

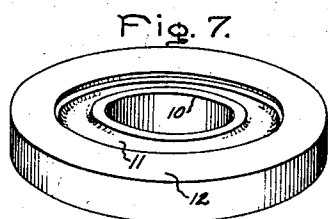
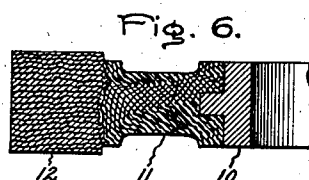
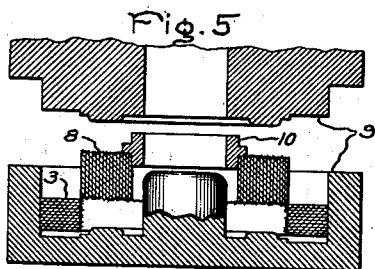
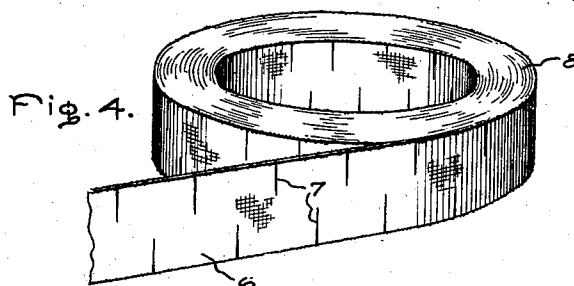
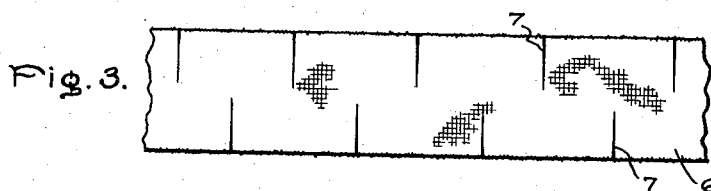
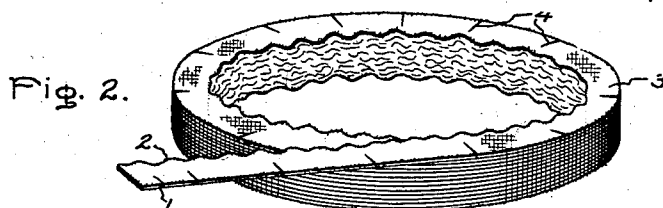
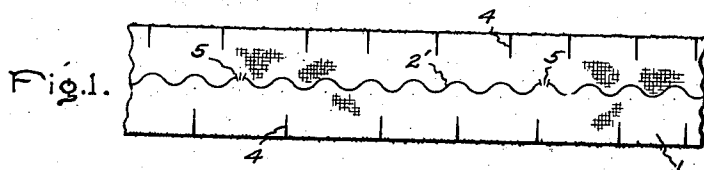
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2,229,982

NONMETALLIC GEAR WHEEL BLANK AND METHOD OF MAKING SAME

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UNITED STATES PATENT OFFICE

2,229,982

NONMETALLIC GEAR WHEEL BLANK AND
METHOD OF MAKING SAME

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Application August 19, 1938, Serial No. 225,750

2 Claims. (Cl. 154—2)

The present invention relates to nonmetallic gear wheels or gear wheel blanks formed of spin-
nable textile fibers and an adhesive, for example,
an artificial resin such as a phenolic condensa-
tion product which is convertible to an infusible
insoluble state by the application of heat and
pressure.

An object of our invention is to provide an im-
proved construction of gear wheels or gear wheel
blanks of this type wherein the rim and web are
molded directly to the hub without the use of a
preformed element, such as a preformed rim or
web. Another object of our invention is to pro-
vide an improved and economical method of
manufacturing such a gear wheel or gear wheel
blank which permits the use of a lower grade of
fabric in the web than is used in the rim yet pro-
duces a strong satisfactory product in which the
parts are firmly bonded together in the finished
structure which is free from any tendency to
develop cracks in the web.

For the consideration of what we believe to be
novel and our invention, attention is directed to
the following description and the claims ap-
ended thereto.

In the drawing, Fig. 1 is a face view of a strip
of woven nonmetallic material, such as cotton
duck, and illustrates an initial step in carrying
out our invention; Fig. 2 is a perspective view
showing the manner in which a strip, as shown
in Fig. 1, is spirally wound edgewise to form
a member to be used as the rim of the gear wheel
or gear wheel blank; Fig. 3 is a face view of a
strip of woven nonmetallic material, such as cot-
ton duck, and illustrates another step in carry-
ing out our invention; Fig. 4 is a perspective
view showing the manner in which a strip, as
shown in Fig. 2, is wound circumferentially into
an annulus or ring to be used as the web of the
gear wheel or gear wheel blank; Fig. 5 shows
the parts of a mold with the members, shown in
Figs. 2 and 4, together with a hub, assembled
therein prior to molding; Fig. 6 is a sectional
view of a part of the completed gear wheel blank;
and Fig. 7 is a perspective view of the com-
pleted blank made in accordance with our inven-
tion.

In carrying out our invention, we first provide
a strip of woven fabric 1, such as a suitable grade
of cotton duck having projections, 2, on one
edge, the fabric being treated with an adhesive,
for example an artificial resin such as phenolic
condensation product and being of sufficient
width to form the rim of a gear wheel blank.
The strip may be formed by taking a piece of

material twice the width of the rim and per-
forating it longitudinally along an irregular line
at the center of the strip, as shown at 2'. The
strip is also slit along its outer edges for a short
distance toward the center line, as indicated at
4. These slits need not be uniform in length.
Preferably, also, the center perforated line is not
completely perforated. The parts which are not
perforated are indicated diagrammatically at 5
and occur at spaced intervals along the center
line. The strip is then bent lengthwise on itself
to form a strip of double thickness, the strip be-
ing provided with the projections 2. The strip
is then wound edgewise after the manner shown
in Fig. 2 thereby providing a ring member 3 to
be used as the rim of the gear wheel blank. The
projections 2 are shown as being rounded but
they may be of any other suitable shape. The
strip may be treated with the adhesive either
before or after it is formed. Preferably, we treat
a width of cotton duck, and cut it into strips
of the width, shown in Fig. 1, before proceeding
as outlined above.

The web of the gear is formed by taking a strip
of woven fabric 6 of suitable width to form the
web, which fabric may be of a lower or cheaper
grade than the fabric used in making the rim,
is treated with an adhesive, for example, an ar-
tificial resin, such as a phenolic condensation
product. The strip 6 may be formed taking a
piece of material of appropriate width and slit-
ting it at spaced intervals from the edges toward
the center line of the strip, the slits 7 being
formed in staggered relation, as shown in Fig. 3.
As in the case of the rim, the strip may be treat-
ed before or after it is formed. We then wind
the strip 6 circumferentially into an annulus or
ring 8, as shown in Fig. 4, to provide a structure
of suitable thickness to form the web of the gear
wheel blank in the finished structure, the inner
diameter being of a width to receive the hub.

The members, shown in Figs. 2 and 4, are placed
in a suitable mold, as indicated at 9, which may
form part of a hydraulic press and are subjected
to heat and pressure to consolidate the structure
and cure the adhesive. The method of molding
material of this type to form gear wheel blanks
is well known in the art and does not require a
detailed description. The structure is molded
under sufficient pressure and at the required
temperature to effect the desired consolidation of
the structure and the curing of the adhesive.
After molding, the structure is removed from the
mold. A cross section of the product is shown in
Fig. 6 while Fig. 7 shows the finished blank in per-

spective. The hub of the gear is indicated at 10, and as will be observed, is solidly embedded in the web 11 of the blank which in turn is securely consolidated with the rim 12 of the blank. The teeth may now be cut in the rim of the blank in the usual manner.

During the molding operation, the heat first softens the adhesive and the pressure causes the material at the periphery of the web member to flow into the spaces and among the projections of the rim member. Because of the fact that the web structure contains the series of slits in the fabric, as described above, a complete and homogeneous consolidation in the press takes place and a uniform molding is obtained. The slits, moreover, permit the stresses and strains developed in the pressing operation to be more uniformly distributed and result in a gear wheel or gear wheel blank which is completely free from any tendency to develop cracks in the web, especially along the web portions adjacent the inner periphery of the rim. The particular web structure also facilitates the embedding therein under pressure of the hub, which may be a metallic hub. It will, therefore, be apparent that the particular web structure containing the slits at spaced intervals is an important feature of our invention.

It will be seen that the present invention provides a method and a construction wherein an improved gear wheel or gear wheel blank is obtained without the use of any preforms. Also our invention enables the use of a cheaper fabric for the web portion because the resulting structure is completely consolidated and is a homogeneous

product, which is strong and free from cracking stresses and strains which have a tendency to develop in gear wheels of this type which do not utilize the particular web structure described.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A gear wheel blank formed from a rim comprising a strip of woven fabric wound edgewise on itself and united with an adhesive, the inner edge of the strip having spaced projections and the outer edge of the strip having slits at spaced intervals, a web formed from a strip of woven fabric wound circumferentially in annular form and united with an adhesive, the edges of the strip having spaced slits cut from the edge to the central line of the strip, a hub in the center of the wound web and united thereto, the rim and web being intimately united to each other.

2. The method of manufacturing a nonmetallic gear wheel blank which comprises winding edgewise a strip of woven fabric having projections along one edge and slits along the other edge to form a ring with the projections on the inside, circumferentially winding in annular form a strip of woven fabric having staggered spaced slits cut from each edge toward the center line of the strip, placing a hub in the central opening of the circumferentially wound strip and molding under heat and pressure the hub and the circumferentially wound strip in the central portion of the ring first formed.

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