Sept. 25, 1962 C. C. BOLYARD 3,055,797

METHOD OF MANUFACTURING SEQUIN IMPREGNATED TISSUE PAPER

Filed March 18, 1957 2 Sheets-Sheet 1

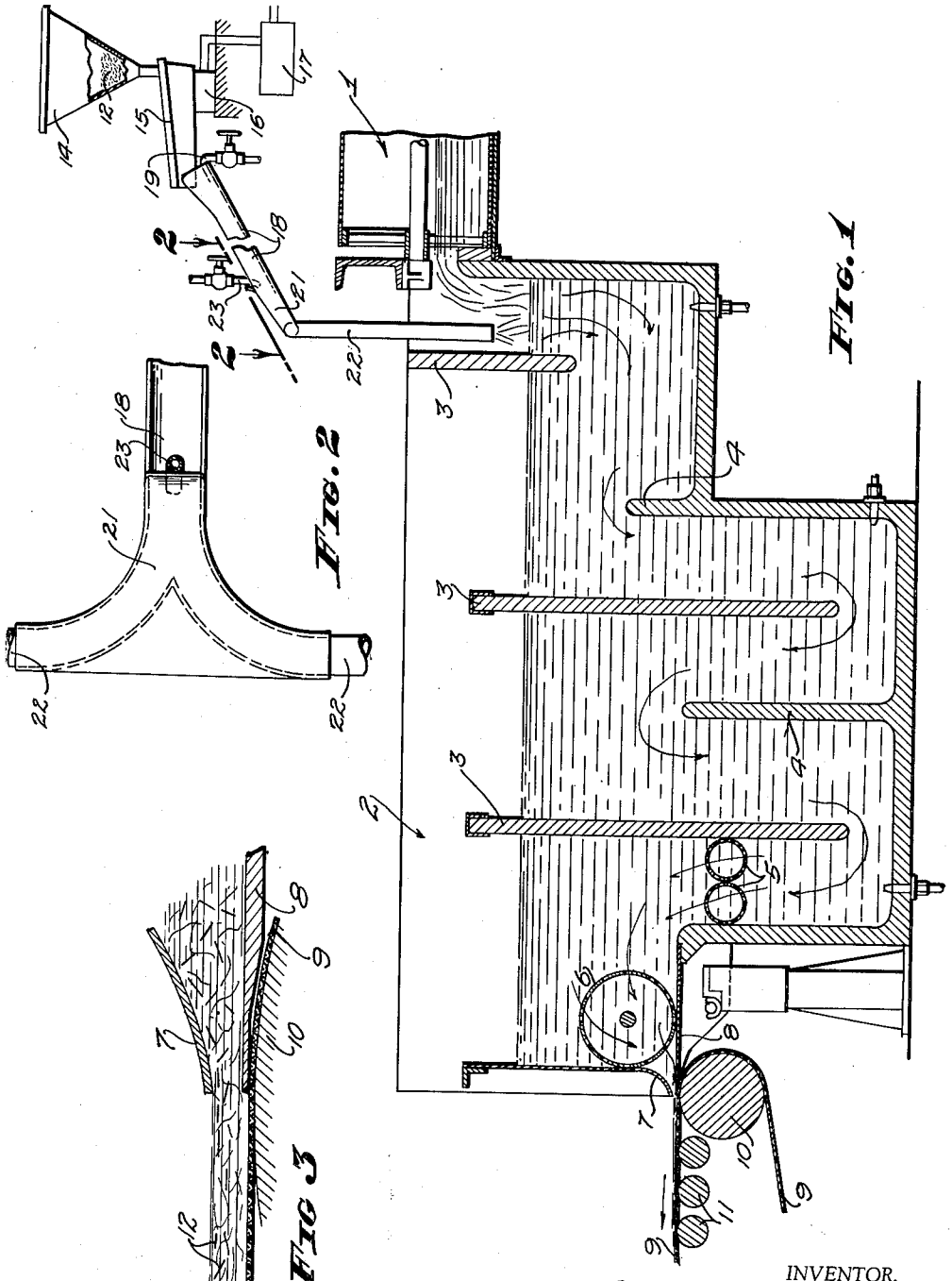


FIG. 1

FIG. 2

FIG. 3

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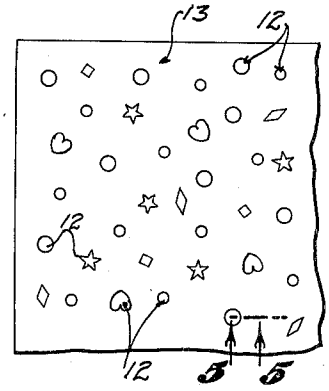


FIG. 4

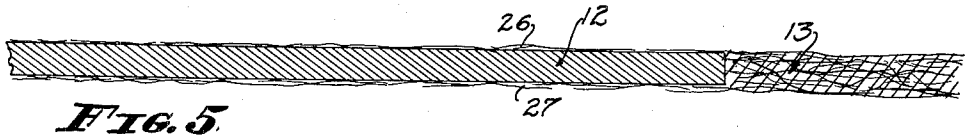


FIG. 5

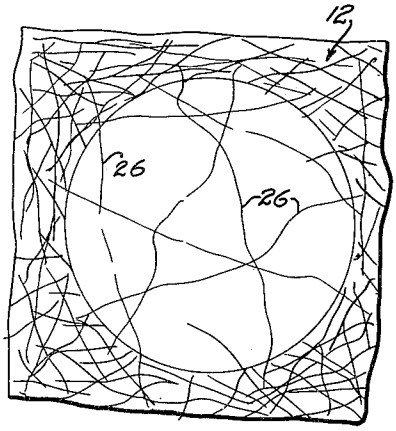


FIG. 6

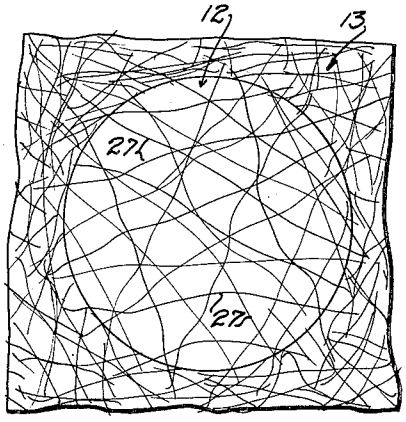


FIG. 7

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METHOD OF MANUFACTURING SEQUIN IMPREGNATED TISSUE PAPER

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Filed Mar. 18, 1957, Ser. No. 646,853
7 Claims. (Cl. 162—181)

This invention relates to method of manufacturing sequin impregnated tissue paper, and is a continuation-in-part of the copending application Serial No. 548,432, filed November 22, 1955, now U.S. Patent No. 2,949,398, for "Sequin Impregnated Paper and Process for Making."

Included in the objects of this invention are:

First, to provide a method of manufacturing sequin impregnated tissue paper wherein sequins are premixed with water, maintained in an agitated condition, and introduced simultaneously with, but separate from, stuff and water into the header box and caused to flow with the stuff and water through the header box and discharge through a slice at high velocity onto the traveling wire screen of a Fourdrinier paper making machine.

Second, to provide a method of manufacturing sequin impregnated tissue paper wherein air is introduced in the flow of stuff and sequins through the header box at points wherein concentration of sequins tends to occur to redistribute the sequins.

Third, to provide a method of manufacturing sequin impregnated tissue paper wherein the sequins are introduced in a region of maximum agitation and at a region of minimum stuff concentration; that is, in the region wherein the water content is in the range between 99.7% to 99.95% water, the remaining fraction of percent being the tissue paper stuff.

Fourth, to provide a method of manufacturing sequin impregnated tissue paper having anodized and dyed aluminum sequins of approximately the thickness of the finished tissue paper in which the proportion of weight of sequins to tissue paper stuff is approximately 6% and the percentage of sequins to the water and stuff being between .018% to .003% by weight.

Fifth, to provide a method of manufacturing sequin impregnated tissue paper wherein the sequins are jetted at high velocity through the slice and tend, on emerging from the slice, to seek preferentially the top surface of the paper so that the sequins are more conspicuously visible from the top side of the finished tissue sheet.

Sixth, to provide a method of manufacturing sequin impregnated tissue paper wherein fibers of the paper stock interlace over the surfaces of the sequins, but more so over the under surfaces thereof, so that the sequins are entrapped in the paper to withstand handling of the paper and the wrapping of packages therewith.

With the above and other objects in view, as may appear hereinafter, reference is directed to the accompanying drawings in which:

FIGURE 1 is a diagrammatical sectional view showing a typical header box and receiving end of a Fourdrinier paper making machine, and indicating the apparatus whereby sequins are introduced into the header box;

FIG. 2 is a substantially diagrammatical, sectional view through 2—2 of FIG. 1, showing the manner in which the flow of sequins and water are divided to effect initial distribution into the header box;

FIG. 3 is an enlarged, fragmentary, diagrammatical, sectional view showing the receiving end of a Fourdrinier wire machine and slice, illustrating the discharge of the water, stuff, and sequins onto the wire;

FIG. 4 is a fragmentary view of the sequin impregnated tissue paper;

FIG. 5 is a greatly enlarged, substantially diagrammatical, fragmentary, sectional view taken through 5—5 of

FIG. 4, showing a sequin and adjacent portion of the paper;

FIG. 6 is an enlarged, fragmentary, top view of a sequin and adjacent portion of the tissue paper;

FIG. 7 is a similar bottom view of a sequin and adjacent portion of the tissue paper.

Tissue paper manufactured by use of a Fourdrinier machine involves the preparation of suitable stuff, mixing the stuff with water, and passing the mixture through suitable wire scerening units 1 which discharge into a header box 2. Here the mixture is passed under and over a series of baffles 3 and 4, and through perforated distributor rolls 5 and 6 submerged in the flow passage of the mixture.

The water and stuff then pass between a slice 7 and an apron 8 onto a wire screen 9 of a conventional Fourdrinier machine, as the wire 9 completes passage around a breast roll 10. The wire 9 passes over a plurality of table rolls 11, under a dandy roll (not shown), around a couch roll (not shown), and then between suitable tensioning rolls back to the breast roll.

The mixture on entering the header box 2, as well as on leaving the slice, is approximately 99.7% to 99.95% water and only 0.3% to 0.05% stuff. An optimum mixture contains between 99.8% and 99.9% water. Water is drained from the stuff as it passes with the wire along the table rolls 11 until at the dandy roll the water content is about 80% and the stuff 20%.

At an approximate point beyond the dandy roll the stuff, now essentially a paper web, is stripped from the wire and fed into a drying machine (not shown). Initially the paper web is carried on belts of felt, but eventually, in the drying and finishing process, the paper passes between steel finishing rolls which exert high pressure on the paper.

In the exercise of the present invention, sequins 12, preferably in the form of aluminum foil of approximately the thickness of the finished tissue paper 13, and are of predetermined size and shape; that is, the sequins are cut in various patterns, such as various geometrical shapes, stars, hearts, etc., as shown in FIG. 4. The aluminum foil stock is anodized and dyed in various attractive colors.

Care is taken to cut single thicknesses of aluminum foil, otherwise there is danger that laminations of foil will not separate. If not, the excessively thick foil is flattened by the finishing rolls of the paper making machine, making unattractive blotches in the tissue paper.

The sequins 12 are fed in a dry condition in a hopper 14, and discharge into a shaker pan 15 mounted on a suitable vibrator 16, the amplitude or frequency of which may be regulated by a suitable control 17. The sequins are shaken from the pan 15 into an inclined trough 18 into which water from a supply pipe 19 is fed. The water and sequin mixture flows down the chute or trough 18 to a divider 21 which divides the mixture equally for flow through pipes 22. Additional water from a supply pipe 23 is preferably introduced just prior to the divider 21 to further aid the flow and facilitate equal division of the water and sequins into the pipes 22.

The pipes 22 discharge into the header box 2, preferably immediately above the regions at which the water and stuff enter. In these regions there exists a maximum amount of agitation which ensures maximum distribution of the sequins.

In the course of flow of the sequins, stuff, and water through the header box, air is introduced from nozzles 24 located wherever the sequins may tend to concentrate or settle out due to insufficient agitation.

The mixture of water, stuff, and sequins discharges at relatively high velocity between the slice 7 and the apron 8 onto the wire 9 of the Fourdrinier machine. The mixture is approximately 99.8% or 99.9% water, that is, the

pulp constitutes only one or two tenths of a percent stuff. The percentage of sequins by weight is approximately 6% of the weight of stuff; so it can be seen that the percentage of sequins issuing with the water constitutes only a small fraction of the liquid and solid material discharged under the slice 7.

In the manufacture of tissue paper, the Fourdrinier wire travels at approximately 600 ft. per minute. The thickness of the stuff and sequin-laden water stream on issuing is approximately ⅛" to 3/16". During travel of the mixture on the wire 9, most of the water drains through the wire so that at the discharge end of the wire the water content has dropped to approximately 80% and the web comprising the 20% stuff and sequins is approximately .001" or .002" thick, or not greatly in excess of the thickness of the final paper.

It has been found that when the Fourdrinier wire is operated at a relatively high surface speed, such as 600 ft. per minute, and the head of liquid behind the slice 7 is maintained at a sufficient value to sustain the flow of water, stuff, and sequins onto the Fourdrinier wire, that the sequins tend to seek the upper layer, so that when finally felted into position at the discharge end of the Fourdrinier wire a substantially larger percentage of the sequins are located at the upper surface of the paper. Ths phenomenon does not occur at lower speeds employed in the production of paper heavier than tissue paper. In other words, this phenomenon occurs in the manufacture of sequin impregnated tissue paper ranging from 10 to 16 lbs. in weight, but does not occur, or is far less prominent, when the machine is operated at a slower speed to produce paper in the range of 30 lb. weight.

The tendency of the sequins to seek the upper surface of the paper enables them to stand out brightly against the paper background, and to give the tissue paper "right and wrong" sides. The result is that a sequin impregnated tissue paper of superior quality is produced.

As pointed out previously, the sequins are preferably formed of aluminum foil of approximately the thickness of the finished tissue paper. The diameter of the sequins may vary from 1/32" to 3/16". The sequins are not necessarily exactly the thickness of the finished paper; for example, the tissue paper may have a normal thickness of .0017" whereas the sequins may be as thick as .0024".

The sequins are, in any case, covered on both sides by fibers of the tissue paper. These fibers are of microscopic size. By reason of the fact that the sequins tend to seek the upper surface of the tissue paper, the fibers, designated 26, which extend over the upper surfaces of the sequins, are gossamer, and, as indicated in FIG. 6, are scarcely visible and offer virtually no obstruction to the reflection of light from the sequins. On the other hand, the fibers, designated 27, underlying the underside of a sequin, are greater in number, as indicated in FIG. 7. The fibers 26 and 27 tend to imprison the sequins so that the tissue paper may be used for its various intended purposes, such as wrapping, without appreciable loss of the sequins.

It should be noted that while a large majority of the sequins have a substantially lesser number of overlying fibers on their upper sides, this is not necessarily true of all of the sequins, for there is a precentage of sequins which are not as favorably located in the tissue paper. The essential fact is, however, that in the manufacture of sequin impregnated tissue paper as distinguished from heavier bodied paper, there is a substantially larger percentage of sequins exposed prominently at the upper surface of the paper.

Also, it should be noted that the original shapes and sizes of the sequins are not altered in the flow through the header box and slice onto the Fourdrinier wire. This is true of even pointed or star-shaped sequins.

It should be noted that the diagrammatical view in FIG. 1 (excluding the sequin-handling apparatus) represents substantially a paper making machine which is a Fourdrinier-type paper machine manufactured by Bagley-Sewall of Watertown, New York, No. N–4–189, and was originally installed about February 18, 1927, and known as the No. 2 machine of the Columbia River Paper Mill at Vancouver, Washington. On installation of the sequin-handling apparatus, this machine was used to produce successfully sequin impregnated tissue paper.

While the method of manufacture of the sequin impregnated tissue paper is best carried out by use of a Fourdrinier machine, the method is adaptable to other types of paper making machines, providing that in the sequence of apparatus there is a region of great agitation of the stuff and water into which the sequins may be added.

For example one type of conventional machine utilizes a cylindrical drum of large diameter having a wire screen or perforated surface. The drum rotates within a header box partially submerged in the stuff and water. A vacuum pressure is maintained within the cylindrical drum so that the water is drawn through the walls of the drum causing the stuff to deposit on the external surface of the drum. The resulting web is removed from the exposed upper portion of the drum and fed to drying and processing machines, similar to those employed in connection with a Fourdrinier machine.

In the exercise of my invention by use of such cylinder drum-type paper making machine, the sequins are introduced into the header box containing the drum at a region of great agitation, or introduced into the conventional beater boxes which may precede the header box. The essenital fact being that the sequins are thoroughly agitated and mixed with and dispersed throughout the water and stuff prior to the settling or felting of the stuff on the cylindrical drum.

Sequin impregnated tissue paper made on the cylindrical drum-type of machine tends to be of lower quality for the reason that the sequins do not appear to deposit preferentially closer to one surface than the other of the tissue paper. That is, there is a tendency for both surfaces of each sequin to be covered by an excess of fibers which dulls the appearance of the paper or requires a larger percentage of sequins to obtain the same effect as that obtained with the use of a Fourdrinier machine.

One reason for this may be due to the fact that in the Fourdrinier machine the initial sheet of water, stuff, and sequins has a predetermined initial thickness delivered by the slice. A limited quantity of water drains downwardly through each unit area of stuff, It must, however, flow around the sequins; therefore, there is a possible "washing" of some fibers from the top sides of the sequins by the small quantity of water which must flow over the surface of the sequins in order to pass downwardly through the Fourdrinier wire.

The cylindrical drum, on the other hand, is submerged in the water and stuff and is thus surrounded by a large quantity of stuff which can, and probably does, replace the fibers that would otherwise be "washed" or displaced from the eventual upper surfaces of the sequins. In any case, it has been observed that there is a greater percentage of "bright" or only lightly covered sequins when the Fourdrinier machine is utilized as compared to the cylindrical drum-type of machine.

While a particular embodiment of this invention has been shown and described, it is not intended to limit the same to the exact details of the construction set forth, and it embraces such changes, modifications, and equivalents of the parts and their formation and arrangements as come within the purview of the appended claims.

What is claimed is:

1. A method of manufacturing sequin impregnated tissue paper, characterized by: cutting sequins from foil stock having approximately the thickness of finished tissue paper; mixing the sequins with water in sufficient quantity to be readily and individually visible throughout the area of the finished paper; introducing the sequin-water mixture into the header box of a paper making machine

simultaneously with and in the region of introduction of stuff and water therein, whereby the sequins are immediately distributed throughout the water with the stuff; maintaining the sequin, stuff, and water mixture agitated during flow through the header box; and discharging the sequin, stuff, and water mixture through a slice onto the wire of a Fourdrinier paper making machine.

2. A method of manufacturing sequin impregnated tissue paper, characterized by: introducing into tissue paper stuff a water mixture comprising between 99.7% and 99.95% water, 0.3% and 0.05% stuff, and less than .03% of sequins cut from anodized aluminum foil having a thickness approximating that of the finished tissue paper; agitating said mixture of sequins, stuff, and water; then discharging through a slice onto a Fourdrinier wire; and then permitting drainage of water through said wire to cause settling of the sequins and stuff fibers into a blanket wherein the fibers of the stuff underlie the sequins to secure the sequins therein.

3. A method of manufacturing sequin impregnated paper wherein a stuff and water mixture is passed through a header box and slice onto a Fourdrinier wire, characterized by: introducing into said header box simultaneously with said stuff and water a mixture of sequins and water; dispersing the sequins throughout the stuff and water mixture by agitated flow of the mixture through the header box; introducing air into the header box to break up concentrations of the sequins; and discharging the sequins with the stuff and water through the slice onto the Fourdrinier wire, the quantity of sequins being sufficient to be readily and individually visible throughout the area of the finished paper.

4. A method of making sequin impregnated paper, comprising: dispensing into the stuff during its flow between the header box and the slice a quantity of sequins; agitating the stuff and sequins to effect an intimate mixture, thereby to entrain the sequins with the fibers and filaments comprising the stuff; and discharging the stuff and entrained sequins through the slice onto a paper making machine, the quantity of sequins being sufficient to be readily and individually visible throughout the area of the finished paper.

5. In a method of making sequin impregnated paper, wherein stuff is passed from a header box through a slice onto paper making machinery and is agitated in its course of flow to the slice, the step of: introducing sequins into the stuff adjacent a region of agitation to effect intermingling of the stuff and sequins, the quantity of sequins being sufficient to be readily and individually visible throughout the area of the finished paper.

6. A method of making sequin impregnated tissue paper, comprising: agitating a stuff and water; introducing sequins into the agitated stuff and water to effect an intimate mixture of stuff and sequins and dispersal of the stuff and sequins; depositing the stuff and sequins on a porous member by flow of the water through said member, to form a web of predetermined thickness; and removing the resulting web for drying and pressing into tissue paper sheet, the quantity of sequins being sufficient to be readily and individually visible throughout the area of the finished paper.

7. A method of making sequin impregnated tissue paper, comprising: agitating a stuff and water; introducing sequins into the agitated stuff and water to effect an intimate mixture of stuff and sequins and dispersal of the stuff and sequins; depositing the stuff and sequins on a porous member by flow of water through said member until a web approximating the thickness of said sequins is deposited; and removing the resulting web for drying and pressing into tissue paper sheet of approximately the thickness of said sequins, the quantity of sequins being sufficient to be readily and individually visible throughout the area of the finished paper.

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