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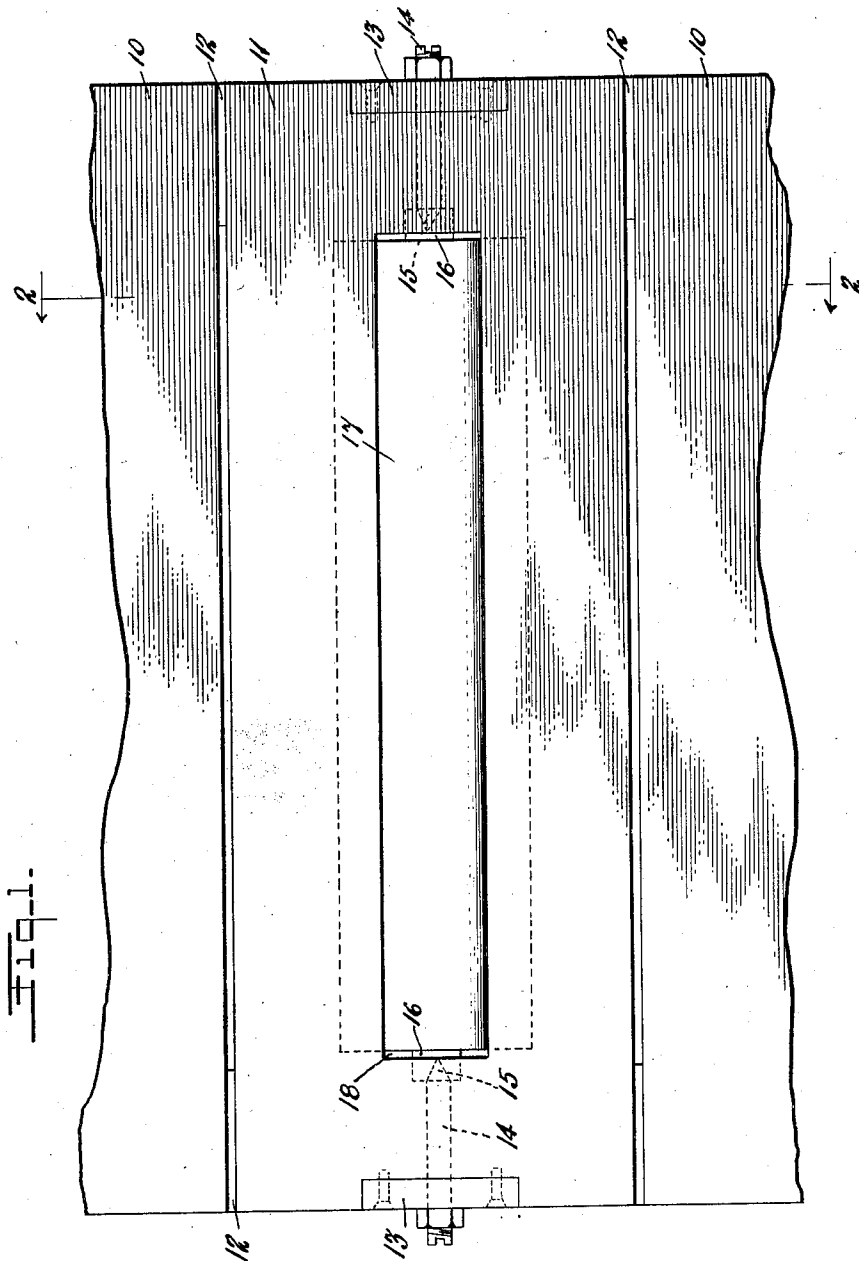
J. D. CONTI ET AL

2,016,627

SEALING UNIT

Filed June 13, 1932

3 Sheets-Sheet 1



WITNESS

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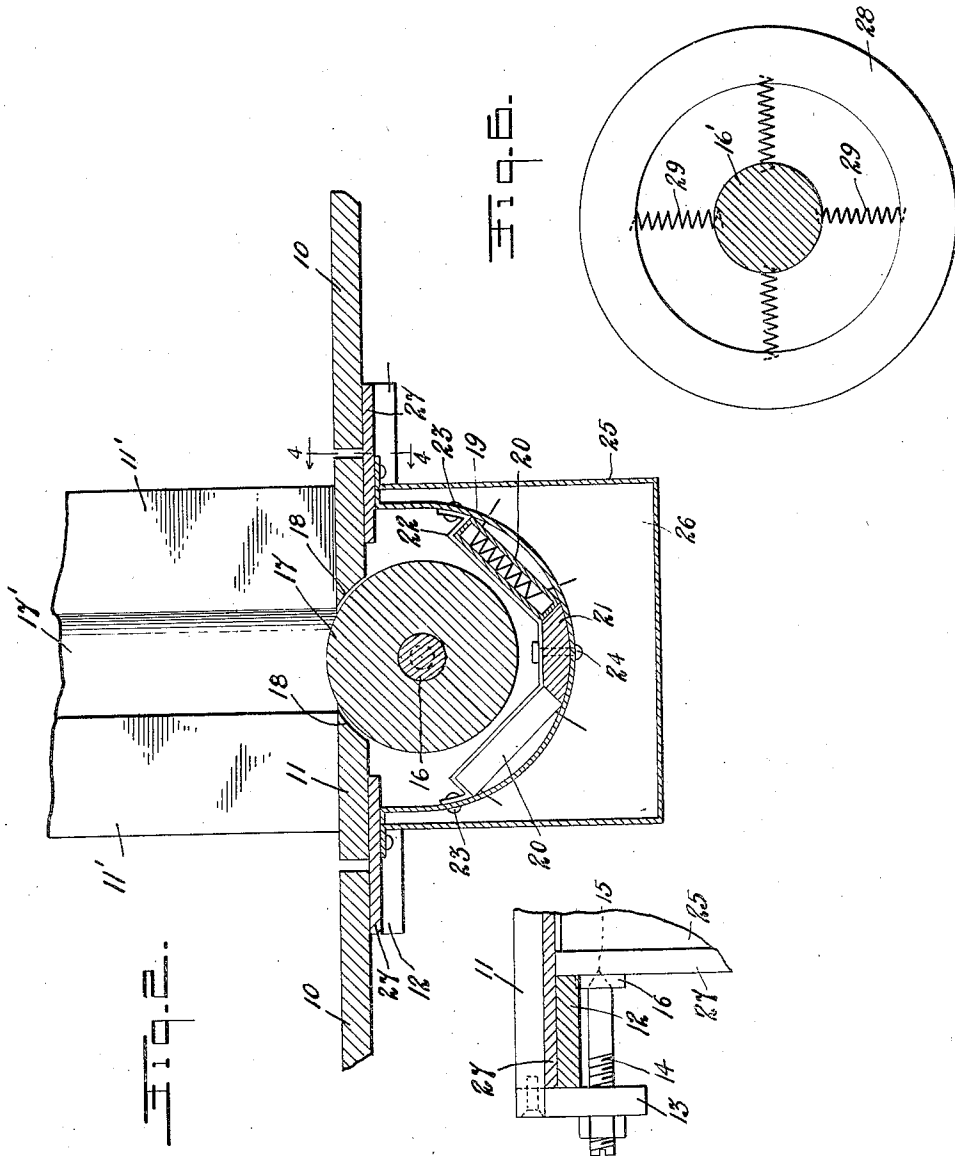
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SEALING UNIT

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3 Sheets-Sheet 2



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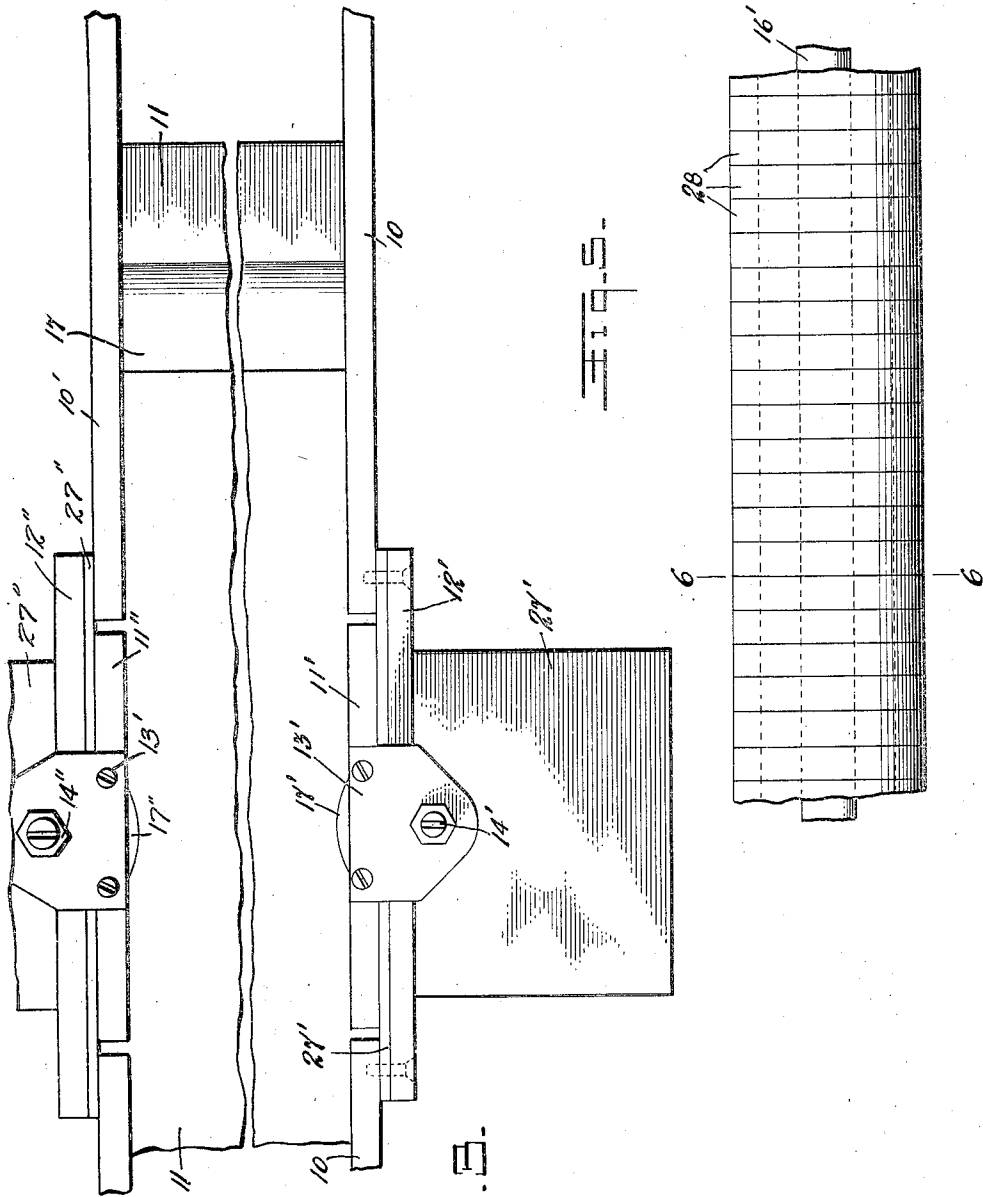
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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,016,627

SEALING UNIT

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13 Claims. (Cl. 93—2)

This invention relates generally to the association of sheet material and deals more particularly with the sealing or joining of seams, folds, overlaps, and the like in article wrapping or packaging.

A general object of the invention is to provide an improved type of unit for sealing or joining contiguous sheet material.

More specifically, the invention has for an object the provision of an improved unit to be employed for sealing articles, including parcels, packages, cartons, or the like, in any type of sheet material which is adapted to be rendered fusible, tacky, adhesive, or otherwise amenable to sealing upon application of heat or of heat and pressure.

A further object of the invention is to provide a sealing or jointing unit of this type including a table section over which the articles are moved and through the upper surface of which protrudes a heated roller over which the article passes and rotates the roller in its passage.

A further object of the invention is to provide improved means for heating the roller.

A further object of the invention is to provide an improved type of heat sealing unit which is adapted to respond to inequalities in the passing article.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

A preferred embodiment of the invention comprises a unit which is to be introduced into or upon the table or run-way over or along which are moved packages or other articles to be covered by sheet material, such movement to be manual or mechanical, with a roller having a minor arc protruding above the plane of the table section, with the major arc disposed within a heating chamber beneath the table section and as a modification, a roller constructed in sections, each section being supported upon springs from a central shaft, the springs tending to maintain the sections in cylindrical unity and to permit the sections to move eccentrically relative to the shaft responsive to the application of pressure.

The invention accordingly comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

The drawings illustrate two embodiments of the invention and the views therein are as follows:

Figure 1 is a top plan view of the simplest type of unit,

Figure 2 is a transverse sectional view, taken on line 2—2 of Figure 1,

Figure 3 is an end view showing the vertical unit differently positioned relative to the horizontal unit,

Figure 4 is a detail vertical sectional view substantially along the axis of the roller and showing its freely rotatable mounting,

Figure 5 is a view in elevation of the modified type of roller, and

Figure 6 is a transverse sectional view through the roller as indicated by line 6—6 of Figure 5, but shown on an enlarged scale.

Like characters of reference indicate corresponding parts throughout the several views.

While the present invention will be found useful in general wherever a ply of suitable sheet material is to be laid over and heat sealed to another, especial utility is found in the wrapping or packaging art. Many types of sheet wrapping materials are known which, when subjected to heat, or heat and pressure, will fuse or become adhesive. In wrapping articles in such materials, it is customary to pass them along a suitable folding and wrapping apparatus, and to seal the overlapped edges of the wrapper when it is folded about the enclosed article. This sealing operation usually involves the application of a heating plate to the wrapper seams. With previously available sealing devices, difficulties have been encountered in obtaining satisfactory performance. Among others, one difficulty involved local overheating of the package when pressed or rubbed against the sealing plate. This rubbing or brushing of the wrapped article past the sealing element also usually involved a slowing down or an interrupting of the orderly and uniform feeding of the package along its path, with a consequent lack of uniformity of the seals formed on the several packages, and also frequently caused the formation of undesired wrinkles and creases, these last sometimes occurring through adhesion of the wrapping material to the heating surface.

The sealing unit contemplated in the present invention is capable of forming highly satisfactory and uniform heat seals, and provides a satisfactory equipment for operating on wrappers which will fuse or become adhesive upon application of heat, whereby the drawbacks hitherto encountered are avoided or substantially eliminated. Through use of the present device, many sheet materials, such as regenerated cellulose, cellulose esters and ethers, gelatine, casein, etc., having a coating of heat-fusible material, such as paraffin, or combined with such material;

coated paper, such as waxed papers; and sheet materials composed in whole or in part of a heat-fusible substance, such as cellulose acetate, cellulose nitrate, synthetic resins, etc., may be sealed about articles with a facility not hitherto available, and with uniformly excellent results.

Referring more particularly to the drawings, the primary unit is designed to occupy a horizontal position within a table 10, an opening for the unit being provided in the table. This table 10 is the table over which packages, cartons, or articles are moved manually or mechanically for sealing, the sealing being of such a nature as to be accomplished by the application of heat to the overlapping margins or sections of the sealing or wrapping sheet.

The unit comprises a table section 11 which is secured between the sections 10 of the table in any approved manner as by the bars 12. The bars 12 and the table section 11 support ears 13 through which extend pintles 14, having pointed extremities as indicated at 15.

These points 15 engage in tapered sockets in the ends of a shaft 16 in the usual well known manner of point journaling. The shaft 16 carries the roller 17, a minor arc of which extends above the plane of the table section 11, as shown more particularly at Figures 2 and 3.

The roller is accommodated by a cut-out 18 in the table section 11, such cut-out being bevelled to correspond as nearly as may be to the curvature of the roller 17, as indicated at Figure 2, and to provide ample clearance for the rotation of the roller.

Heat may be applied to the roller in any known manner but in the now preferred embodiment of the invention the major arc of the roller is disposed beneath the table section 11 within the heating chamber, comprising the arcuate trough 19 which is roughly concentric with the roller and with heating elements 20 located within this trough. As shown at Figure 2, the heating elements 20 indicate electrical heating elements which, at the present time, appear to be the favored type, but it is to be understood that the invention is in no way limited to electrically heated elements. When elements of this type are employed, they may be secured within the trough by means of a stay bar 21 extending longitudinally within the bottom of the trough and against which the elements abut, with a securing strap 22 bolted to the trough at 23 and through the strip 21 at 24.

As many of these strips may be employed as found necessary or desirable to provide rigidity.

Surrounding the trough 19 is a box 25 providing a space between such box and the trough which is preferably filled with some heat insulating material, such as asbestos, indicated at 26. The ends of the box and also of the trough are closed by caps 27 which are held thereon frictionally or otherwise as may be found desirable or necessary.

Heat insulating material may be employed at any point where found necessary, and is here indicated as 27, it being understood, however, that the showing of this heat insulating material so placed is no limitation upon employing it elsewhere. It is desirable that the table, both the sections 10 and 11, shall be maintained in as cool a condition as possible that is, at a temperature less than a sealing temperature, while the roller 17 shall be maintained in a heated condition. Hence, it is found desirable under some circum-

stances to produce the table section 11 of some material which is a poor conductor of heat.

A unit constructed in accordance with the foregoing may also be erected vertically in proper relation to the horizontal roller 17. As shown at Figure 2, the roller 17' is erected upon the table section 11 and is in all respects similar to the unit just described, and with its axis substantially perpendicular to the axis of the roller 17.

Under other conditions, it is found desirable to move the vertical roller to a position spaced somewhat away from the roller 17. As shown at Figure 3, the roller 17'' is carried by the table section 11' and is positioned in laterally spaced relation to the roller 17. The sealing apparatus shown in Fig. 3 comprises a bottom consisting of the table section 11 with its roller 17 and two spaced parallel side plates 11' and 11'' having opposing openings therein and rollers 17' and 17'' protruding in part through the openings, and 20 heating chambers 27' and 27'' enclosing the major arcs of the rollers 17' and 17'' respectively.

The roller 17' or 17'' may act upon the article or parcel being sealed before or after it has encountered the roller 17. These vertical rollers 17' and 17'' are for sealing the folded ends or sides of the parcel so that all of the overlapping parts of the wrapping sheet may be sealed by a single passing of the article or parcel over or along the table manually or mechanically.

The device is used under some conditions upon articles or parcels, the underside of which is not always a true plane. As it is desirable to seal the covering sheet throughout substantially its entire extent, it is desirable to provide means to respond to inequalities in the passing articles. This is accomplished by employing a roller comprising a plurality of rings 28 surrounding the shaft 16'. The shaft 16' is mounted in all respects similarly to the shaft 16 and is surrounded and embraced by any approved number of rings 28. These rings 28 are connected with the shaft 16' by yielding members. As shown at Figure 6, these yielding members take the form of helical springs 29, but it is to be understood that any other form of springs or members properly yielding to eccentric movement of the rings relative to the shaft are fully within the scope of the present invention.

As the sectional roller is not directly power driven, but only rotated by the passing of the article thereover, the manner of attaching the rings 28 to the shaft 16' requires less stability than would be the case were power applied for rotating the roller. It will be apparent that as each individual ring 28 is capable of eccentric movement, the inequalities of the passing article will be fully taken care of and that the sealing will, therefore, be accomplished throughout the entire area passing over the roller. These sectional rollers may be employed also as vertical rollers when and as found desirable.

With any given roller embodying the principles of the present invention, since the heat need not be applied except throughout the extent of the overlaps, the roller of the sealing unit need not be wider than such overlaps in a permanent installation of the unit.

The described equipment may be used in conjunction with any suitable folding and wrapping machinery, or, if desired, hand wrapped articles may be passed thereover. In the ordinary use of the machines, articles may be passed along table 10 at a uniform rate, and no impedence or delay in the orderly progress of these articles is incurred by the freely rotatable heat-sealing roller,

and the latter is able to produce uniform seals on each of the several packages passed thereover. Where necessary, sufficient pressure to assure an effective seal may be applied to the wrapped article as it passes by the roller, and this pressure may be applied manually or by any of the means well known to the packaging art for obtaining this function. Since there is substantially no relative movement or slip between the sheet material and the roller as the material passes thereover, there is a minimum of drag and distortion of the material, with consequent elimination of the undesired wrinkles and creases frequently attributable to this cause. With the present freely rotatable sealing roller, there is only a line contact between the sealer and the sheet material, whereby any tendency toward local over-heating is substantially obviated.

It will be seen that there has been provided a sealing unit which is well adapted to fulfill its intended functions. Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

The invention is hereby claimed as follows:

1. A sealing unit comprising a table section having an opening therethrough, a roller having a minor arc projected through said opening, means to apply heat to the major arc, said roller comprising a plurality of juxtaposed rings, and means providing for eccentric movement of the rings independently.

2. A sealing unit comprising a table section having an opening therethrough, a roller having a minor arc projected through the opening, means to apply heat to the major arc, said roller being composed of a plurality of juxtaposed rings, and means providing yielding movement of each ring eccentrically and independently.

3. In a sealing unit for heat-fusible sheet material, a roller comprising a shaft, a plurality of rings embracing the shaft and normally spaced therefrom concentrically, yielding members interposed between the rings and the shaft providing for eccentric movement of the rings relative to the shaft independently, and means for heating said roller.

4. A sealing unit comprising a table section having an opening therethrough, a roller having a minor arc projected through said opening, means to apply heat in part by reflection to the major arc, said roller comprising a plurality of juxtaposed rings, and means providing for eccentric movement of the rings independently.

5. A sealing unit comprising a rotatably mounted sealing element having a curved surface for line contact with an article passed thereover, said element comprising a plurality of separately yieldable sections, and means for heating said element.

6. A sealing unit comprising a rotatable sealing roller formed of a plurality of separately yieldable sections, and means for heating said roller.

7. A unit for sealing materials of the class de-

scribed, comprising a table section having an opening therethrough, a freely rotatable sealing element projecting through said opening and having a curved surface for line contact with an article passed thereover, said element including a plurality of separately yieldable sections, means for heating said element to a sealing temperature, said table section having a temperature less than a sealing temperature.

8. A sealing unit comprising a table having an opening therein, a freely rotatable heat-applying roller extending in part beyond the plane of the table, means to heat the roller to a sealing temperature to effect sealing fusion of material in line contact with said roller, and means to maintain the table at a temperature less than a sealing temperature.

9. A sealing unit comprising a table section having an opening therein, a heating chamber disposed beneath the table and the opening, a freely rotatable heat-applying roller having its major arc disposed within the heating chamber and a minor arc extending through said opening to afford line contact directly with an article passed thereover, means within said heating chamber to heat the roller to a sealing temperature to effect sealing fusion of material in line contact with said roller, and means to maintain the table section at a temperature less than a sealing temperature.

10. A sealing unit comprising a table formed of a material having a low thermal conductivity and having an opening therein, a freely rotatable heat-applying roller extending in part beyond the plane of the table, means to heat the roller to a sealing temperature to effect sealing fusion of material in line contact with said roller, and means to maintain the table at a temperature less than a sealing temperature.

11. A sealing unit comprising, in combination, a table section having an opening therein, a freely rotatable heat-applying roller having a minor arc protruding through said opening, a pair of spaced parallel side plates extending perpendicular to the plane of said table section and substantially transverse the longitudinal axis of said roller, opposing openings in said side plates, freely rotatable heat-applying rollers having minor arcs protruding through said opposing openings, means to heat the rollers to a sealing temperature to effect sealing fusion of material in line contact with said rollers, and means to maintain the table section and the side plates at a temperature less than a sealing temperature.

12. A sealing unit comprising, in combination, a table section having an opening therein, a freely rotatable heat-applying roller having a minor arc protruding through said opening, a pair of spaced parallel side plates extending perpendicular to the plane of said table section and substantially transverse the longitudinal axis of said roller, opposing openings in said side plates, freely rotatable heat-applying rollers having minor arcs protruding through said opposing openings, means to heat the rollers to a sealing temperature to effect sealing fusion of material in line contact with said rollers, and means to maintain the table section and the side plates at a temperature less than a sealing temperature, a roller of the sealing unit comprising a plurality of separately yieldable sections.

13. A sealing unit comprising, in combination, a table section having an opening therein, a freely rotatable heat-applying roller having a minor arc protruding through said opening, a pair of

spaced parallel side plates extending perpendicular to the plane of said table section and transverse the longitudinal axis of said roller, opposing openings in said side plates, freely rotatable
5 heat-applying rollers having minor arcs protruding through said opposing openings, means to heat the rollers to a sealing temperature to effect sealing fusion of material in line contact with

said rollers, and means to maintain the table section and the side plates at a temperature less than a sealing temperature, said heating means comprising heating chambers enclosing the major arcs of the heat-applying rollers.

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