July 11, 1939. W. F. H. MATTLAGE 2,165,286

SHEET MATERIAL

Filed Oct. 31, 1936 2 Sheets-Sheet 1

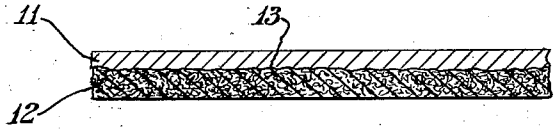


Fig. 1

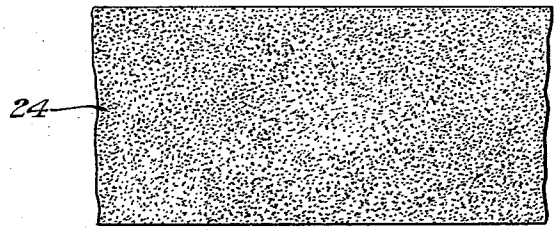


Fig. 2

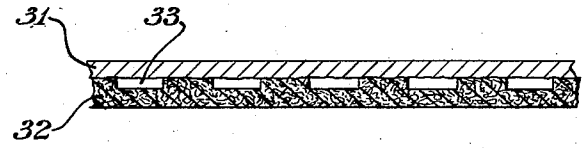


Fig. 3

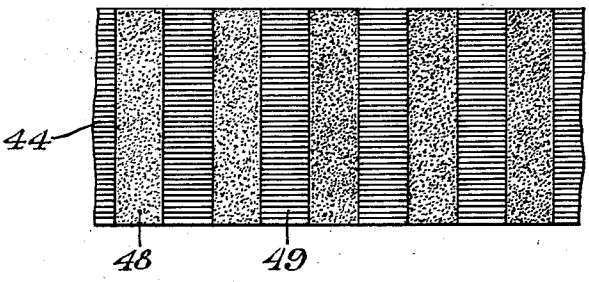


Fig. 4

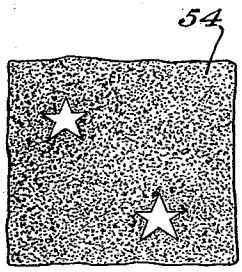


Fig. 5

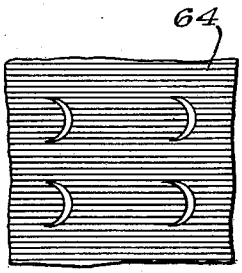


Fig. 6

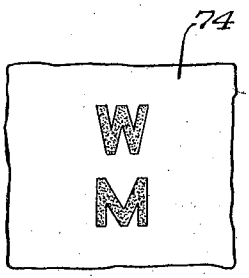


Fig. 7

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SHEET MATERIAL

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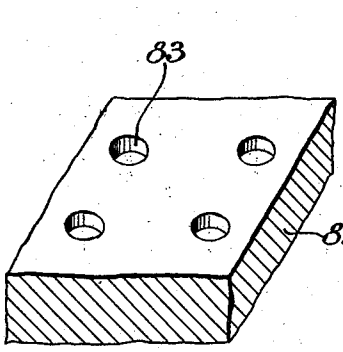


Fig. 8

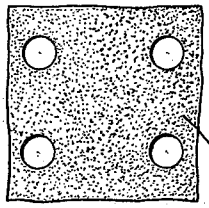


Fig. 9

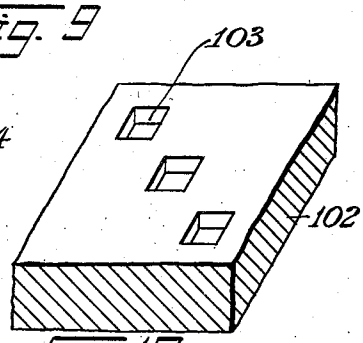


Fig. 10

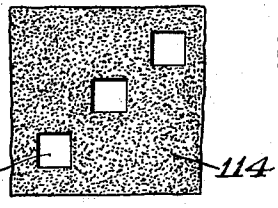


Fig. 11

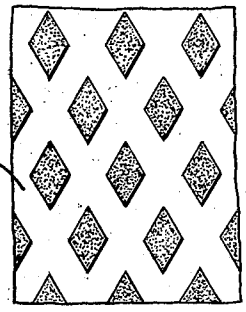


Fig. 12

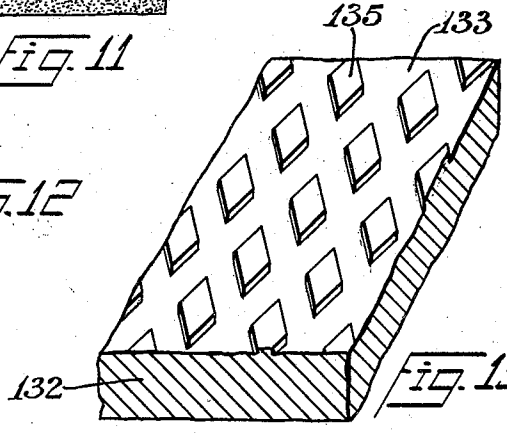


Fig. 13

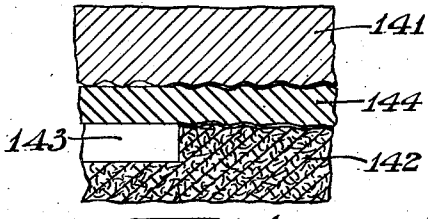


Fig. 14

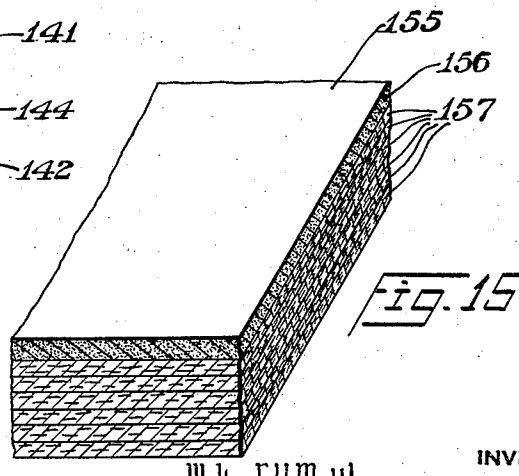


Fig. 15

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UNITED STATES PATENT OFFICE

2,165,286

SHEET MATERIAL

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Application October 31, 1936, Serial No. 108,589

5 Claims. (Cl. 101—32)

This invention relates to embossed sheet material having a surface pattern, and more particularly to a process for producing patterns in continuous sheet material by embossing.

In producing surface pattern effects on coated flexible sheet material by means of embossing, two types are commonly used; namely, roller embossing and plate embossing. In the roller embossing engraved metal (steel) rolls are used with counter rolls, the latter being usually made of paper discs placed in direct contact with each other under high pressure on a steel mandrel. Frequently the engraved roll is heated, usually with steam, and the paper roll carries the pattern counter to the pattern on the steel roll. In producing the pattern on the coated material it is passed between the rolls with sufficient pressure to produce the desired pattern. The paper roll can of course be used with only a single design. The steel embossing roll and the counter paper roll for any particular design represent a substantial investment. Roller embossing is not entirely satisfactory for many patterns since the very short contact of the material being embossed between the rolls does not produce the desired sharpness of design that is required in many patterns.

In the so-called plate embossing a press is used. The upper jaw of the press holds the metal plate (sheet) on which is engraved or electroplated the pattern of the design which is to be embossed on the sheet material. This metal plate is placed adjacent to a steam chest which forms part of the upper jaw of the press. On the lower jaw of the press is a felted fibrous sheet commonly known as the bed. This bed carries the counter of the design on the upper metal plate.

In producing an embossed pattern on sheet material the material is passed between the jaws, the jaws brought together at a predetermined pressure and after the design has been produced are again released and the process thus continued. Press embossing produces clearer, more distinct and more durable and natural effects or designs than can usually be produced by roller embossing. Further the cost of the embossing plates and the so-called bed for a particular design is less than one-fifth the cost of an engraved roll and the necessary counter roll. For these and other reasons embossing presses are preferred to roller embossing wherever practical.

This invention had for an object the provision of a process for producing embossing effects, designs and patterns on sheet material. Further objects were the provision of a method for producing embossing effects and designs by the use of a combination of two embossing plates, the provision of a method for producing novel striped embossing effects on sheet material which avoids the necessity of obtaining new embossing plates for each design combination, the provision of an embossing process whereby the same embossing plate may be used to produce more than one pattern, and the provision of an embossing process whereby the same embossing bed may be used to produce more than one pattern. Still further objects were to devise embossing processes wherein the embossed pattern does not correspond to the embossing plate producing it, wherein the embossed pattern is produced by embossing with a plurality of embossing plates and wherein embossings consisting of combinations of the designs of various embossing plates could be produced without the modification of the embossing plates or other portions of the embossing apparatus.

A general advance in the art and other objects which will appear hereinafter are also contemplated.

The foregoing objects and the related ends are accomplished in the manner set out in the following description in which details of what is believed to be the best mode for carrying out the invention are disclosed.

In general the invention is carried out by embossing sheet material, which may be plain or may have been previously embossed either by plate or roller embossing by pressing it between the embossing plate and an embossing bed, the bed being of the type wherein a portion facing the embossing plate has been removed. The objects of the invention are also realized by embossing the sheet material in an overall design and then re-embossing predetermined portions of the embossed surface, which predetermined portions are controlled by the partial removal of the embossing bed used in the re-embossing operation. The embossing plate employed in the re-embossing operation produces an embossed effect or design which entirely obliterates the original design on that portion which is re-embossed.

In the accompanying drawings,

Figure 1 represents a section through an embossing plate pressed against an embossing bed.

Figure 2 represents a fabric which has been embossed by pressing it between an embossing plate and an embossing bed of the type illustrated in Figure 1.

Figure 3 represents a section through an embossing plate pressed against an embossing bed. The embossing bed represented in this figure is

of the type illustrated in Figure 1 after portions of the bed have been removed.

Figure 4 represents the fabric of Figure 2 after it has been embossed a second time by pressing it between an embossing plate and an embossing bed of the type illustrated in Figure 3.

Figure 5 represents a fabric which has been embossed by pressing it between an embossing plate and an embossing bed generally similar to those represented in Figure 3. In this case, portions of the embossing bed have been removed to form a design composed of stars.

Figure 6 represents a fabric which has been embossed by pressing it between an embossing plate and an embossing bed generally similar to those represented in Figure 3. In this case, portions of the embossing bed have been removed to form a design composed of crescents.

Figure 7 represents a fabric which has been embossed by pressing it between an embossing plate and an embossing bed generally similar to those represented in Figure 3. In this case, portions of the embossing bed have been removed to form a design composed of letters.

Figure 8 represents (diagrammatically) an embossing bed, portions of which have been removed by drilling circular holes in the same.

Figure 9 represents an embossed fabric similar to those of Figures 5, 6 and 7 in which the embossing bed illustrated in Figure 8 has been used in the embossing.

Figure 10 represents (diagrammatically) an embossing bed, portions of which have been removed by cutting square holes in the same.

Figure 11 represents an emboseed fabric similar to those of Figures 5, 6 and 7 in which the embossing bed illustrated in Figure 10 has been used in the embossing.

Figure 12 represents an embossed fabric similar to that represented in Figures 5, 6 and 7 in which portions of the bed used for the embossing have been removed leaving parallel rows of diamond shaped contacting surfaces.

Figure 13 represents (diagrammatically) a portion of the embossing bed used in embossing the fabric of Figure 12.

Figure 14 represents (diagrammatically) a section (not necessarily drawn to scale) through an embossing plate, fabric being embossed and an embossing bed having cutaway portions.

Figure 15 represents more or less diagrammatically a portion of an embossing bed having no cutaway portions.

Similar characters refer to similar parts throughout the several views. In Figure 1 there is shown more or less diagrammatically an embossing plate 11 and an embossing bed 12. Embossing plates are usually made of metal and because of their thickness are very rigid. An embossing bed is usually composed of a base portion of paper laminations indicated at 157 in Figure 15 and an embossing plate contacting surface of resilient high grade felt indicated at 156. When new, an embossing bed has a smooth surface as indicated at 155. In ordinary practice an embossing plate is pressed against an embossing bed to form thereon a counter surface as shown in Figure 1 where 13 indicates the contacting surfaces. Thereafter the embossing plate and its bed are utilized in embossing by pressing the material to be embossed between the plate and the bed. The relation of the parts may be clearer from Figure 14 in which 141 represents an embossing plate, 144 the material being embossed and 142 the embossing bed. After the material to be embossed has been properly pressed between the plate and the bed, the design of the plate is left on the starting material, as shown at 24 in Figure 2.

Embossing plates are quite expensive and in the past have been a considerable item of expense to the manufacturer of embossed material. This necessarily followed because heretofore it was believed that an embossing plate could be used for only one design. As is well known to those skilled in the art, it was necessary to purchase large numbers of embossing plates from time to time because of the seasonal character of embossed goods. It has now been discovered that the same embossing plate may be used for the production of an almost unlimited series of designs by appropriate alteration of the contacting surface areas of the embossing beds which are relatively inexpensive.

In practicing this invention portions of the embossing bed surface which ordinarily face the embossing plate are removed in any desirable manner as, for example, by cutting, milling, boring and the like. This is illustrated in Figure 3 wherein 31 indicates an embossing plate and 32 indicates an embossing bed having portions removed as indicated by the numeral 33. This feature is shown on a larger scale in Figure 14 in which a portion 143 of the embossing bed 142 has been removed. When sheet material is pressed between an embossing plate and an embossing bed of this type, embossing takes place only at the places where portions of the bed have not been removed. At the places where portions of the bed have been removed, no pressure is exerted and for this reason the original surface of the starting material is retained. This feature is brought out in Figure 14 where the starting material 144 is shown as not conforming to the embossing plate immediately above the cutaway portion 143. The other portion of the starting material receives the design of the embossing plate. At 44 in Figure 4, there is illustrated a sheet of material which has been twice embossed. A smooth surface sheet of starting material was embossed over its entire surface by a plate and bed of the type illustrated in Figure 1 to produce the sheet material 24 of Figure 2. The once embossed material was then pressed between a plate and bed of the type illustrated in Figure 3. Since grooves, indicated at 33, had been cut in the embossing bed 32, there was no pressure on the sheet material 24 at that place and as a result, the final product 44 has longitudinal stripes 48 bearing the pattern of the first embossing, that of the plate 11, and has its remaining areas (stripes) embossed in the design of plate 31 as indicated at 49.

The numeral 54 in Figure 5 illustrates a product which has been obtained by a single embossing. In this case, the bed had portions cut away in the shape of five-pointed stars. There was no pressure at the cutaway portions so that the original smooth surface of the starting material was retained. The remaining portions having been pressed between the plate and the bed have acquired the design of the embossing plate.

A similar product is illustrated in Figure 6 by the numeral 64 in which the embossing bed had portions cut away in the shape of crescents.

In Figure 7, there is indicated by the numeral 74 a sheet material in which most of the contacting surface of the embossing bed has been cut away leaving contacting portions in the shape of letters.

Numeral 83 in Figure 8 indicates a hole which has been drilled in an embossing bed 82. When such an embossing bed is used there results the product indicated at 94 in Figure 9. In this product the original surface of the starting material is retained at the portions which registered with the holes 83 in the bed 82. In Figure 11 there is represented the embossed material 114 which bears the design of the embossing plate all except that the squares 118 where the original surface has been retained due to the fact that the embossing bed 102 used in producing the material had corresponding square recesses. These recesses in the bed 102 are indicated at 103 in Figure 10.

Numeral 124 illustrates a sheet material obtainable by embossing with an embossing bed 132. Embossing bed 132 was prepared by cutting parallel grooves (channels) in its contacting surface. By cutting these grooves 133 at an appropriate angle there remained of the contacting surface only the diamond shaped portion 135. Use of this bed resulted in the product 124 which received embossing only on the diamond shaped areas corresponding to the projections 135.

In practicing the preferred embodiment of this invention the sheet material is first embossed in the regular manner with either the roller or plate type of embossing with any particular type of grain. After the sheet material has been embossed in an all over design predetermined portions are then re-embossed, in a press type of embossing machine with a design different than that employed in the first embossing. The embossed design employed in the first embossing is preferably a shallow grain with small characters. The embossing plate employed in the second embossing operation has larger characters than the design employed for the first embossing operation in order that the design employed in the first embossing operation will be entirely concealed by the design of the second embossing plate. The re-embossed portion takes on the appearance of the plate employed in the second embossing operation and the portion which is not re-embossed remains unchanged. The predetermined portions which are re-embossed are governed by the partial removal or making of depressions in the bed employed in the second embossing operation. A sheet of material produced according to this preferred embodiment is disclosed in Figure 4.

It is also to be understood that one of the plates or rolls may be smooth so that the finished design will have a strip of embossing alternating with a smooth finish. This same general effect, i. e., a smooth and an embossed portion design, may be obtained by a single embossing of the original stock material provided the embossing bed used in such an embossing has cutaway portions. Examples of material produced in such a manner are illustrated in Figures 5, 6, 7, 9, 11 and 12 of the drawings.

It has been found that striped novel embossing effects can be obtained by making ½" channels in the bed at every ½" space across the entire width of the bed, the channels running the entire length of the bed. This type of pattern is illustrated in Figures 4 and 12.

While the preferred method described is the removal of a portion of the bed employed in the second embossing operation, it is also possible to obtain the same effect by placing over the bed strips or designs of material similar to the bed. In this manner, only that portion of the sheet which is supported by the design or strip placed over the bed will be re-embossed.

The type of embossing bed which has been found satisfactory for the purpose is a fiber board commonly known as "Homosote" covered with embossing felt which gives a resilient surface and will take the form of a matrix to the embossing plate. Such an embossing bed is generally only used for one grain.

It is also possible to remove a portion of the drum employed in roller embossing which corresponds to the bed in plate embossing. However, the pressure necessary for roller embossing would tend to break down the edges of the channels in the paper bowl and for this reason the second embossing operation is not adapted to the roller type embossing as well as the plate type.

In the embodiment involving a second embossing operation the present embossing machine is equipped with an embossing bed which has portions cut away. As a result, only that portion of the embossed sheet coming in contact with the steel plate and the unremoved portion of the bed will be re-embossed. The embossing plate will, however, come in contact with the entire surface of the previously embossed sheet, but there will be no pressure applied wherever a portion of the bed has been removed and consequently there will be no re-embossing at these points or point. The result is that the portion of the sheet which has been re-embossed has the design of the second embossing plate and the portion which was not re-embossed has the design of the first embossing.

As will be apparent from the preceding description, this invention enables the manufacturer to produce a practically unlimited number of designs, such as the polka dot design of Figure 9, the initialed design of Figure 7, the striped designs of Figures 4 and 12 and the squares design of Figure 11, without the necessity of having specially prepared embossing plates or a large number of embossing plates.

Many other designs, for example those involving flowers and animals, will be suggested to those skilled in the art after consideration of this specification.

The process of the invention is particularly adaptable to the production of novel embossed designs on coated or uncoated sheet material such as leather, coated fabrics of various types, coated or uncoated paper and similar non-woven fabric materials, etc.

The process of the invention presents as a principal advantage a means for producing new and novel embossed designs on sheet material by the use of equipment ordinarily used in the usual embossing operations, thus obviating the necessity of additional equipment for producing special designs.

A further advantage is a means for producing varied design combinations on sheet material at a reduced cost over methods now available.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that I do not limit myself to the specific embodiment thereof except as defined in the appended claims.

I claim:

1. In the process of embossing fabrics in which the fabric is pressed between a member bearing a design and a registering embossing bed bearing the counter-part of the design, the improvement which comprises removing a portion of

the bed to a depth greater than the design and pressing a fabric between the said member bearing the design and the embossing bed.

2. In a process for embossing patterns on a coated sheet material in which the material is pressed between an element bearing a design and a counter element in which has been impressed the counter-part of the design, the improvement which comprises embossing the said sheet material and subsequently re-embossing with a plate bearing a different design and a bed bearing a counter design, said bed having portions of the design removed to such a depth that no impression is made on the fabric over the removed portion during the second embossing step.

3. The process of claim 2 in which the plate used in the second embossing step is of a finer design than that used in the first.

4. Process of claim 1 in which the material embossed is a fabric coated with a cellulose derivative.

5. Process of claim 2 in which the material being embossed is a fabric coated with a cellulose derivative composition.

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