

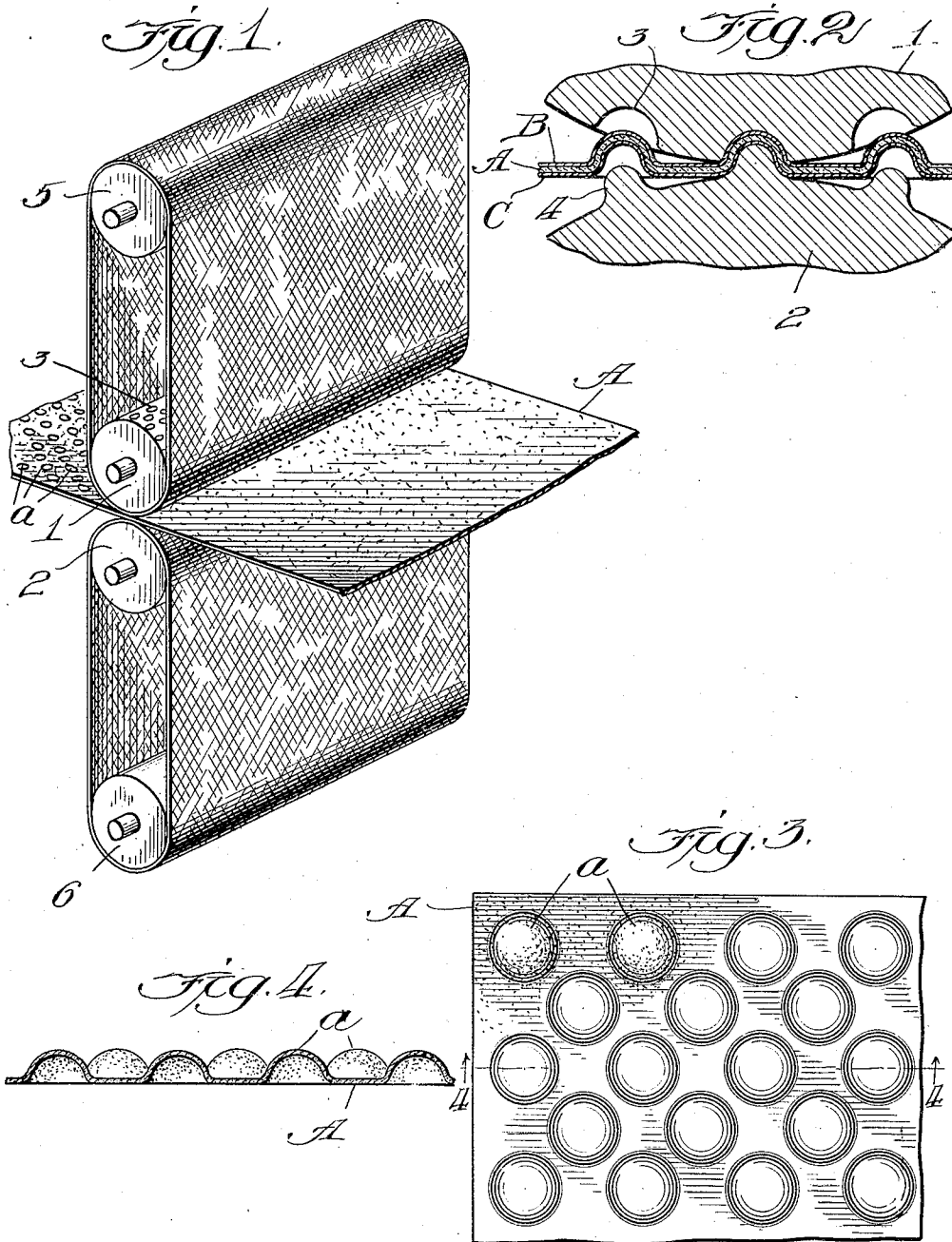
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METHOD OF EMBOSSING FIBER SHEETS

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METHOD OF EMBOSSING FIBER SHEETS

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There is a large demand for so-called cushioning flats to cooperate with the cellular fillers employed in the crating of eggs, to separate one layer of eggs from another. The same material in various sizes and in various designs of embossing may be used advantageously in many places where a single faced or double faced corrugated board has heretofore been employed. It was long deemed impossible effectively to emboss a heavy paper sheet to a depth and in such a manner as properly to meet the requirements of a successful cushioning flat. The natural procedure in the manufacture of such embossed sheets would be to pass the fibrous sheet, immediately after its creation from the mass of pulp, and before drying, between embossing rollers. However, although the sheet would seem at that time to be in such a condition that the fibers would readily slip by each other and permit a drawing of the sheet to produce an embossed effect the fact is that the fiber sheet is not amenable to being worked in this way and the result that it becomes badly torn in the process.

To a certain extent this case is a continuation of my prior application Serial Number 173,529 filed March 7, 1927.

The object of the present invention is to make it possible successfully to emboss a fibrous sheet where the displacement of the material must be to a considerable distance out of the normal plane of the sheet.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is a schematic illustration of my invention; Fig. 2 is a transverse section, on an enlarged scale through two cooperating embossing rollers and a piece of work passing between the same, only fragments of the rollers being shown; Fig. 3 is a plan view of a fragment of the embossed sheet and Fig. 4 is a section taken on line 4—4 of Fig. 3.

I have discovered that if a fibrous sheet,

such as a sheet of heavy paper, in a very wet condition, is passed between embossing rollers while protected by a thin flexible covering, preferably fabric, the sheet may be deeply embossed without being torn whereas, if it were not so protected, it would leave the embossing dies full of holes and tears. In some cases it may be sufficient to place the protective covering on only one side of the fibrous sheet, but where the sheet is thin and the embossing deep, it is advisable to protect both sides or faces. The fibrous sheet is preferably worked immediately after its creation from the pulp and before any drying operation thereon, other than that resulting from the preliminary passing of the same through rollers. In this way an embossed sheet is produced at a cost not much greater than the cost of a plain sheet and without any reworking of a finished product as is the case in the manufacture of corrugated board.

In the drawing I have illustrated my invention in connection with the manufacture of a fibrous sheet A embossed to produce many dome-like elevations *a* of considerable height; but the invention is not limited to any particular design or to embossing that takes place in one direction from the plane of the sheet instead of in both directions, as long as the embossing is effected by deflecting or curving the material out of the normal plane along each of a plurality of lines transverse to each other.

Referring to the drawing, 1 and 2 represent cooperating embossing rollers having dies on their peripheries. In the arrangement shown, the roller 1 has peripheral recesses 3 and the roller 2 has peripheral projections 4 registering with and adapted to enter the recesses as the rollers are rotated. In accordance with my invention in its most developed form I lay against the two broad faces of the fiber sheet, in its wet condition, flexible sheets B and C, preferably of fabric. Therefore, when the sheet to be embossed passes through the rotary dies it is clamped between the two protecting sheets and the stresses are distributed throughout the deformed portions, with the result that the embossing is done in the manner of draw-

ing ductile metal and the embossed sheet emerges from the dies in an imperforate condition.

As heretofore stated, the use of cloth on one face of the fibrous sheet, say the upper face in Figs. 1 and 2 will sometimes suffice if the fibrous sheet be not too thin. The protecting coverings may be applied in any suitable way, this being simply a matter of expediency. For example, the protective coverings may be in the form of endless belts each passing over one of the rotary dies and over another roller parallel with the die, such additional rollers being indicated at 5 and 6. On the other hand, the protective coverings may be in the form of long strips that are progressively laid on the fibrous sheet as it passes through the dies and are afterwards rolled up and used again after its entire length has travelled through the dies.

It will be understood that the present invention does not relate to processes involving mere bending operations, in which the curvature is all in one direction as is the case, for example, when a sheet is corrugated to produce parallel ridges and valleys extending entirely across the same; but to processes involving a drawing of the material of the sheet bodily to produce a dish-shaped projection or depression. By embossing as used in the claims, I therefore mean such distortion as will produce a deflection or curving of the material out of the normal plane along lines parallel to the plane and at right angles to each other.

I claim:

1. The method of embossing a fibrous sheet, which consists in passing the same, in a wet condition, through embossing rollers while in contact with a flexible sheet strong enough to prevent it from being torn by the rollers and forcing separated areas of the sheet bodily out of the plane of the sheet.

2. The method of embossing a fibrous sheet, which consists in passing the same, saturated with moisture, through embossing rollers with a thin flexible sheet interposed between at least one face thereof and the corresponding roller and forcing separated areas of the sheet bodily out of the plane of the sheet.

3. The method of producing an embossed paper sheet, which consists in making a paper sheet in the usual manner and, before it is dried and while still wet, passing it and an overlying thin flexible sheet between embossing rollers and forcing separated areas of the sheet bodily out of the plane of the sheet.

In testimony whereof, I sign this specification.

LEOPOLD OXHANDLER.