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FLUORESCENT SEAM PASTE

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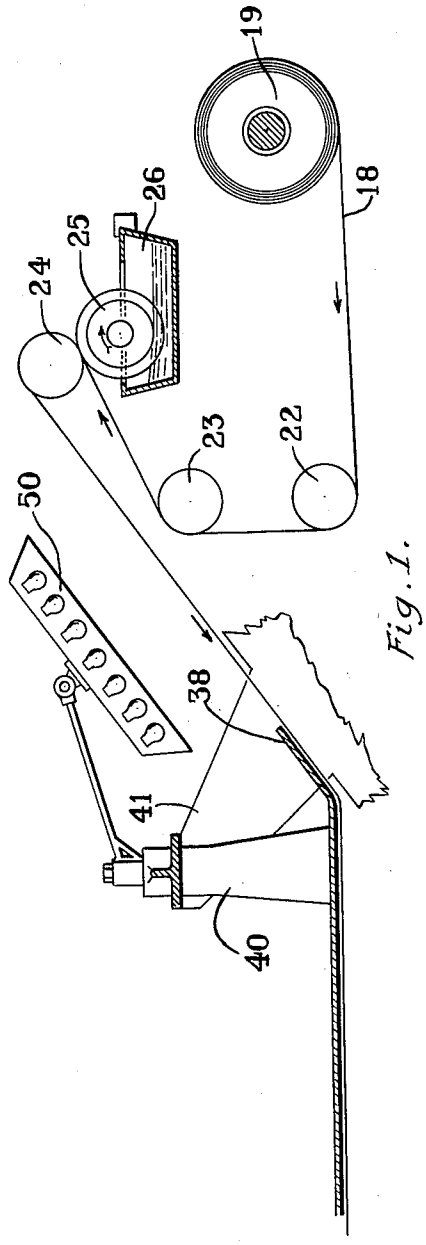


Fig. 1.

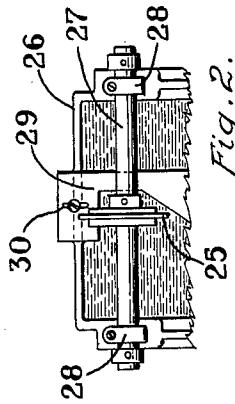


Fig. 2.

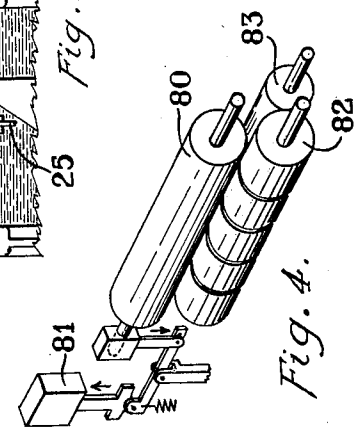


Fig. 4.

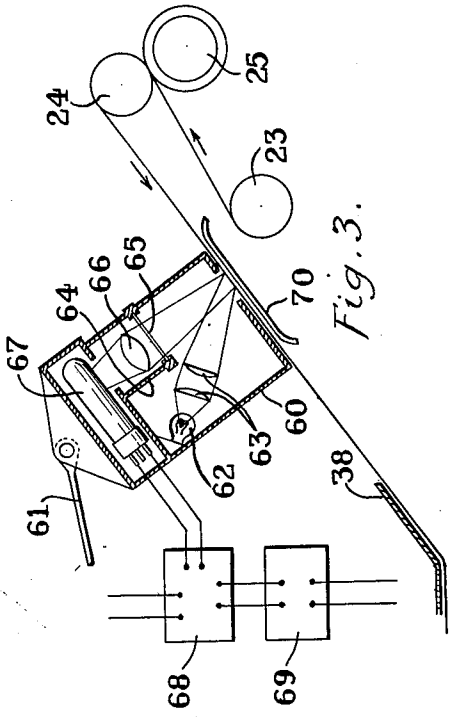


Fig. 3.

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FLUORESCENT SEAM PASTE

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10 Claims. (Cl. 250—71)

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Our invention pertains to an improvement in the making of paper bags and the like.

In the making of paper bags, envelopes, and similar receptacles, machines are used which, prior to folding a continuous web of the paper into a tube, apply seam paste to one margin of the web most practically by means of a disc or cylinder which dips into a paste pot. Obviously, it is desirable to have a continuous seam line so that the individual paper bags or similar receptacles made in this manner can properly serve their purpose.

However, there are several causes for breaking the continuity of the seam line, such as changes in the tension of the web which then momentarily fails to exert enough friction to drive the roller applying the seam paste. Or, especially with porous, low weight kraft paper, paste which penetrates the paper accumulates and dries on the idler bearing against the paste-applying disc, which causes excessive pressure leading to irregularities and even to breakage of the web at the seam line. At other times drying paste accumulates under the scraping device which then removes not only excessive paste from the disc, but all of it or most of it. A still further cause for breaking the continuity of the seam line is the occlusion of fiber or dirt at the scraper, preventing the disc from carrying an uninterrupted line of paste to the web. The incident of these occurrences is relatively high and is a definite problem in the making of paper bags and the like. It is only partly met by random sampling of the finished receptacles.

Since the seam paste is basically colorless and because of the distances which, with most bag machines, separate the operator from the paste applying device, it is difficult for him to note, by glancing back at the seam line, whether it is continuous or not. Often 50 to 100 bags are delivered unglued or imperfectly glued before the machine is stopped to clean the paste applicator or to readjust the tension of the web. It would aid the operator considerably in detecting a faulty seam line if a strong dyestuff were added to the paste. However, this is out of question in most instances because the dye would discolor the bag.

Our invention consists in adding to the seam paste a substance which, under ordinary light, does not change the color of the paste or does not change it materially, but emanates a distinctive fluorescence when exposed to ultra-violet light. By directing a beam of ultraviolet light at the seam paste after it has been applied to the

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web and before the web is folded, because of the color differences between the fluorescent paste and the non-fluorescent paper in ultraviolet light, the operator is able to tell from one fleeting glance whether the paste applicator works properly.

Inasmuch as it is difficult to pay continuous attention to the seam line, there is still a possibility of imperfect bags being produced. We meet this possibility by means of another embodiment of our invention, where, in addition to the fluorescent material in the seam paste and the ultraviolet light source, a photoelectric tube and a relay circuit is employed to stop the machine. The relay circuit is kept open as long as the photoelectric cell registers a constant intensity of light emanating from a regular and unimpaired paste seam, but closes immediately and stops the machine if the intensity of the registered light is diminished, due to an imperfection or interruption of the applied strip of paste.

As a still further improvement we utilize the relay circuit to actuate a solenoid-operated printing roller to mark the web whenever a stop occurs, so that the bag or bags having imperfections can be readily culled as they are delivered by the machine or later.

Broadly, any fluorescent material is potentially useful for the herein-disclosed purpose, although the efficiency of some of them may be low to begin with, or may materially decrease when added to certain binders. Others, having a very strong coloring effect in ordinary light require experimentation in order to find the proper ratio of addition, i. e. the amount which can be added to the binder without changing the color of the paste too much, but still provide a sufficiently high degree of fluorescence. Therefore, the examples given further below are to be understood as illustrating, but in no way limiting the disclosure.

The fluorescent agent can be added to the adhesive so as to be present as a solution, or solid particles of a fluorescent substance can be dispered in the binder. Because of this a great number of fluorescent materials are available for the herein-disclosed purpose, regardless of whether they belong to the group of inorganic phosphors, or consist of a fluorescent dyestuff or any other fluorescent organic material.

The adhesives which are used in the making of paper bags and the like are mostly of the vegetable type, in containing starch which has been degraded through partial hydrolysis by means of

acids, base, or enzymes. Such adhesives may contain resins or proteins in addition to starch and dextrins. More recent adhesives applicable for this purpose are resin solutions in aqueous or organic solvent media. As will be noted from the list below, some of the enumerated fluorescent materials are sulfonic acids. These we find especially useful, not only for the purpose of imparting fluorescence to the paste, but because of their wetting and penetrating properties which greatly enhance the efficiency of the type of adhesives in question.

In case of some highly rosin sized papers it is difficult to lay down a continuous aqueous paste line and to obtain a proper sealing. To overcome the water repellency of such highly rosinated paper, it is the common practice to add certain organic solvents, such as turpentine, to the aqueous seam paste for the purpose of penetrating and partly dissolving the rosin sizing. However, there has been always the difficulty of the solvent separating from the aqueous paste and forming a layer on top. By adding certain fluorescent materials belonging to the group of long chain sulfonic acid compounds, such as, say, the sodium salt of diisobutyl naphthalene sulfonic acid, we are not only able to make the seam paste fluoresce but also to produce a stable emulsion of the orgainic solvent in the seam paste.

The following is a representative list of fluorescent materials which, when incorporated in adhesives of the aforedescribed type, make the seam paste fluoresce in an ultraviolet light beam, without materially changing the color of the paste in white light.

Fluorescent Compound	Solvent	Color of Fluorescence
beta-methyl umbelliferone	dilute alkali	bright blue.
beta-oxy naphthoic acid	alc.+NaOH*	green.
beta-naphthol	alc.+NaOH*	violet.
anthranilic acid	dilute alkali	Do.
sublimed anthracene	alcohol	blue-green.
fluorene	alc.+turpentine	violet.
chlormethyl deriv. of dimethyl dehydrothio-p-toluidine.	alc.+H_2O*	yellow-green.
2-napithylamine-1-sulfonic acid.	alc.+NaOH*	violet.
diisobutyl-naphthalene sulfonic acid.	alc.+naphtha	blue.
sodium salt of diisobutyl-naphthalene sulfonic acid.	H_2O	Do.
sodium salt of 4-4'-dibenzoyl-amino-stilbene-2-2-sulfonic acid.	H_2O	blue-green.
sodium salt of anthraquinone-2-sulfonic acid.	H_2O	Do.
sodium salt of alpha-naphthylamine-4-sulfonic acid.	H_2O	Do.
zinc sulfide phosphor	none; (dispersed)	green.

*The fluorescent material is first wetted with, or dispersed in, the alcohol, whereafter dilute sodium hydroxide or water is added, as indicated, in order to produce a solution.

We find that by preparing 5 per cent solutions of these compounds in the repective solvents and adding 100 cc. of the solutions to 900 cc. of paste, aside from insoluble pigments, such as the listed phosphor of which we disperse 5 gram in about 1000 cc. of paste, a proper degree of fluorescence is attained, as well as an adequate emulsifying effect with those compounds which are long chain sulfonic acids and where, for the sealing of highly rosinated paper web, turpentine is added to the aqueous paste. Depending upon the fluorescent strength of the individual materials, it is obvious that a great latitude exists as to the amount added, while the result will be practically the same. A similar latitude exists as to the basic paste constituents. They may vary, for example, from a 6% solution of Cassava starch to 50% dispersion of dextrin, with or without other of the aforenamed constituents, without an apparent influence upon the strength of fluorescence of the added material.

An an illustration of the manner in which the invention can be carried out, the accompanying drawing shows the commonly used paste applying mechanism of a bag machine together with the means of carrying out the present invention, although it is to be understood that the invention is equally applicable to other bag machines and for purposes other than making paper bags.

In the drawing, Fig. 1 is a longitudinal section of part of a bag machine comprising the hereindisclosed improvement.

Fig. 2 is a top view of the paste applying device.

Fig. 3 is a part sectional and part diagrammatic view of an embodiment of the present invention providing for automatic stoppage of the machine in response to an imperfection in the applied seam line.

Fig. 4 is a perspective view of an embodiment comprising means for marking the web in response to an imperfection in the applied seam line.

Referring more particularly to Fig. 1, the paper or other material which is to form the bags is fed as a web **18** from the roll **19** by means of pull exerted upon the web. The web passes over the guide rollers **22** and **23** and over another roller **24** which reverses the direction of movement. A paste applying disc **25** is arranged to make contact with the web coming from roller **23**. The said paste applying disc is located close to one of the edges of roller **24** so that it is actuated by bearing upon the web in contact with the said roller. The disc **25** dips into a paste-pot **26**.

As shown in greater detail in Fig. 2, the paste applying disc **25** is provided with a shaft **27**, inserted into bearings **28** which constitute part of the side walls of the paste-pot **26**. Fig. 2 shows also the details of the scraping device **29**, consisting of a piece of flat metal, suitably slotted to remove excess paste from the disc as its edge emerges from the paste. A slot and screw **30** provide for any necessary adjustment.

After receiving the seam line and passing over the roller **24**, the web is delivered to other elements of the machine, such as the former plate **38**, under which the web passes in order to be formed into a tube which is severed into individual pieces the bottoms of which are then closed by usual means.

The former plate **38** is supported from a bridge **40**, which is carried by arms **41**, projecting forwardly and upwardly from the framework of the machine. In this embodiment the unobstructed distance of travel of the web between the roller **24** and the tip of the former plate **38** facilitates the throwing of a beam of ultraviolet light at the seam line. Depending upon the type of ultraviolet material which has been added to the paste in pot **26**, the seam line will glow, especially in subdued light, in a brilliant hue, making an discontinuity or imperfection immediately noticeable. Mercury arc lamps radiating through quartz can be used as the source, or the ultraviolet light can be obtained from a carbon arc or carbon filament lamp, having a colored glass filter which removes most of the visible rays emanating from the lamp. The nu-

meral 50 indicates an assembly of several ultraviolet light sources, fastened to the center post of the bridge 40, and throwing, aided by an aluminum reflector, an elongated beam of ultraviolet light laterally at the seam line, so that a relatively long portion thereof is exposed to the ultraviolet light and the observation is unobstructed.

The embodiment of Fig. 3 shows a box 60 positioned over the web in alignment with the seam line within the unobstructed distance of travel between the roller 24 and the tip of the former plate 38. The box is carried by a support 61 fastened to the bridge 40 and is open or partly open at the bottom so that a beam of ultraviolet light, emanating from the source 62 inside the box can be directed at the paste line passing underneath the box. Inserted in the beam is the lens pair 63, preferably made from quartz, which produces an image of the light source at the paste line. A partition 64 divides the box into compartments; one for the aforementioned ultraviolet light assembly. Because of the partition reaching only part of the way down from the top of the box, visible radiation emanating from the seam paste under the influence of the ultraviolet light is able to enter the other compartment through an ultraviolet absorbing filter 65, such as the Wratten Filter 2A of the Eastman Kodak Company. After passing the condensing lens 66 arranged inside the second compartment the visible radiation from the seam paste is registered by the photoelectric cell 67. The latter is connected to a relay circuit, comprising as elements a power amplifier 68 and a relay 69, by means of which the power supply of the motor running the bag machine is shut off the moment there is a change in the light intensity registered by the photoelectric cell. In order to keep the web as close as possible to the bottom of the box so as to avoid entry of stray light, we find it advantageous to mount a slide plate 70 underneath the web in alignment with the box opening, or an endless guide blanket travelling over 2 roller. In addition, strips of felt or other material can be attached to the lower edges of the box so that they touch the moving web and prevent entry of stray light.

Fig. 4 depicts a device for marking the web until the machine is brought to a stop after an imperfection has occurred in the applied seam line. For this purpose a roller 80 is arranged to bear lightly against the web or to be close to the web, preferably within the unobstructed distance of travel between the roller 24 and the tip of the former plate 38 and after the web has passed the photocell assembly shown in Fig. 3. Simultaneously with a shut off of the power supply in response to an irregularity of the paste line, the axle of this roller is lowered, by means of two toggle solenoids, one of which is illustrated at 81, actuated by the aforementioned relay circuit, or by other known means, until the roller 80 bears, with the intervening web, against the printing roller 82, having an ink supply roller 83 adjacent thereto.

We claim:

1. In a bag machine the combination with bag tube forming mechanism, means for feeding a web to said mechanism, and a paste-applying disc near one edge of the web, of a supply of paste containing an agent reflecting visible light under the influence of ultraviolet light, and an ultraviolet light source throwing a beam at the paste line of the web moving from the said paste-applying disc to the said tube forming mechanism.

2. In a bag machine the combination with bag tube forming mechanism, means for feeding a web to said mechanism, and a paste-applying disc near one edge of the web, of a supply of paste containing an agent reflecting visible light under the influence of ultraviolet light, an oblong aluminum reflector fastened laterally above the seam line, and, arranged within the reflector, a plurality of ultraviolet light sources throwing an elongated beam at the paste line on the web moving from the said paste-applying disc to the said tube forming mechanism.

3. In a bag machine the combination with bag tube forming mechanism, means for feeding a web to said mechanism, and a paste-applying disc near one edge of the web, of a supply of paste containing an agent reflecting visible light under the influence of ultraviolet light, a photosensitive device comprising a box arranged in position adjacent to the web moving from said paste-applying disc to said tube forming mechanism, said box containing a bottom aperture in alignment with the seam paste applied to the web, a source of ultraviolet light throwing a beam at the said aperture, a partition holding a filter absorbing ultraviolet light but passing visible light and a photoelectric cell arranged to register visible light reflected from the seam paste under the influence of ultraviolet light and passing through the said filter, and circuit means including a power amplifier for signals from the photoelectric cell and a relay shutting off the power supply of said web feeding means in response to changes in the light intensity registered by the photoelectric cell.

4. The combination of claim 3, comprising a printing roller underneath the web moving from the paste-applying disc to the tube forming mechanism, the said printing roller being dissociated from the web during normal operation, and another, solenoid actuated roller, arranged to move between fixed limits and to bear against the web and the said printing roller in response to changes in the light intensity registered by the photoelectric cell.

5. The improvement in the method of continuously making bags from a paper web, consisting in adding to the paste for joining the side walls of the bags a fluoroscent agent which does not materially change the color of the paste when viewed in white light but causes a paste line applied to the web to be distinctly visually different from the web when exposed to ultraviolet radiation, exposing to such ultraviolet radiation consecutive sections of the moving web having a paste line applied thereto, and observing the paste line for continuity.

6. The improvement according to claim 5, the fluoroscent agent being zinc sulfide phosphor.

7. The improvement according to claim 5, the fluoroscent agent being the sodium salt of diisobutyl-naphthalene sulfonic acid.

8. The improvement according to claim 5, the fluoroscent agent being a five per cent solution of beta-naphthol in alcoholic sodium hydroxide of which 100 cc. is added to 900 cc. of paste.

9. The improvement in the method of continuously making bags from a paper web, consisting in adding to the paste for joining the side walls of the bags a fluoroscent agent which does not materially change the color of the paste when

viewed in white light but causes a paste line applied to the web to be distinctly visually different from the web when exposed to ultraviolet radiation, exposing to such ultraviolet radiation consecutive sections of the moving web having a paste line applied thereto, and employing electric signals generated by a photoelectric cell responsive to changes in the intensity of visible light reflected by the paste line to bring the moving web to a stop.

10. The improvement in the method of continuously making bags from a paper web, consisting in adding to the paste for joining the side walls of the bags a fluoroscent agent which does not materially change the color of the paste when viewed in white light but causes a paste line applied to the web to be distinctly visually different from the web when exposed to ultraviolet radiation, exposing to such ultraviolet radiation consecutive sections of the moving web having a paste line applied thereto, and employing electric signals generated by a photoelectric cell responsive to changes in the intensity of visible light reflected by the paste line to mark the moving web until it is brought to a stop.

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