July 20, 1965 A. S. HUBIN 3,195,286

METHOD AND APPARATUS FOR SEALING CONTINUOUSLY MOVING SHEET MATERIAL

Filed Aug. 20, 1962 2 Sheets-Sheet 1

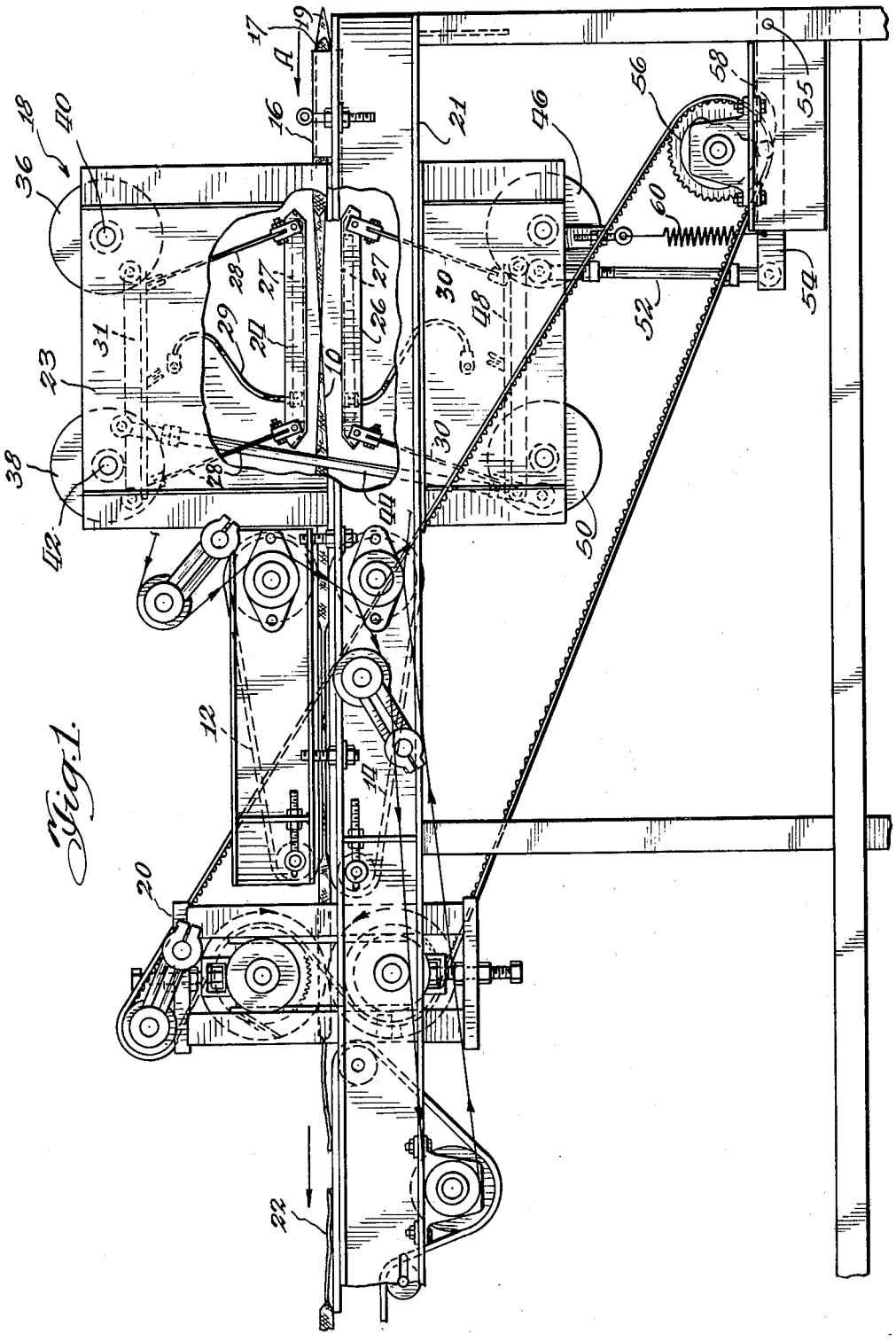


Fig. 1.

July 20, 1965 A. S. HUBIN 3,195,286

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Filed Aug. 20, 1962 2 Sheets-Sheet 2

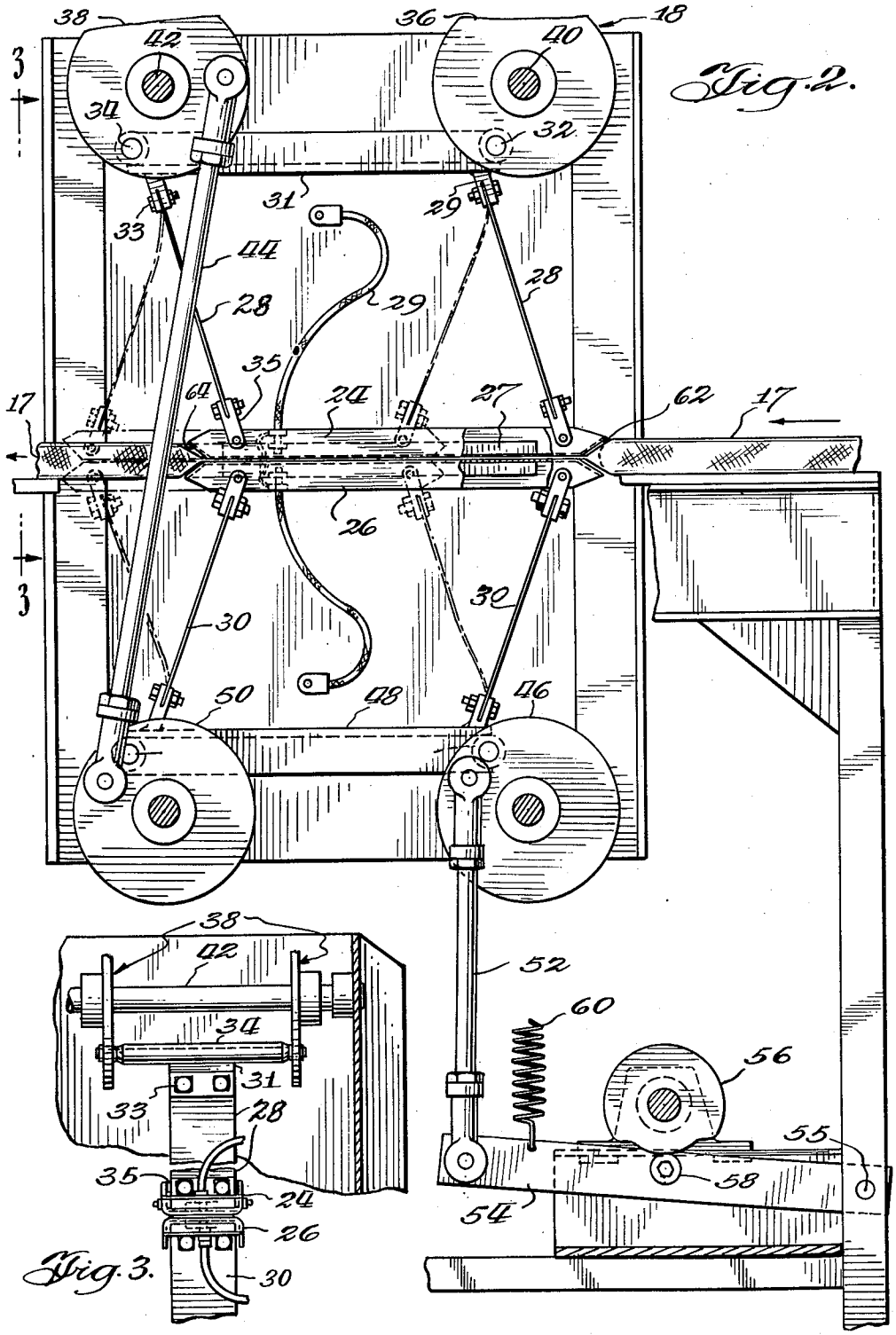


Fig. 2.

Fig. 3.

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METHOD AND APPARATUS FOR SEALING CONTINUOUSLY MOVING SHEET MATERIAL

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6 Claims. (Cl. 53—39)

This invention relates to improved methods and associated apparatus for sealing fabric-like material, with particular reference to sanitary napkin tab ends.

An important object of the invention resides in the provision of an improved apparatus for the periodic heat sealing of wrapper portions of a continuously moving elongate pad and wrapper assembly during the fabrication thereof on apparatus of the continuously operative type.

Another object is to provide improved apparatus for the periodic sealing of tab ends of sanitary napkins, as formed on continuously operative production apparatus, which require sufficient bonding to fix the configuration thereof while in the form of a continuously moving pad and wrapper assembly prior to the severance of the pad bridging wrapper portions to form individual sanitary napkins.

Another object is to provide an improved and simplified wrapper sealing device adapted to be constructed at minimum cost while insuring maximum dependability of operation.

Other objects and advantages will become apparent to persons skilled in the art, as will various adaptations and modifications of the concepts as defined in the appended claims.

In the drawings, in which like parts are identified by the same reference numerals,

FIG. 1 shows in side elevation a portion of sanitary napkin production apparatus incorporating the invention.

FIG. 2 shows in side elevation a portion of the apparatus of FIG. 1.

FIG. 3 is a fragmentary end elevation taken along line 3—3 of FIG. 2.

The invention has broad utility in respect to the mass production of such light weight articles as bandages and sanitary napkins which during fabrication thereof are enclosed in light weight wrapper material which bridges spaced pads forming a continuously moving assembly which is thereafter severed into individual units. The invention is particularly adapted for use with tab end forming equipment described and illustrated in applicant's concurrently filed co-pending application, Serial No. 217,923 filed August 20, 1962. A sealing unit involving the concepts herein taught may be placed immediately adjacent a unit which converts pad bridging portions of wrapper into a desired tab end configuration.

As shown in FIG. 1, an assembly 10 of wrapper enclosed pads with pad bridging wrapper portions assuming a generally X-configuration in plan, or some other desired configuration, is fed in the direction of arrow "A" into a sealing unit generically designated 18. The preformed elongate assembly 10 comprising spaced pads 17 and an elongate enclosing wrapper 19 continuously moves downstream (to the left as shown). Assembly 10 is maintained taut by continuously applied forward pull imparted by a pair of conveyor belts 12, 14 positioned downsteam of sealing unit 18 frictionally to engage and continuously to draw the pad assembly. To insure that the pad assembly is fed to the sealing unit with pads 17 horizontally disposed, a channel-like inlet device 16 is positioned adjacent the sealing unit. Unit 18 finds its support on a suitable framework 21 which also provides support for associated components.

Device 18 includes a pair of heat sealing shoes 24, 26 synchronously operative in respect to the downstream movement of the pad and wrapper assembly between the spaced apart position shown in FIG. 1 and a closed or wrapper engaging position shown in FIG. 2.

Heated shoes 24, 26 effect inter-pad wrapper sealing upon movement from the open position of FIG. 1 to the closed position, FIG. 2. Following closure, shoes 24, 26 are drawn downstream through a limited path by the engaged pad and wrapper assembly. The extent of downstream shoe movement is illustrated in FIG. 2 by the dotted line position which may be three or four inches downstream of the initial heavy line position shown therein. Shoes 24, 26 are dimensioned substantially to bridge the inter-pad spacing with the ends thereof engaging the pad ends. Upon completion of the movement from the heavy to the dotted line position of FIG. 2 the shoes are rapidly withdrawn, by mechanism later described, to the open upstream position of FIG. 1 in readiness for the subsequent cycle of operation. While the broad employment of sealing shoes operative from an open to a closed position and adapted for engagment with moving articles to be sealed is known, the present invention is directed to the employment of concepts permitting a very simplified construction with attendant low costs.

As illustated in FIGS. 1 and 2, the various components of the sealing unit are supported by a generally rectangular framework 23 fixed to the machine frame 21 with similar half portions thereof extending above and below the path of article travel. Sealing shoes 24, 26 are resiliently mounted by means of pairs of flexible flat springs 28, 30. Each pair of shoes 24, 26 is actuated through associated paired mounting springs 28, 30 by a cam actuated control mechanism which includes two upper pairs of axially spaced crank discs 36, 38 and two pairs of lower axially spaced crank discs 46, 50. Each pair of crank discs is suitably journaled on shafts as shown at 40, 42, and upper paired discs 36, 38 are driven for simultaneous rotation in a direction opposite to the lower paired discs 46, 50.

To effect synchonism between disc rotation and movement of articles through the unit, a cam 56, and conveyor belt units 12, 14 which control the rate at which the pad and wrapper assembly is drawn in a downstream direction are driven from a common power source. A driving arm 54, pivoted at 55, carries a cam follower 58 maintained biased against cam 56 by tension spring 60 for the transmission of oscillatory movement through connecting rod 52 to one of the paired discs 46. Link 48 interlocks discs 46, 50 for synchronized power transmission therebetween through the relatively small arc of rotation required for the proper actuation of paired shoes 24, 26 through the associated paired springs 28, 30. The lower paired discs 46, 50 connected by rod 44 to one of the upper paired discs 38, provide for the synchonized driving of the two upper paired discs 38, 36 which are interconnected by a link 31. Thus it will be seen that rotation of cam 56 results in the synchronized rotation of the two lower sets of paired discs, for example, in a clockwise direction, and in the simultaneous synchronized counterclockwise rotation of the upper disc pairs 38, 36.

Upper and lower pairs of crank discs thus provide synchronized control of upper and lower shoes 24, 26, respectively, through the flexible leaf springs. The crank discs of each pair, such as pair 38 shown in FIG. 3, are interconnected by an eccentrically positioned rod 34 extending parallel to the axis of shaft 42. Rod 34 and a like rod 32, FIG. 2, are interconnected by bar 31, thus connecting crank discs 36, 38 for rotation as previously described. Link 31 has mounted thereto by a suitable

bracket, as shown at 33, a flexible leaf spring 28, the lower end of which is attached by a bracket 35 to one end of shoe 24. In a like manner lower pairs of crank discs 46, 50 are interconnected by similar rods and brackets associated with the lower pair of mounting springs 30 for the flexible positioning of lower sealing shoe 26. The two upper leaf springs 28 are thus supported and actuated by crank discs 33, 36, whereas the two lower leaf springs 30 are supported and actuated by lower pairs of crank discs 50, 46. The crank disc connecting rods are positioned radially of the crank disc axes sufficiently to insure synchronized movement of shoes 24, 26 between the open position shown in FIG. 1 and the closed position shown in FIG. 2.

FIG. 1 illustrates shoes 24, 26 in a fully opened position just prior to being closed by cam 56, it being noted that spaced pads 17 are in a position to place the bridging wrapper portion in substantial registry with the areas of shoe engagement therewith. The action of cam 56 is quite rapid and as follower 58 rides upwardly onto the minor cylindrical cam surface the above described crank disc movement effects rapid shoe closure. As shown in FIG. 2, opposite ends of each shoe are beveled and upon shoe closure define V-shaped channels 62, 64 which insure snug engagement with corresponding ends of the pads 17. The bridging portion of the wrapper is thus securely clamped between the shoes 24, 26 which are maintained suitably heated by elements partially shown at 27 and connected through lead line fixtures 29 to a suitable source of electricity. Positive closure of shoes 24, 26 effects locking engagement with the pad and wrapper assembly, hence continued travel of the assembly in the downstream arrow direction results in a corresponding movement of the shoe assembly through a sufficient linear path to insure proper bonding of the wrapper. The time of travel need not be great and may, for example, involve a three inch path of travel at the end of which the shoes open and return by "snap back" to the FIG. 1 position.

The actuating mechanism maintains shoes 24, 26 in a closed position as the shoes are pulled downstream by the pad and wrapper assembly, during which movement paired mounting springs 28, 30 undergo substantial deflection, as shown in the dotted line position, FIG. 2. When in the downstream position, the shoes are subjected to maximum spring urge toward the full line position. As the closed shoes move downstream to the dotted line position of FIG. 2, cam follower 58 concurrently rides to the outermost cam portion with resultant rapid retraction of the shoe supporting springs to an open shoe position. Resultant shoe disengagement from the pad assembly permits the tensioned shoe supporting springs to snap back from the dotted line position of FIG. 2 to the full line position of FIG. 1, with corresponding repositioning of shoes 24, 26 in readiness for a subsequent cycle.

It will thus be appreciated that the invention provides an extremely simple and inexpensive apparatus for sealing pad bridging wrapper portions of a moving pad and wrapper assembly. In addition to low initial cost, the apparatus is relatively free from maintenance costs due to its simplicity. Apparatus employing the invention has proved particularly effective for use immediately downstream of applicant's sanitary napkin tab end forming equipment as described and claimed in co-pending application, Serial No. 217,923, filed August 20, 1962. The invention permits replacement of the relatively complex mechanisms heretofore constructed within close machine tolerances to effect satisfactory sealing of continuously moving materials by a comparatively simple but highly dependable mechanism, due largely to applicant's utilization of the inherent benefits of leaf springs as described above. In addition, variations in the speed at which the pad and wrapper assembly moves do not affect the operation of the sealing shoes, since their flexible spring mountings allow them to adjust to any variations in speed.

In the claims:

1. In a device for sealing continuously moving sheet material, means for conveying said material through a certain path, a pair of sealing members spaced on opposite sides of said path, and means for mounting said sealing members and synchronized with said conveying means for moving said members in a direction substantially at right angles to said path toward and into contact with the sheet material, said mounting means including spring means arranged to yield in such manner as to allow said sealing members to move in the direction of said path so that the sheet material pulls the sealing members along the path against the action of the spring means while the sealing members remain in contact with the sheet material.

2. In a device for sealing continuously moving sheet material of a type which may be sealed by the application of heat, means for conveying the sheet material at a constant speed through a linear path, a pair of sealing members spaced on opposite sides of said path, means for heating said sealing members, and means for mounting said sealing members and synchronized with said conveying means for moving said members in a direction substantially at right angles to said path toward and into contact with the sheet material, said mounting means including spring means arranged to yield in such manner as to allow said sealing members to move in the direction of said path so that the sheet material pulls the sealing members along the path against the action of the spring means while the sealing members remain in contact with the sheet material to seal the latter.

3. In a device for sealing continuously moving sheet material, means for conveying the material through a linear path, a pair of sealing members spaced on opposite sides of said path, means for mounting said sealing members and arranged to move the sealing members substantially at right angles to said path toward and into contact with the sheet material, said mounting means including spring means arranged to yield in such manner as to allow said sealing members to move in the direction of said path so that the sheet material pulls the sealing members along the path against the action of the spring means while the sealing members remain in contact with the sheet material, and means for synchronizing the movement of said mounting means along with said material conveying means so that the sealing members are withdrawn from the sheet material after moving with the sheet material for a predetermined distance along said path.

4. In a device for sealing continuously moving sheet material, means for conveying the material at a constant speed through a linear path, a pair of elongated sealing members spaced on opposite sides of said path, means for mounting said sealing members and including a leaf spring connected at one end of the spring to each end of each of the sealing members and extending approximately transversely of said path and including also movable supports for the other ends of said leaf springs, and means for moving said supports in a direction approximately at right angles to said path so as to move the sealing members through said leaf springs substantially at right angles to said path toward and into contact with the sheet material, said leaf springs being so arranged to yield in such manner as to allow said sealing members to move in the direction of said path so that the sheet material pulls the sealing members along the path against the flexing action of the leaf springs while the sealing members in contact with the sheet material.

5. In a device for sealing continuously moving sheet material, means for conveying the sheet material at a constant speed through a linear path, a pair of elongated sealing members spaced on opposite sides of said path,

means for mounting said sealing members and including a leaf spring connected at one end of the spring to each end of said sealing members and an eccentric connected to the other end of each of said leaf springs, said eccentrics and leaf springs being so arranged that the elongated sealing members are moved in a direction substantially at right angles with said path into contact and out of contact with the sheet material as said eccentrics are rotated and the leaf springs being arranged to yield to allow the sealing members to move in the direction of said path so that the sheet material pulls the sealing members along the path against the action of the leaf springs after the sealing members have been moved into contact with the sheet material, and means for rotating said eccentrics in synchronized relationship with respect to said material conveying means so that said elongated sealing members are moved out of engagement with the sheet material after having traveled a predetermined distance with the sheet material.

6. The method of fabricating sanitary napkins comprising the steps of continuously forming an assembly of spaced apart absorbent pads enclosed in an elongated wrapper material, continuously moving said assembly

through a linear path while maintaining said wrapper material taut with portions thereof bridging the space between said pads, moving a pair of heated members from opposed spaced apart positions outside the path of movement of said assembly and in a direction substantially at right angles to said path into contact with the assembly within said path and allowing the wrapper material to pull the members along with the wrapper material due to the engagement of the members with the wrapper material while the members effect flattening and sealing of the pad bridging wrapper material intermediate said pads, and thereafter returning said heated members to their original spaced apart positions outside said path of wrapper movement.

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