Sept. 19, 1944. H. E. HALLMAN 2,358,455

RADIANT HEAT SEAL

Filed Dec. 6, 1939 2 Sheets-Sheet 1

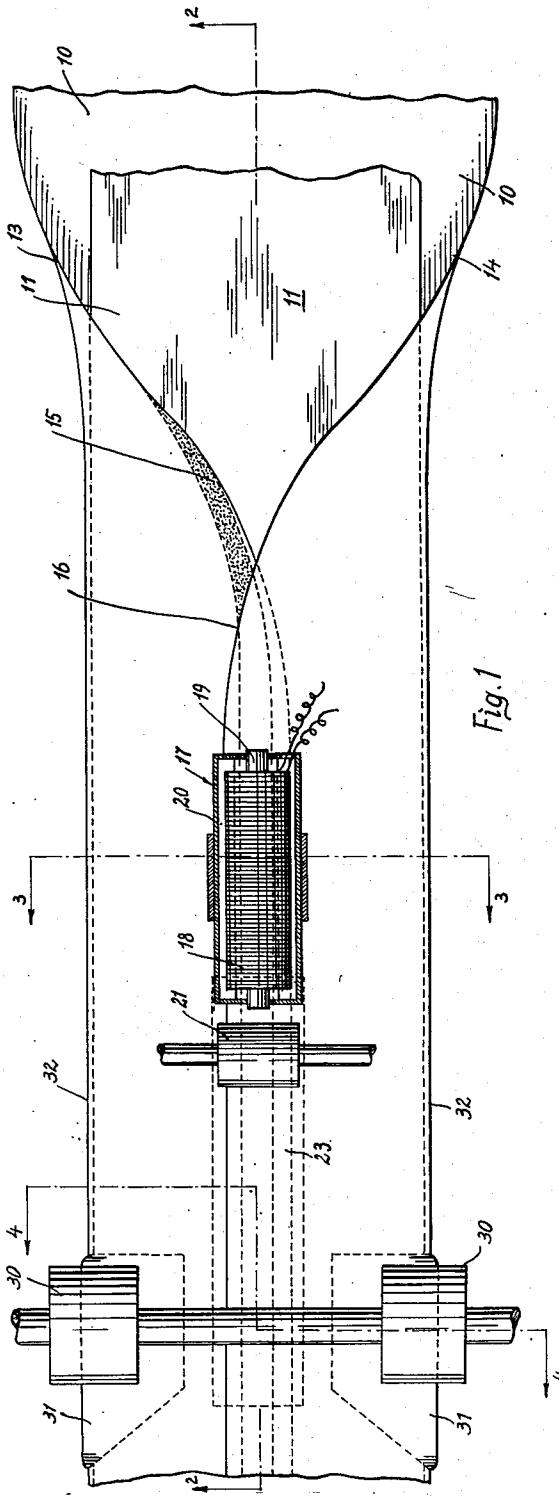


Fig. 1

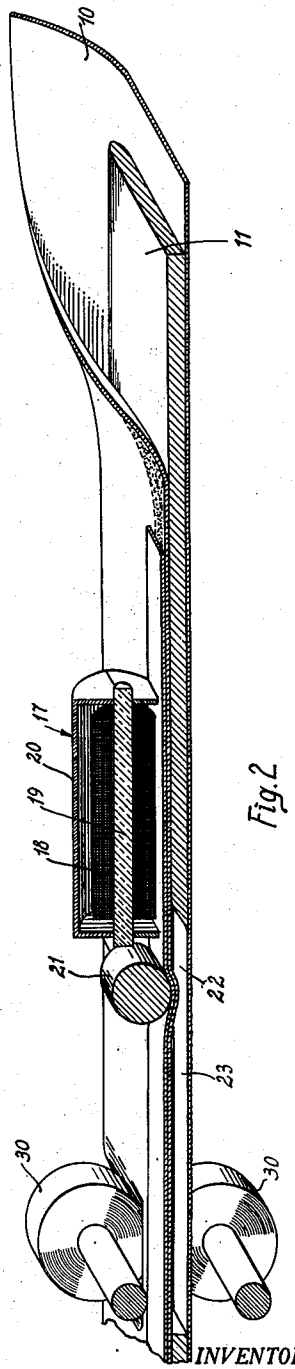


Fig. 2

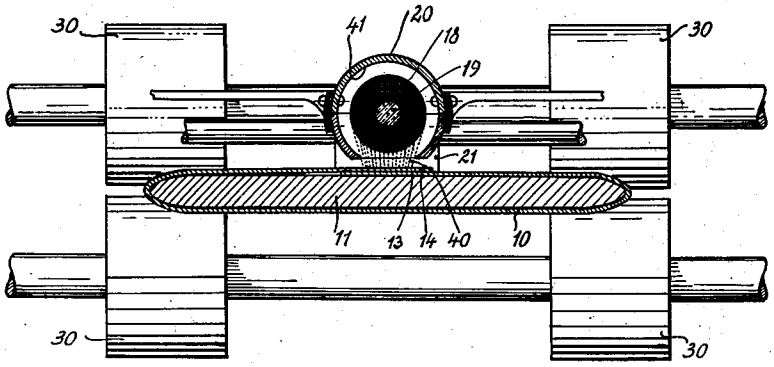
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Fig. 3



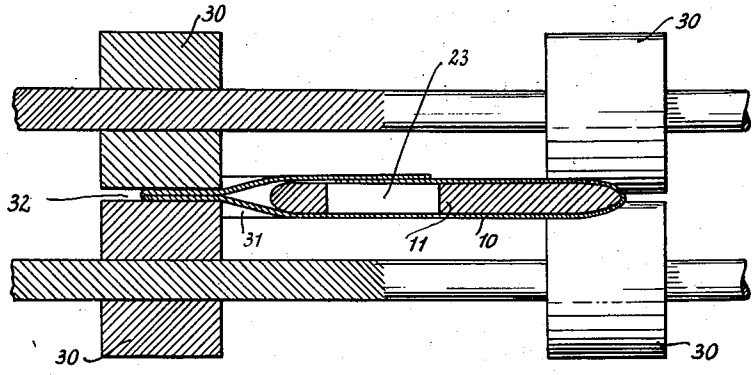


Fig. 4

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RADIANT HEAT SEAL

Harold E. Hallman, Catonsville, Md.

Application December 6, 1939, Serial No. 307,794

3 Claims. (Cl. 154—42)

This invention is a continuation in part of my application Serial No. 253,742, filed January 31, 1939, and relates to a novel apparatus for sealing the longitudinal seam in the formation of wax coated paper bags.

It relates more particularly to a machine comprising in combination, a former over which continuously travels a web of wax coated paper upon and over which the edges of the wax coated paper are folded and placed in juxtaposition to each other after a suitable adhesive has been applied to the surface of one of the edges which is to extend beneath and adjacent to the surface of the opposite edge.

In its progress over the former after the adhesive has been applied to the appropriate edges placed in juxtaposition to each other, the wax coated edge passes beneath the source of radiant heat, the heat striking through the wax coated paper, causing the wax to run and melt sufficiently to permit the adhesive to strike through the wax coating and permit the adhesive to bond the paper together.

The former preferably will then have a slot beyond the source of radiant heat so that there will be no tendency of any wax which might have been melted to cause the web to stick to the former and, if desired, a tension roll may be mounted in order to exert a yielding pressure or tension on the web so that the edges might be glued together.

In the manufacture of wax coated paper bags and similar articles, the problem of obtaining a proper seal of the wax paper has presented many difficulties. It is necessary that this longitudinal seam have strength and such strength cannot be obtained simply by heat sealing the wax coated paper.

When glue is applied to facilitate the joining operation and to make the joint more secure, the glue fails to obtain a sufficient grip upon the wax coated paper and it is thus difficult to get proper results. It is known that to obtain the proper seam the wax must be sufficiently melted so that the applied glue strikes through the wax to the paper and firmly bonds the paper to effect a seam.

However, when heat is applied with pressure, the pressure squeezes the glue out of its proper position and a proper seam is not readily obtainable. If, on the other hand, no pressure is used thereon, then a proper joint is not obtained because the edges are not pressed into close enough relation to each other to permit the glue to strike through. Very frequently wax coated papers of various kinds and particularly of a type used in forming bags are translucent or transparent and will therefore readily permit heat rays to pass through.

Accordingly, it is my intention, in this invention, to make use not necessarily of conducted heat but of radiant heat for the purpose of causing the melting of the wax and the striking through of the glue through the wax into the paper. It will not be necessary to bring the wax paper directly into contact with the heat source, but it will be possible by merely passing the paper beneath a source of radiant heat or close to such a source that the radiant heat rays will strike through the transparent paper to the wax below and cause that wax to melt and run sufficiently to permit the glue to strike through to the principal web and bond the papers together.

In order to further insure that the glue strikes through and in order to prevent the wax from running out upon the free edges, a yielding pressure may be applied to the joined portions immediately after the application of heat and such yielding pressure which can be readily regulated will cause the edges to approach each other under tension sufficiently to join the edges together without exerting such extreme pressure as would drive the wax out of its proper contact. Further it becomes useful to so adjust and arrange the former that there will be no possibility of the melted wax causing the web to stick to the former and thus impeding or disrupting the manufacturing operation.

It is an object of my invention therefore to provide a novel apparatus for imparting radiant heat for the purpose of effecting a seal between wax coated papers when an adhesive is employed therebetween.

It is a further object of my invention to provide, in a novel apparatus for joining wax coated papers with glue between, a source of radiant heat which will cause the wax to run sufficiently to permit the glue to strike through to the papers, followed by a means for applying yielding pressure to insure the formation of the joint.

It is a further object of my invention to provide an apparatus comprising a former and source of radiant heat and a means for obtaining yielding pressure upon the joint to be formed immediately after the application of such heat.

Other objects of my invention will become apparent from the following description and drawings, in which:

Figure 1 is a top plan view showing the gen-

eral organization or relationship of the wax coated web, the former, the source of radiant heat, the yielding tensional device and the means for drawing the web along the former.

Figure 2 is a cross-sectional view taken along 2—2 of Figure 1.

Figure 3 is a cross sectional view taken along line 3—3 of Figure 1.

Figure 4 is a cross-sectional view taken along line 4—4 of Figure 1.

Referring now to Figures 1 and 2, the web 10 is drawn along the former 11 in the manner hereinafter described. The web 10 originally commences the process at the right hand side of the figure in the form of a flat wax coated sheet preferably either translucent or transparent. By gluing and folding means well known in the art, the edges 13 and 14 of the web 10 are folded up in the manner shown about the former 11 as the sheet continues to move forward, that is, towards the left. At the same time, an adhesive stripe 15 is applied to the longitudinal area adjacent the edge 13 which lies beneath the edge 14 in the folded position as seen at 16. The sheet as it is continuously drawn onwardly passes beneath a source of radiant heat 17.

This source of radiant heat 17 is preferably of the open flame type wherein a source of heat preferably an electrical resistance coil 18 is wound about a core 19 and partially encased within a cylinder 20, the interior of which is polished, the said cylinder being open along the side thereof adjacent the edge 13—14 of the web passing beneath. The exact organization of this cylinder is hereinafter described. By an open flame type of heater is meant one wherein the actual heating element or heat source is directly exposed to the member to be heated and where substantially all of the heat transferred between the actual heating element or heat source and the member to be heated is by radiation rather than by conduction.

Thereafter, as seen in Figures 1 and 2, the folded web passes onwardly beyond the roll 21 which rides in a recess 22 in the former, the said roll projecting beyond the upper surface of the former into the recess so that the paper is bent out of its position beneath the roll at said recess. The recess 22 communicates with a slot 23 in the former, the said slot 23 being also clearly visible in Figure 4.

The folded web is drawn along the former as seen in Figures 1, 2 and 4, by means of the pressure rollers 30, 30 which register with the cut out portion 31, 31 of the former so that the edge of the folded web 32 (Figure 4) may be fed directly between opposed rolls 30, 30 and pushed on.

It will be seen that while whatever heating operations are performed or occur at the center of the former and hence at the longitudinal center of the folded web, the feeding operations represented by the rollers 30, 30 occur at the margins of the former and hence at the margins 32 of the folded web and hence any pressure thereat since it is not in proximity to any wax which may have been melted or to any adhesive will not deleteriously affect the finished product.

As before pointed out, the purpose of this invention and of the apparatus herein described is to first apply the adhesive to the edge as shown, then to fold the two edges together, one above the other, then to heat the edges so that the wax will melt sufficiently to permit the adhesive to strike through. As seen in Figure 3, the source of radiant heat 18 is not at any time directly in contact with the edges 13 or 14 which are to be glued together. The source of heat 18, however, is of the open flame type and is contained within the cylinder 20 having the opening 40 and a highly reflective interior surface 41 whereby the heat generated by the heat source 18 is reflected anad directed upon the areas 13 and 14 to be joined. There is no pressure whatever at the time heat is applied.

Obviously it will be seen that the cylinder 20 need not necessarily be truly cylindrical in form. It may be of any cross-sectional arrangement suitable for directing a sufficient amount of radiant heat upon the area to be joined. Thus, a section thereof may, if desired, have a parabolic curve or any other suitable curve or arrangement. If desired, also, suitable prisms or lens systems may be used to effectively localize the heat rays and to insure that they impinge upon and strike through to the proper area.

Also, as above pointed out, in the usual case the wax coated paper to be joined in the manner herein described is either transparent or translucent so that even without direct contact, the radiant heat is enabled to strike through the transparent or translucent sheet to melt the wax to permit the adhesive to bind together the sheets.

Thereafter, whatever pressure is desired is created by the roll 21 registering with the recess 22 wherein the sheet at the joint is not pressed against the former but is bent out of the line which it would normally follow and thus the tendency of the sheet to naturally return to its original position provides a sufficient yielding pressure to insure that the adhesive will strike through the melted wax to secure the sheets together. When the sheet then passes beneath and beyond the roll 21 in the ordinary speed of the process, the wax may not yet have had sufficient time to become hard enough to prevent its running or sticking. If it is permitted to contact or collect upon the former, then the adhesion of the wax to the former would seriously impede the progress of the web and tend to wrinkle or even destroy it.

Accordingly, the slot 23 (Figures 1, 2 and 4) immediately beneath the joint removes any portion of the former to which the wax might conceivably adhere and gives the web sufficient time to dry or re-harden while the web is travelling alone. Accordingly the slot 23 should be of sufficient length to permit the wax to re-harden and the slot 23 may thus, if desired, be continued to the end of the former where the moving web enters upon the succeeding processes of bag formation.

If desired, also, instead of slot 23 a cooling medium may be used, not necessarily in contact with but adjacent to the joint in order to hasten the re-hardening process. This cooling medium may be provided either in the slot 23 or by members adjacent to or supported immediately above that part of the web which extends above the slot 23. Thus for instance, capsules containing dry ice may be mounted in the slot 23 or upon suitable brackets contained therein or the roller 21 which applies the initial yielding pressure which finally effects the seal at the joint may be followed by similar hollow rollers which may be filled with solidified carbon dioxide or various mechanical refrigerating devices may be used in proximity to the joint at a point immediately after the initial yielding pressure is applied.

I have even found it practical to apply dry ice in the roller 21 since the pressure I seek is applied not so much directly by the roller 21 as by the fact that that roller causes the paper to be deflected out of its normal position and the tension generated in the paper by its resistance to such deflection exerts the pressure necessary to cause the glue finally to adhere to opposite sheets of paper.

By the time then that the joint is actually in contact with the roller 21, the glue has already struck through the melted wax and there is no harm done at that time if the wax is suddenly chilled so that the sealing may actually take place by the roller 21 which is the cause of the yielding pressure which I find useful.

Nevertheless, in high speed operation I prefer, in order to insure the effectuation of a complete bond that the chilling operation should take place after the paper has passed the roll 21.

It is obvious of course that many modifications of the particular apparatus and methods shown herein may be used. Thus my machine and method is not necessarily limited to a particular type of heating device. Any open type heating device generating radiant heat which might be directed to a particular area may be used. I need not by the use of this device, have actual contact between the heat element and the sheet itself. In this way any possibility of burning the sheet itself is obviated.

Particularly when the sheet itself is transparent or translucent and thus permits the heat to strike through to the wax coating and melt the same; a process using radiant heat of this type instead of conductive heat generated by contact becomes even more useful.

The application of the yielding pressure may take many forms. However, I prefer that the pressure following the application of heat be a yielding one so that whatever wax is melted will not be forced to flash out upon the joint and thus make the joint uneven.

Although I have particularly described my invention with respect to the formation of a longitudinal seam of wax coated paper bags, it is evident that it can be applied to effect the union of any wax coated paper structure and the primary principles involved are the application of radiant heat without contact, followed by a yielding non-rigid pressure for the purpose of joining the wax coated paper carrying an added adhesive.

Although I have particularly referred to wax coated paper in the specification, it should be understood that this invention applies to the union of any coated materials and more especially to any sheet materials coated with thermosensitive materials. It will be noted that the method and apparatus herein shown effect the parting of the heat sensitive coating on the sheet material to allow the penetration of the added adhesive and that this would be the effect with any coating such as cellulose derivatives, synthetic resins or rubber compounds or any suitable coating materials used in conjunction with paper, regenerated cellulose sheet material including Cellophane, pliofilm, sylph-wrap, paper or any suitable sheet material.

Many other variations and modifications of the apparatus and method herein described will now be obvious. I prefer, however, to be limited not by the specific disclosure herein but only by the appended claims.

I claim:

1. An apparatus of the character described comprising a former, a source of radiant heat directed toward said former, and a recess in said former immediately beyond said source of radiant heat, and a pressure member registering with said recess.

2. An apparatus of the character described comprising a former; an open flame heat source; means for directing the heat radiating therefrom upon a confined area of said former; a recess in said former immediately beyond said source of radiant heat; and a pressure member registering with said recess.

3. An apparatus of the character described comprising a former; a recess in said former; a pressure member registering with said recess; a source of radiant heat immediately before said recess; said heat source comprising an open flame type heater adjacent said former; and an internally polished sheath therefor having an opening directed toward a confined area of said former.

HAROLD E. HALLMAN.