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APPARATUS FOR FORMING DESIGNS ON OPPOSITE SURFACES OF SHEETS OF FIBROUS MATERIAL.

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Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Witnesses

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APPARATUS FOR FORMING DESIGNS ON OPPOSITE SURFACES OF SHEETS OF FIBROUS MATERIAL.


To all whom it may concern:

Be it known that I, FREDERICK W. MOORE, a citizen of the United States, residing in Lynn, in the county of Essex and State of Massachusetts, have invented an Improvement in Apparatus for Forming Designs on Opposite Surfaces of a Sheet of Fibrous Material, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to an apparatus by means of which a flexible sheet or layer of fibrous material may be formed on its opposite surfaces. For this purpose I employ a belt-knife splitting-machine of any usual or suitable construction and adjust the gage-roll with relation to the ring-roll of said machine so as to allow of the passage between them of the flexible sheet or layer and a pattern provided with solid portions and with spaces or openings between said solid portions which cooperate with said machine to form the design on both surfaces of the said sheet or layer.

Other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 represents a sufficient portion of a skin provided with a design which is formed thereon by an apparatus embodying this invention; Fig. 2, a sectional view of a sufficient portion of an apparatus embodying this invention; Figs. 3, 4, 5, and 6, details in section to be referred to, and Figs. 7 and 8 modifications to be referred to.

Referring to Fig. 2, I have represented the essential elements of a belt-knife splitting-machine, which may be of any suitable or usual construction and which is employed to form a design $a$ on the upper and lower surfaces of a skin or other flexible sheet or layer $b$ of fibrous material.

The essential elements of the belt-knife splitting-machine herein shown consist of the bed-roll $c$, the ring-roll $d$, the gage-roll $e$, the presser-roll $f$, and the belt or band knife $g$. The mechanism for imparting movement to the knife $g$ and the rolls of the splitting-machine is not shown, as such mechanism is well known. The gage-roll $e$ and ring-roll $d$ have cooperating with them a pattern $i$, which is fed between said rolls while bearing on the upper surface of the skin $b$, which preferably rests upon a yielding backing $n$, of paper or other like yielding material.

The pattern $i$ consists of a strip or sheet of suitable material, such as celluloid or metal, which is provided, as shown in Figs. 2 and 5, with solid portions in the form of projections $j$ and with spaces or openings $k$, into which portions of the skin are forced to form a design, which is in relief with relation to the portions of the skin compressed by the solid portions $j$ of the pattern. The presser-roll $f$ and gage-roll $e$ are adjusted with relation to the ring-roll $d$ so as to afford sufficient space for the passage of the pattern $i$, the skin $b$, and preferably also the sheet $n$ of paper or like yielding material, as will be described. The apparatus may be provided with the usual rigid table $l$.

In operation with the apparatus herein represented the skin $b$ and the yielding backing $n$ are subjected to compression as they are fed between the rolls $d$ and $e$ together with the pattern $i$, the projections $j$ of which engage the upper surface of the skin. The projections $j$ force certain portions of the skin below other portions of the upper surface of the skin, which other portions enter the spaces or openings in the pattern and are substantially un compressed, and simultaneously the projections $j$ force certain portions of the lower surface below or beyond the plane of the lower surface and into the path or plane of the movable knife $g$, and those portions of the skin which project below or beyond the lower surface of the skin are removed or cut off by the knife $g$, thereby forming on the lower surface of the skin the same design which is formed by compression on the upper surface of the skin, so that when the compression is removed, which occurs when the skin has passed through the machine, the skin is provided with the same design on both surfaces.

The operation of the machine may be clearly understood by reference to Figs. 3 to 6. In Fig. 3 the pattern $i$, the skin $b$, and the backing $n$ are represented in the normal or uncompressed position before passing through the rolls.

In Fig. 4 the parts represented in Fig. 3 are shown in the position they occupy while passing between the gage-roll $e$ and the ring-roll $d$, and when in this position the projections $j$ on the pattern $i$ are forced into the upper surface of the skin $b$, and corresponding portions $o$ of the skin are forced beyond the level of the lower surface of the skin and into the yielding backing.

In Fig. 5 the projecting portions $o$ of the
lower surface are represented as being cut by
the knife g, and in Fig. 6 is represented the
skin after it has passed through the machine.
The skin on its passage between the rolls e d
is subjected to pressure over its entire sur-
face; but the portions which are engaged by
the projections f on the pattern are subjected
to greater pressure than the portions of the
skin not in contact with the said projections,
and those portions of the upper surface which
make contact with the projections on the pat-
tern may be termed the "compressed" por-
tions, and the remaining portions may be
termed the "uncompressed" portions.

In Fig. 6, p represents the uncompressed
portions of the upper surface of the skin, and
the compressed portions. The portions which
are removed from the lower surface q of the
skin are represented by r.

It will be observed that the uncompressed
portions p, which enter the spaces or openings
p in the pattern, form on the upper surface of
the skin a design which is in relief with re-
lation to the compressed portions q and that
the portions q of the lower surface also form a de-
sign in relief with relation to the removed or
cut portions r of said lower surface, and this
design is the same as that formed by the un-
compressed portions p.

The pattern i may be made in the form of
a sheet or strip, which is laid upon the skin
and fed through the machine simultaneously
with the skin; but I do not desire to limit my
invention in this respect, as the pattern may
be formed on the gage-roll e, as represented
in Fig. 8.

I claim—

1. The combination with a belt-knife split-
ting-machine provided with a ring-roll, a gage-
roll cooperating therewith and a belt-knife, of
a pattern movable between said ring-roll and
said gage-roll and provided with solid portions
and with spaces or openings between said solid
portions, said solid portions of the pattern be-
ing acted upon by the gage-roll to compress
portions of a sheet or layer of fibrous mate-
rial below the cutting edge of said knife to
cause said knife to remove portions of said
fibrous sheet or layer and form on one surface
thereof a design composed of a plurality of
component parts corresponding to the design
formed on the other surface by the solid por-
tions of said pattern, substantially as de-
scribed.

2. In a machine of the character described,
compression-rolls between which the sheet or
layer of fibrous material is fed, a pattern pro-
vided with solid portions and with spaces or
openings between said solid portions movable
with one of said rolls and engaging one sur-
face of said sheet, and a knife cooperating
with said compression-rolls to act on said sheet
and remove a portion thereof while firmly held
under compression by said rolls, substantially
as described.

3. In a machine of the character described,
in combination, compression devices between
which a sheet or layer of fibrous material is
fed, a pattern provided with solid portions
and with spaces or openings between said solid
portions movable with one of said devices and
engaging one surface of said sheet to form a
design thereon composed of a plurality of com-
ponent parts, and to simultaneously form pro-
tjections on the opposite surface of said sheet,
and means for removing said projecting por-
tions to form the same design on the said op-
posite surface of said sheet, substantially as
described.

In testimony whereof I have signed my name
to this specification in the presence of two sub-
scribing witnesses.

FREDERICK W. MOORE.

Witnesses:
Jas. H. Churchill,
J. Murphy.