68 and 70. At this take over point the envelope starts to move at a faster rate, whereby the convergence of the pins 72 and 74 towards the centerline of the central supporting plate 24 completes the alignment of the blank both from its angular and lateral displacement.

By the time the pins 72 and 74 have reached the line of the shaft 38, the pins 72 and 74 have converged into a corner formed at the point where the sealing edge 76 of the blank 2 joins the rest of the trailing edge of the blank. The converging lateral travel of the aligning pins can be seen in FIGS. 3 and 4, FIG. 3 showing the distance $D_1$ between the impact point of the pin 72 and the corner at the sealing flap 76, and in FIG. 4 the distance $D_2$ is shown to have diminished at the point of the travel of the blank where the aligning pins 72 and 74 separate from it and the chains turn down for their return trip, the distance $D_2$ being substantially equal to the radius of the aligning pins, thereby indicating that the aligning pins converged laterally into the corner of the sealing flap. This way, the alignment is accomplished by means of the converging pins in a known manner, and the centerline of the blank 2 will substantially parallel the centerline of the central supporting plate 24.

By the time the blank 2 is completely aligned and the aligning pins 72 and 74 separate therefrom in line with the shaft 38, the forwarding of the aligned blank is continued by means (not shown) adapted to grab the moving aligned blank by its leading edge.

From the point of view of the present invention it is immaterial whether the group of envelope blanks from which the blanks are to be individualized and aligned is fanned out, as in the present embodiment, or in a completely overlapped stack, moving or stationary; any change in the above conditions from the one shown in the preferred embodiment, described in the preceding, would require merely the use of a blank separating apparatus other than the apparatus 4, described above. By comparison of FIGS. 1 and 5 it will become apparent that the envelope blanks may be partially overlapped as shown in FIG. 5, during the steps of conveying and alignment or may be spaced apart, as shown in FIG. 1.

It is to be understood that while only a specific envelope blank shape is shown in the drawing, the apparatus described can be used in conjunction with any other desired envelope shape. Similarly, the speed of the envelope blank separating apparatus 4, the outer chains 26 and 28, the inner aligning chains 30 and 32 and the respective relative spacing of the timing pins 68–74 can be varied to any desired degree to obtain optimum operation. Similarly, the degree of convergence of the various aligning chains 26–32 and the speed differential between these chains can be varied according to the desire without departing from the spirit of the present invention.

It is also to be understood that the invention was described by a specific embodiment thereof, and, therefore, its scope is to be interpreted from the appended claims.

What I claim is:

1. In an envelope-making machine, the combination including a timing and aligning mechanism, envelope blank separating means for accelerating the leading envelope blank from a moving line of envelope blanks and depositing it upon said timing and aligning mechanism, said envelope blank having fold notches in its trailing edge,

said timing and aligning mechanism including; an elongated supporting plate, an outer pair of endless chains and pins carried by the chains and engageable with the trailing edge of the blank to continue its forward movement, said pins engaging said blank at points other than said fold notches, an inner, converging pair of endless chains driven at a higher speed than said outer pair of chains and pins on the inner chains for overtaking the blank, engaging the trailing edge thereof and taking over control of the blank from the outer pair of chains and pins, said inner pair of chains being substantially equal in length to each of said outer pair of chains, said inner pair of chains being aligned to allow the pins thereon to



move inwardly along the trailing edge of the envelope blank to finally come to rest against said fold notches.

2. An envelope-making machine as in claim 1, wherein said outer pair of chains converge and said envelope-blank separating means deposits the envelope blank on said supporting plate in partial overlapping relationship.

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