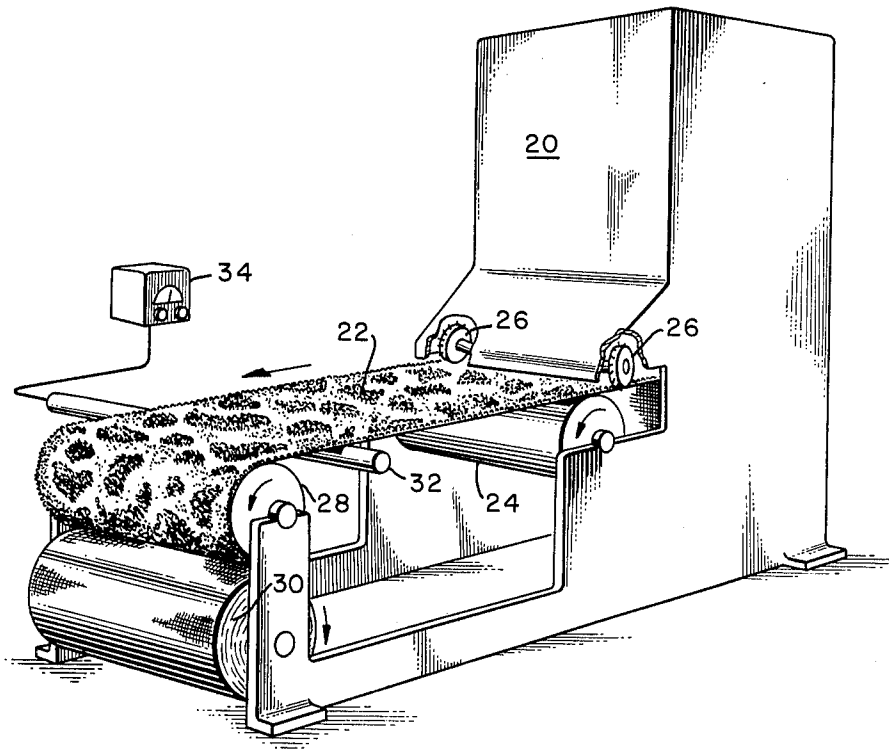


Feb. 15, 1966

R. HORNE ET AL
HEAT-SETTING OF FABRICS

3,234,971

Filed Dec. 13, 1963



INVENTORS
RONALD HORNE
JOHN L. MARSHALL, JR.
PAUL M. NEISLER, JR.
BY *Kelly O. Corley*
ATTORNEY

1

2

3,234,971

HEAT-SETTING OF FABRICS

Ronald Horne, and John L. Marshall, Jr., Pensacola, Fla.,
and Paul M. Neisler, Jr., Kings Mountain, N.C., assign-
ors, by direct and mesne assignments, to Dacey Mills
Incorporated, a corporation of North Carolina
Filed Dec. 13, 1963, Ser. No. 330,294
4 Claims. (Cl. 139-291)

The present invention relates to thermally setting newly-
formed textile products. More particularly, the inven-
tion concerns thermally setting the product directly on the
loom or knitting machine.

Newly-formed textile products are frequently somewhat
unstable physically and may be susceptible to damage by
disarrangement or displacement of the fibers or yarns dur-
ing latex-coating, dyeing or other subsequent operations.
This susceptibility to damage is particularly severe with
certain fabric constructions, such as tufted-pile or looped-
pile fabrics. Sections of the fabric in which the pile has
been disturbed frequently must be discarded since it would
be uneconomical to repair them; in some operations waste
or losses from this cause are as high as 10 or 15 percent
of the total yardage produced. According to the present
invention, the fabric is heat-set while still on the loom
and before the face of the fabric has been contacted by
anything which might disturb the original and desired
woven configuration.

Accordingly a primary object of the invention is to pro-
vide an efficient method for heat-setting of fabrics.

A further object is to provide a method of the above
character which significantly increases the output of first
quality fabric.

A further object is to provide heat-setting apparatus
for practicing the above method.

Other objects of the invention will in part be obvious
and will in part appear hereinafter.

The invention accordingly comprises the features of
construction, combination of elements, and arrangement
of parts which will be exemplified in the construction
hereinafter set forth, and the scope of the invention will
be indicated in the claims.

For a more complete understanding of the nature and
objects of the invention, reference should be made to the
following detailed description taken in connection with
the accompanying drawing, in which the single figure is a
schematic view of fabric-forming apparatus incorporating
the present invention.

Referring now to the drawing, the invention is illustrated
on a generalized fabric-forming apparatus 20, which for
simplicity of discussion will be considered to be a Jacquard
loom producing a woven looped-pile fabric 22. Immedi-
ately after being formed at the needles or pick line (not
illustrated), fabric 22 passes over a support member such
as roll 24 and is laterally spread to the proper fabric
width by a conventional temple mechanism 26. Fabric 22
next passes over a guide roll 28 and is wound on a take-up
roll 30.

According to the present invention a heating element
32 is mounted on loom 20 and extends transversely under
fabric 22 to heat-set the loops in the woven position at
some point before the fabric is taken up by take-up roll
30, i.e., before anything contacts or disarranges the loops
on the face of the freshly-formed fabric. A temperature
controller 34 is connected to heating element 32, and main-
tains the element at the proper temperature.

Generally speaking, the rate at which heat is applied
to the fabric may vary over a wide range, being limited
by the melting point of the filaments on the one hand and
by the necessity of applying heat rapidly enough to set

the fabric as it is woven on the other hand. The proper
temperature of element 32 will be determined by such
factors as the fabric construction, the types of yarn em-
ployed, the spacing of the heating element from the fabric,
the speed of the fabric past the heating element, and other
similar considerations which will readily occur to those
skilled in the art.

As a specific example of the practice of the invention
as applied to a Jacquard loom, heating element 32 was
mounted about 1/4 inch below the lower or back surface
of fabric 22, and extended across the entire width of the
fabric. The backing fabric was of cotton and rayon con-
struction and the looped-pile was continuous filament
nylon yarn having a total denier of 840 and 136 filaments.
With about 7 1/2 linear inches of fabric being woven and
passing over element 32 per minute, temperature con-
troller 34 was adjusted to maintain element 32 at about
165° C.

In normal operation of this particular loom without
heat-setting provided by element 32, approximately 6 to
8 yards of fabric per 60-yard cut were damaged by dis-
placement of the loops during the various finishing op-
erations to which the fabric was subjected. In contrast,
when element 32 was maintained at 165° C., the damaged
fabric was reduced to about two yards per 60-yard cut.
The practice of the invention thus produces a substantial
reduction in damaged fabric and a consequent gain in
efficiency.

While the invention has been specifically described as
applied to a Jacquard loom producing a woven looped-
pile fabric, and while the advantages of the invention are
most fully realized when used for heat-setting woven
tufted-pile or looped-pile fabrics such as carpets or up-
holstery fabrics, some degree of the advantages of the in-
vention may be obtained by similarly heat setting other
fabric constructions on the loom or knitting machine im-
mediately after the fabric is formed and before the de-
sired fabric construction can be disarranged.

It may be seen from the above description together
with the accompanying drawing that the present inven-
tion provides for greatly increased efficiency in the pro-
duction of fabrics which contain thermoplastic yarns
capable of being heat-set. By heat-setting the freshly
formed fabric on the loom or knitting machine before
the fabric has been disarranged by subsequent processes,
the fabric is stabilized in the desired form and is much
less subject to damage in later processing operations to
which the fabric may be subjected. The invention may
conveniently be practiced by mounting an electrical heater
adjacent the freshly formed fabric at some point before
the fabric is taken up. Since electrical heaters are con-
veniently available in compact physical dimensions, such
heaters may readily be added to existing looms or knitting
machines at a minimum cost. However, other heat
sources may be installed in place of the specifically dis-
closed electrical heater, if desired.

It will thus be seen that the objects set forth above,
among those made apparent from the preceding descrip-
tion, are efficiently attained and, since certain changes
may be made in carrying out the above process and in the
construction set forth without departing from the scope
of the invention, it is intended that all matter contained
in the above description or shown in the accompanying
drawing shall be interpreted as illustrative and not in a
limiting sense.

It is also to be understood that the following claims are
intended to cover all of the generic and specific features
of the invention herein described, and all statements of
the scope of the invention which, as a matter of language,
might be said to fall therebetween.

3

Having described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A method of manufacturing stable pile fabrics, comprising in combination:

- (a) forming said fabric with a thermoplastic yarn projecting from the face of said fabric in a series of unrestrained loops; 5
- (b) heating the back of said fabric to a temperature higher than the drawing temperature of said yarn before the face of said fabric is contacted; 10
- (c) and taking up said fabric.

2. A method of manufacturing stable pile fabrics, comprising in combination:

- (a) forming said fabric with a thermoplastic yarn projecting from the face of said fabric in a series of unrestrained loops; 15
- (b) heating said fabric sufficiently to thermally set said yarn within said fabric before the face of the fabric is contacted; 20
- (c) and taking up said fabric.

3. Apparatus for producing stable fabrics from yarn composed at least in part of thermoplastic filaments, said apparatus comprising in combination:

- (a) yarn handling means for forming said yarn into a fabric with said thermoplastic filaments projecting from the face of said fabric in a series of unrestrained loops; 25
- (b) fabric take-up mechanism for taking up said fabric in an orderly fashion; 30
- (c) and heat-setting means located between said yarn handling means and said take-up mechanism for thermally setting said unrestrained loops before said fabric is engaged by said take-up mechanism.

4

4. A loom weaving a fabric composed at least in part of thermoplastic yarn, said loom comprising:

- (a) yarn handling means for forming said yarn into a fabric with said thermoplastic yarn projecting from the face of said fabric in a series of unrestrained loops;
- (b) a temple mechanism for spreading the freshly woven fabric to its proper width;
- (c) heating means located adjacent said fabric at a point near said temple mechanism for heat-setting said spread fabric in its woven configuration while said projecting loops are unrestrained;
- (d) and means for taking up said heat-set fabric in an orderly fashion.

References Cited by the Examiner

UNITED STATES PATENTS

270,321	1/1883	Lister et al. -----	139—292 X
1,305,373	6/1919	Koch -----	139—21
1,835,316	12/1931	Mellor -----	139—397
2,101,286	12/1937	Theunissen -----	139—398
2,769,222	11/1956	Southwell -----	139—291 X
2,815,558	12/1957	Bartovics -----	28—72
2,821,457	1/1958	Erlich -----	28—72 X
2,973,018	2/1961	Finlayson et al. -----	139—391
2,983,288	5/1961	Metzler -----	139—291
3,061,907	11/1962	Nicholl -----	139—291 X
3,078,543	2/1963	Bloch -----	139—391 X

FOREIGN PATENTS

1,045,354 12/1958 Germany.

DONALD W. PARKER, *Primary Examiner*.

RUSSELL C. MADER, *Examiner*.