April 19, 1938. D. M. FINCKE 2,114,833

SEALING MECHANISM FOR BREAD WRAPPING MACHINES

Filed Aug. 14, 1935 3 Sheets-Sheet 1

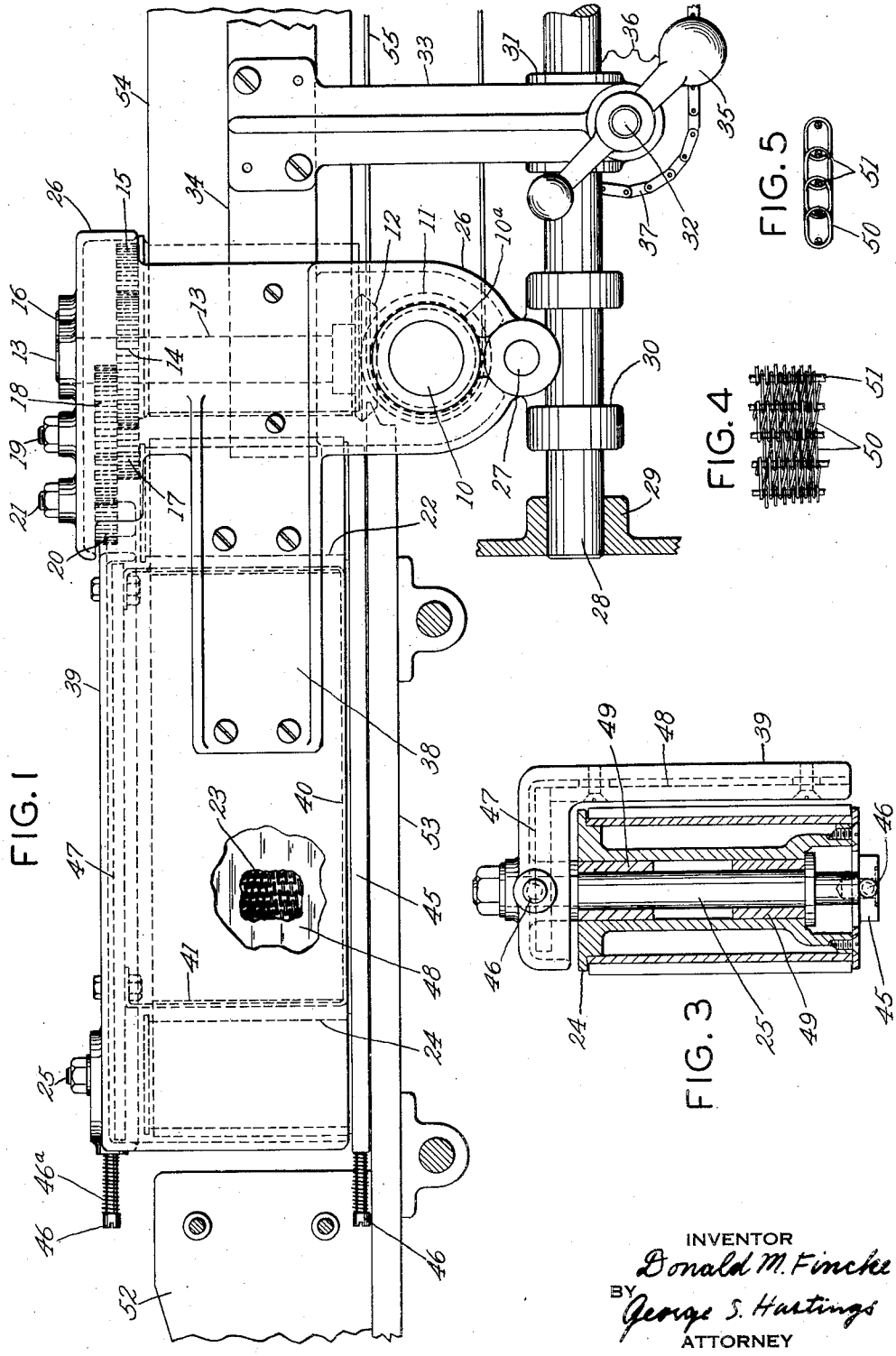


FIG. 1

FIG. 5

FIG. 4

FIG. 3

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SEALING MECHANISM FOR BREAD WRAPPING MACHINES

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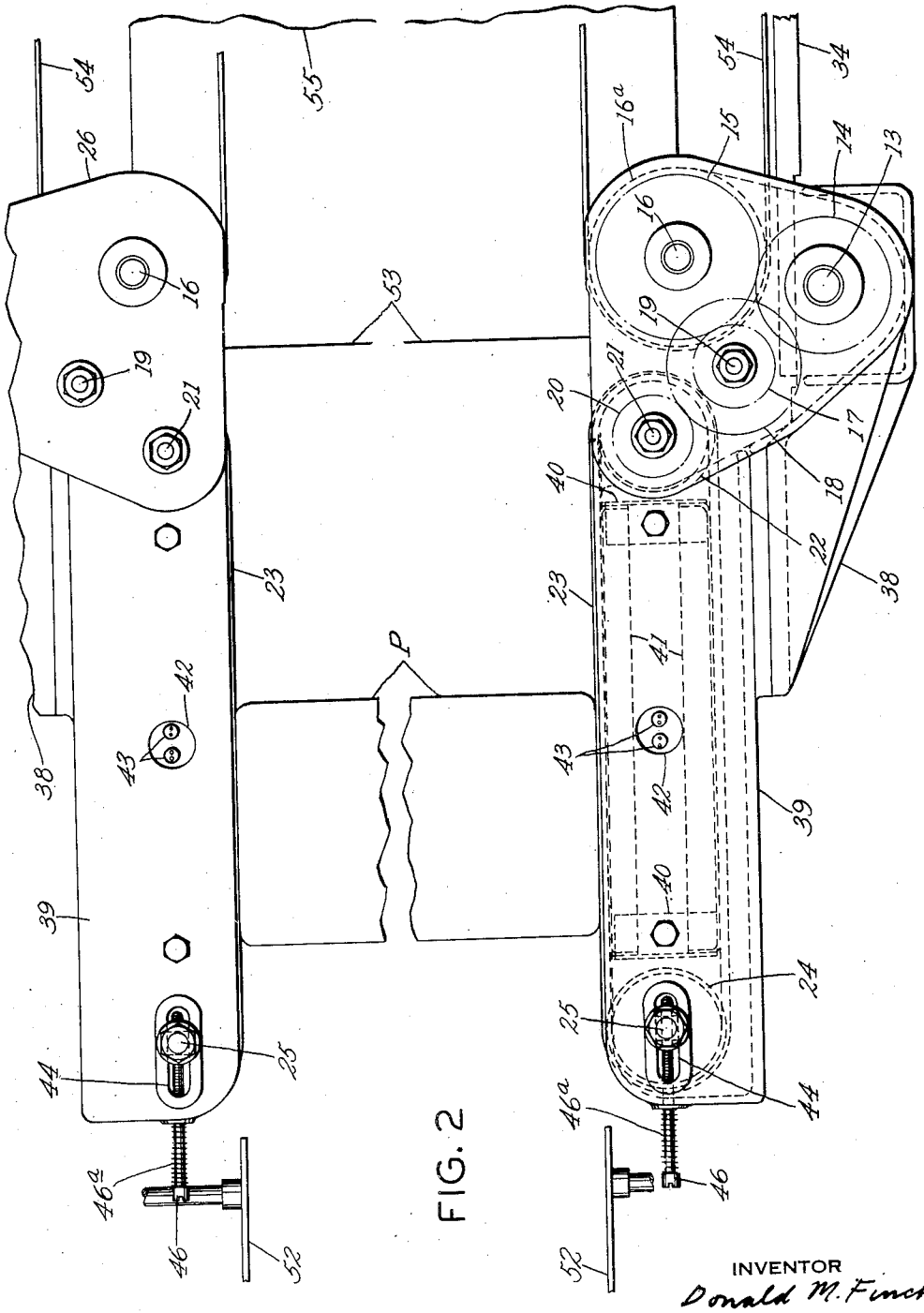


FIG. 2

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SEALING MECHANISM FOR BREAD WRAPPING MACHINES

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FIG. 6

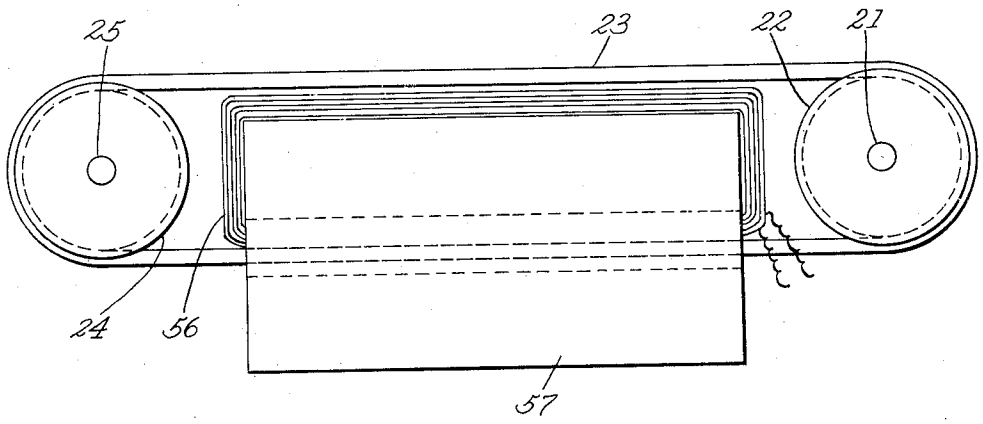
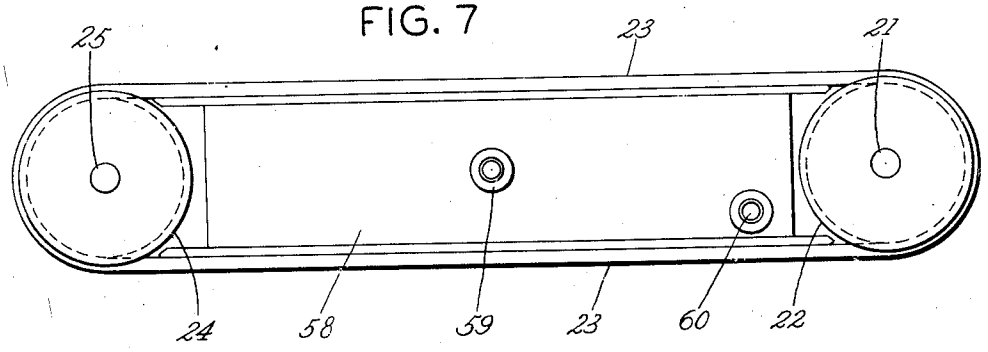


FIG. 7



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Patented Apr. 19, 1938 2,114,833

UNITED STATES PATENT OFFICE

2,114,833

SEALING MECHANISM FOR BREAD WRAPPING MACHINES

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Application August 14, 1935, Serial No. 36,047

21 Claims. (Cl. 93—2)

This invention relates to wrapping machines, more particularly to sealing mechanisms for bread wrapping machines, comprising a set of heated, traveling belts for heat sealing the end folds of a fusible coated wrapper after the loaf has been wrapped therein, and a second set of traveling belts receiving the heat sealed packages from the heated belts and further advancing them. The two sets of belts may be arranged in tandem or other sequential relation, and the same will permit the attainment of higher speeds since the packages will be advanced while their folds are being heat sealed. Furthermore, by the use of wire mesh belts for either or both sets of belts as contemplated, the necessity of relatively large pulleys for the sheet metal belts used heretofore will be obviated and yet the flexibility of the wire mesh belts will permit them to conform substantially to the irregular end contours of the wrapped loaf. Owing to their flexibility and the fact that they present a knurled or linked surface to the wrapper folds, a more secure heat seal is obtained. Moreover, since the belts travel with the loaf, the increased efficiency of the heat seals obtained may also be due in part to the fact that greater pressure may be applied to the package. The main object of the invention, therefore, is to provide flexible, traveling, heat-sealing surfaces acting to simultaneously advance a package and heat seal folds thereof.

A further object of the invention is to provide flexible, traveling, heated surfaces and similar refrigerated surfaces arranged in tandem or other sequential relation to heat seal the folds of a package and then chill the same while advancing the package. Still another object is to obtain the advantages of wire mesh belts by using them for the cooling and/or heat sealing members.

The heat-sealing belts may be heated by electric heater members or electrical induction, and an additional object of the invention is to heat the belts by conduction or induction. Since the lengths of the two sets of belts, whether heated or refrigerated, will vary with any changes in the temperature thereof, a further object of the invention is to provide mountings for the belts which will take up any expansion or contraction thereof. With these and other objects not specifically mentioned in view, the invention consists in certain constructions and combinations hereinafter fully described and then specifically set forth in the claims hereunto appended.

In the accompanying drawings which form a part of this specification and in which like characters of reference indicate the same or like parts:

Fig. 1 is a partial side elevation of a wrapping machine equipped with one embodiment of the improved sealing mechanism;

Fig. 2 is a plan view of the same;

Fig. 3 is a sectional view of one of the idler pulleys of the heat-sealing belts, showing how the same is mounted to take up the expansion and contraction of the belt;

Fig. 4 is a fragmentary side view, on an enlarged scale, of a section of one of the wire mesh belts;

Fig. 5 is a sectional view of the same;

Fig. 6 is a detail plan view of a wire mesh belt equipped with an induction coil for heating the same; and

Fig. 7 is a detail plan view showing one of the refrigerated belts which chill the hot package seals.

Generally stated, in the embodiments of the invention herein illustrated, there is provided a set of flexible, heated, traveling members arranged to advance a package and heat the folds thereof; and/or a set of flexible, refrigerated, traveling members arranged to advance a package and chill heat-sealed folds thereof. In the best constructions contemplated the heated traveling members may be endless and formed of wire mesh fabric and the refrigerated members may be of a similar nature. The particular constructions selected to illustrate the invention may be widely varied since they are but a few of the many possible concrete embodiments. The invention, therefore, is not to be restricted to the particular embodiments chosen as illustrative of the invention.

Referring to Figs. 1 and 2, wherein is shown one embodiment of a sealing mechanism constructed in accordance with the invention, on a jack shaft 10 of the wrapping machine are mounted bevel gears 11 which mesh with bevel gears 12 mounted on the vertical shafts 13 of the belt drives for the heat-sealing belts, which will now be described. Since the belt drives and the heater members of the heat-sealing belts constitute units, which as shown in Fig. 2, are identically alike, one unit is shown in outline and the other unit is fully disclosed in detail. Therefore, in the interest of brevity and clearness, a detailed description of one unit will suffice for both, as like parts bear like characters of reference in each unit.

To the upper end of each shaft 13 is attached

a pinion 14 which meshes with a gear 15 mounted on the drive shaft 16 of one of the delivery belts hereinafter described. The gear 15 in turn meshes with a gear 17 mounted on a stud 19. An intermediate gear 18 integral with the gear 17 drives a gear 20 which is attached to the drive shaft 21 of one of the heat-sealing belts which may be formed of wire mesh fabric or sheet metal. On the shaft 21 is mounted a pulley 22 driving one of the endless heat-sealing belts 23 which are preferably formed of wire mesh as shown, running over an idler pulley 24 mounted on a shaft 25.

The shafts 13, 16 and 21 and the stud 19 are supported by gear housings 26 loosely mounted on the shaft 10 and a cross-bar 27. Tie-rods 28, mounted at one end in bearings 29 of the machine frame, carry bearing-blocks 30 and 31 which support the bar 27 and a spindle 32, respectively. The ends of the spindle 32 are oppositely threaded into a pair of arms 33, each of which is connected at its upper end to a bar 34 which is attached to one of the gear-housings 26.

The turning of a handle 35 attached to one end of spindle 32 turns a sprocket 36 thereon, over which runs a chain 37 driving a sprocket (not shown) which is mounted on a spindle (not shown) similarly supported from the other ends of the tie-rods 28, to simultaneously adjust the heat-sealing belts and the delivery belts inwardly or outwardly. This adjustment permits the heat-sealing unit and the delivery conveyor, which will be hereinafter described, to be set simultaneously for different lengths of packages.

Each housing 26 is provided with a horizontally extending arm 38 which carries a guard 39 covering the outer run of one of the heat-sealing belts as shown in Fig. 3. From the horizontal leg of each guard 39 is suspended a U-shaped holder 40 carrying a set of electric heater members 41, as shown in Figs. 1 and 2, the guards 39 being provided with apertures 42 through which the wires 43 are inserted and then connected to the heaters 41.

In an elongated slot 44 in the horizontal leg of each guard 39 is slidably mounted a collar fastened on the upper end of a shaft 25. The lower end of each shaft 25 is guided in a slot in the bar 45 which is mounted at its other end on the shaft 21, Figs. 1 and 3. The spring-tensioned adjusting screws 46 which are threaded into the upper and lower ends of shaft 25, provide means for setting the belt 23 taut; and the compression springs 46*a* thereon take up the expansion and contraction of the belt and thus tend to hold the belt taut at all times.

The interior of the guards 39 (Fig. 3) is lined with heat insulating pads 47 and 48 which arrest the radiation of heat from the belts 23. The shaft 25 is mounted in heat-resistant bushings 49 in the bore of the pulley 24, and the shaft 21 is mounted in a like manner in the bore of the pulley 22.

Referring to Figs. 4 and 5 wherein a section of the wire mesh belt 23 is shown on an enlarged scale, it will be seen that the same consists of a series of coil spring members 50 which are interlocked by transverse pins 51, thus forming an endless belt. The flexibility of the belts obtained with this construction permits them to accommodate themselves to loaf ends of varying contour.

The packages P, having been wrapped and their end flaps having been folded over the loaf ends, emerge from the last set of adjustably mounted folders 52, which may be of any type commonly used in wrapping machines and enter into the heat-sealing chamber consisting of the traveling heat-sealing belts 23 and a stationary bottom sealing plate 53. The latter may be suitably heated, if desired, wherefore both the bottom seam and end flaps of the packages will be sealed while being conveyed by the belts 23. Upon leaving the heat-sealing chamber the packages enter a delivery conveyor which may be arranged in tandem with the heat-sealing belts and consist of side belts 54 and a bottom belt 55 coacting to carry the sealed packages towards a take-off table (not shown) of the machine. It should be noted that the belts 54 and 55 are driven by pulleys 16*a* and 10*a* respectively on shafts 16 and 10.

Referring to Fig. 6, there is disclosed an induction coil for heating the sealing belts 23 according to a modified form of the invention. In this embodiment the primary 56 is wound about one leg of a transformer core 57 which extends through the space between the runs of the endless belt 23 formed of wire mesh fabric or sheet metal as desired, and is connected to a source of alternating current, the belt 23 acting as a closed secondary.

Referring to Fig. 7, the sealing belts 23 according to this form of the invention are arranged to be used as a refrigerated sealer. A brine tank 58, or an expansion chamber if desired, is placed between the runs of the traveling sealer belts 23 in such a manner as to contact and chill said belts. The expansion coil of the tank 58 is provided with an inlet 59 and an outlet 60 which, by suitable means, are connected to a refrigerating unit (not shown). Furthermore, the belts 23 in this embodiment of the invention may be of wire mesh fabric; and the folders 52 will be used to fold the end folds of the packages in a well known manner. Moreover the belts 54 may be refrigerated and the belts 23 may be heated in any desired manner as disclosed above, to provide traveling heated surfaces arranged in tandem with traveling refrigerated surfaces; and the idler pulleys (not shown) of the belts 54, when the same are refrigerated, may be yieldingly mounted like the pulleys 24 to take up expansion and contraction thereof. It will be understood that the belts 54 in this case may be formed of wire mesh or sheet metal as desired.

With respect to the construction shown in Fig. 6, it is noted that the endless conducting sealing belt constitutes a transformer secondary coil having a single turn. Since the primary coil 56 of the transformer has a large number of turns the voltage induced in the conducting belt 23 is very low—it may be for example on the order of one volt more or less—and consequently will heat the belt as a result of a rather low resistance on the part of said belt. In order to increase the resistance of the belt the belt may be made rather thin, particularly when it is an endless flat steel belt, or the belt may be made of materials of relatively higher resistance than iron or steel. In order to prevent loss of current the pulleys 24 may be of insulating material. Of course it will be understood that this aspect of the invention is not limited to sealers of the endless belt type.

What is claimed is:

1. In a sealing mechanism for wrapping machines, the combination with a set of flexible, self-heated, traveling members including respectively heating elements each formed as a unitary structure with its belt; said travelling members being arranged to admit a wrapped package therebetween and engage and heat seal the folds of the

wrapper on the ends of the package while advancing the package, of a set of flexible, refrigerated, traveling members arranged to receive the heat sealed package therebetween from said heated members and engage and chill the heat sealed end folds thereof while further advancing the package.

2. In a sealing mechanism for wrapping machines, the combination with a set of heated, endless, traveling, wire mesh belts arranged to admit a wrapped package therebetween and engage and heat seal the folds of the wrapper on the package, of a set of refrigerated, traveling, endless, wire mesh belts arranged to receive the heat sealed package therebetween from said heated belts and engage and chill the heat sealed folds thereof while further advancing the package.

3. In a sealing mechanism for wrapping machines, the combination with a set of heated, endless, wire mesh belts arranged to admit a wrapped package therebetween and engage and heat seal the folds of the wrapper on the package, of a set of refrigerated, endless, wire mesh belts arranged to receive the package from said heated belts and engage and chill the heat sealed folds thereof.

4. In a sealing mechanism for wrapping machines, the combination with a set of endless, traveling, wire mesh belts arranged to admit a wrapped package therebetween and engage the folds of the wrapper on the package while advancing the package, pulleys driving said belts, yieldingly mounted idler pulleys over which said belts run, whereby the expansion and contraction of the belts will be compensated by said idler pulleys, and devices for heating said belts to cause the folds of the package to be heat sealed.

5. In a sealing mechanism for wrapping machines, the combination with a set of endless, traveling, wire mesh belts arranged to admit a wrapped package therebetween and engage the folds of the wrapper on the package while advancing the package, pulleys driving said belts, yieldingly mounted idler pulleys over which said belts run, whereby the expansion and contraction of the belts will be compensated by said idler pulleys, and induction coils for heating said belts to cause the folds of the package to be heat sealed, said induction coils including metal cores adjacent said belts and primaries wound about said cores and connected to a source of alternating current, the belts constituting closed secondaries of the induction coils, whereby the belts are heated by induction.

6. In a sealing mechanism for wrapping machines, the combination with a set of endless, traveling, wire mesh belts arranged to admit a wrapped package therebetween and engage the folds of the wrapper on the package while advancing the package, pulleys driving said belts, yieldingly mounted idler pulleys over which said belts run, whereby the expansion and contraction of the belts will be compensated by said idler pulleys, and devices for refrigerating said belts to thereby chill the folds of the wrapper.

7. In a wrapper sealing device, the combination with a self-heated, flexible, metallic member arranged to engage and heat seal folds of a wrapped package, of devices on which said member is mounted, one of said devices being yieldingly mounted to compensate for expansion and contraction of said member.

8. In a wrapper sealing mechanism, the combination with a set of electrically energized metallic heating elements arranged to engage and seal folds of a wrapped package passing therebetween; of a set of refrigerated elements arranged in the line of travel of said wrapped packages and adapted to engage and chill said heat-sealed folds; the discharge ends of said set of heating elements occupying a fixed position adjacent to the receiving end of said set of refrigerating elements, and the sets of heating and refrigerated elements being respectively provided at their remote ends with temperature-compensatory supporting devices.

9. In a wrapping machine, the combination with a set of traveling, endless, wire mesh belts arranged to engage the folds of a wrapped package and advance the package, of means for heating said belts to cause them to heat seal the folds while advancing the package.

10. In a wrapping machine, the combination with a set of traveling, endless, wire mesh belts arranged to engage the folds of a wrapped package and advance the package, of means for refrigerating said belts to cause them to chill the folds while advancing the package.

11. In a wrapping machine, the combination with a pair of heated, traveling belts carrying self-heating elements, and arranged to engage and heat seal the end folds of a package and simultaneously advance the package, and means for energizing said self-heating elements to heat the belts; of a pair of refrigerated belts arranged to engage and chill the heat sealed end folds of the package and further advance the same, and means for supporting and driving said belts, said means including yieldingly mounted pulleys to compensate for the expansion and contraction of said belts.

12. In a package wrapper sealing mechanism, the combination with a set of conducting elements having sealing surfaces adapted to engage the end folds of the package wrapper, of means for inducing an alternating electric current through said element of a voltage low enough not to shock a person touching said surface to heat said element by the electrical resistance thereof.

13. In a package wrapper sealing mechanism, the combination with a conducting element having a sealing surface adapted to engage folds of the package wrapper, of means for passing an electric current through said element to heat said element by the electrical resistance thereof, said means including a transformer having a secondary coil of which said element forms at least a part.

14. In a package wrapper sealing mechanism, the combination with a conducting element having a sealing surface adapted to engage folds of the package wrapper, of means for passing an electric current through said element to heat said element by the electric resistance thereof, said means including a transformer and said element comprising an endless conducting belt having one run thereof passing through the core of said transformer.

15. A heat-sealing mechanism for wrapped packages, said mechanism comprising an elongated sealing zone adapted to be traversed by said wrapped packages successively; a planiform heating element formed preponderantly of metal resistant to the passage of electrical current, said metal resistor element being approximately coextensive in length with said zone; and means to energize said planiform element electrically substantially throughout the lengthwise dimension of said zone.

16. A heat-sealing mechanism for wrapped packages, having the features claimed in claim 15, in which the electrical heating effect is communicated to said planiform element conductively.

17. A heat-sealing mechanism for wrapped packages, having the features claimed in claim 15, in which the electrical heating effect is communicated to said planiform element conductively and is thereby distributed uniformly throughout said sealing zone.

18. A heat-sealing mechanism for wrapped packages, having the features claimed in claim 15, in which the electrical heating effect is communicated to said planiform element inductively.

19. A heat-sealing mechanism for wrapped packages, having the features claimed in claim 15, in which the electrical heating effect is communicated to said planiform element inductively and is thereby applied uniformly throughout said sealing zone.

20. A heat-sealing mechanism for wrapped packages, having the features claimed in claim 15, in which said planiform element constitutes at least a portion of a primary element of an electrical transformer, said transformer including a multiple winding secondary coil adapted to impress upon said primary a current of the order of less than ten volts.

21. A heat-sealing mechanism for wrapped packages, having the features claimed in claim 15, in which said planiform element includes an endless belt, having a metallic element disposed therein, and which is heated by electrical current passed therethrough.

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