Molded wood particle products including integrally joined intersecting members

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A molded product formed from wood flakes intermixed with a binder and a first elongated member formed from elongated wood flakes compressed and bonded together with a binder, the wood flakes having a grain direction extending generally parallel to the longitudinal axis of the flakes and the flakes being generally oriented in alignment with the longitudinal axis of the first elongated member. A second elongated member intersects the first elongated member and is integrally joined to it. The second elongated member is also formed from elongated wood flakes compressed and bonded together with a binder, the wood flakes being generally oriented in alignment with the longitudinal axis of the second elongated member. The wood flakes of the second elongated member intersect and are interleaved with the wood flakes of the first elongated member to thereby form an integral molded joint between the first elongated member and the second elongated member.

4 Claims, 3 Drawing Figures
MOLDED WOOD PARTICLE PRODUCTS
INCLUDING INTEGRALLY JOINED INTERSECTING MEMBERS

FIELD OF THE INVENTION

The invention relates to the construction of products
from compressed wood particles joined by a binder and
to methods for making such products. The invention
also relates to the manufacture of wood products such
as furniture.

BACKGROUND PRIOR ART

In the manufacture of conventional wood structures
such as furniture wherein the furniture includes a frame
having at least one elongated member joined to a transverse elongated member, a common method of joiner
requires forming a bore in one of the elongated members
and inserting the end of the other member into the
d boring. The joint is secured by an adhesive. If the two
intersecting members are of similar cross-sectional sizes,
the end of the second member must be reduced in diame-
eter such that it can be inserted into the bore in the first
elongated member. Since the first member includes a
bore at the point of juncture and the second member is
reduced in diameter, each of the members is reduced in
strength in the area of the joint.

In other bodies of prior art, the prior art structures
teach the construction of elongated panels and boards
from wood chips or wood particles mixed with a binder
and compressed together. Such prior art, however, is
generally limited to the construction of discrete linear
members such as panels or boards. For reference to
some of the prior art teachings illustrating the construct-
ion of boards or panels from wood chips, attention is
directed to the Himmelheber et al. U.S. Pat. No.
3,447,996, the Rondum U.S. Pat. No. 3,415,708, the
Habgood U.S. Pat. No. 3,790,421; and the Sears et al.
U.S. Pat. No. 3,441,959.

Attention is also directed to the McKean U.S. Pat.
No. 3,956,555, the Hunt et al. U.S. Pat. No. 4,246,310;
and the Pringle U.S. Pat. No. 4,097,648.

SUMMARY OF THE INVENTION

The present invention provides an improved means
for constructing structural members from composite
wood particle mixtures and particularly those structural
members, such as furniture components, which have in
the past been comprised of assembled pieces of wood.
The invention includes the construction of such struc-
tural members from elongated wood flakes wherein
intersecting elongated members forming the structure
are formed unitarily and with the wood flakes forming
one elongated member being interleaved with the wood
flakes forming the intersecting elongated member, such
intersection of the elongated wood flakes forming a
unitary joint having a strength which is greater than
that of conventional joints used in the construction of
furniture and the like.

More particularly, the invention includes a molded
unitary product comprised of wood flakes intermixed
with a binder, the molded product comprising a first
elongated member including elongated wood flakes
compressed and bonded together with a binder. The wood flakes have a grain direction extending generally
parallel to their longitudinal axes, and the wood flakes
are oriented in alignment with the longitudinal axis of
the first elongated member. The molded product also
includes a second elongated member intersecting the
first elongated member and being integrally joined to
the first elongated member, the second elongated member
also including elongated wood flakes compressed
and bonded together with a binder. The wood flakes
forming the second elongated member are oriented
generally in alignment with the longitudinal axis of
the second elongated member, and the wood flakes of
the second elongated member intersect and are interleaved
with the wood flakes of the first elongated member to
thereby form an integral molded joint between the first
elongated member and the second elongated member.

The invention also includes a method for forming a
structural member comprised of elongated wood flakes
bound together with a binder and including a first elon-
gated structural member and a second elongated struc-
tural member integrally joined together at a point of
connection and at an obtuse angle. The method includes
the steps of providing a first mold member having a first
elongated cavity and a second elongated cavity intersect-
ing the first elongated cavity at an intersecting cavity
portion, the first elongated cavity being at an obtuse
angle to the second elongated cavity. Elongated wood
flakes intermixed with a binder are deposited in the first
elongated cavity with a majority of the wood flakes
being oriented generally parallel with the longitudinal
axis of the first elongated cavity and elongated wood
flakes intermixed with a binder are also deposited in the
second elongated cavity with a majority of the wood
flakes in the second elongated cavity being oriented
generally parallel to the longitudinal axis of the second
elongated cavity. The wood flakes in the first cavity
portion are interleaved with the wood flakes in the
second cavity portion.

The wood flakes in the mold are then compressed to
form a composite product including first and second
structural members integrally joined together.

Various other features of the invention will be appar-
tent from the following description of a preferred em-
bdiment, from the claims, and from the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a structure embodying
the present invention.

FIG. 2 is an enlarged elevation view of a portion of
the structure shown in FIG. 1.

FIG. 3 is a perspective view of a die assembly for use
in forming the structural members illustrated in FIG. 1.

Before describing a preferred embodiment of the
invention in detail, it is to be understood that the inven-
tion is not limited in its application to the details of
construction nor to the arrangement of the components
set forth in the following description or illustrated in
the drawings. The invention is capable of other embodi-
ments and of being practiced and carried out in various
ways. Also, it is to be understood that the phraseology
and terminology employed herein is for the purpose of
description and should not be regarded as limiting.

DESCRIPTION OF A PREFERRED
EMBODIMENT

Illustrated in FIG. 1 is a chair 10 embodying the
present invention, at least a portion of the chair, such as
the chair back 12, being constructed as a molded unitary
compressed wood product embodying the invention
and being comprised of elongated wood flakes intermixed with a binder and compressed so as to form a high density product. More specifically, the chair back illustrated in FIG. 1 includes a plurality of vertically extending elongated members 14 comprised of compressed wood flakes and a plurality of horizontal elongated transverse members 16 also comprised of compressed wood flakes, the elongated transverse members 16 intersecting the elongated members 14 and being integrally joined thereto. The elongated members 14 and 16 are each comprised of wood flakes 18 (FIG. 2) joined together by a binder and compressed so as to form a densified and integral structural member and with the elongated members being integrally joined together.

FIG. 3 illustrates a die assembly arrangement 20 for use in making a compressed wood flake product as illustrated in FIG. 1. Generally, the die assembly 20 comprises a female die 22 having a first elongated die cavity portion 24 wherein the elongated member 14 can be formed and an intersecting die cavity portion 26 wherein the elongated members 16 can be formed. The die assembly 20 also includes a male die member 28 including integrally joined forming members 30 and 32 which are complementary to the female die cavity portions 24 and 26, respectively, and which are adapted to be inserted into those die cavity portions to compress wood flakes therein to form the product illustrated in FIG. 1. Conventional means not shown are provided for generating a substantial downward force on the press member 28 to compress wood flakes contained in the die cavity. It should be noted that the forming members 30 and 32 include elongated concave surfaces 34 on their lower ends adapted to form an upper portion of the molded product, and the die cavity portions 24 and 26 include opposed complementary elongated concave forming surfaces.

In operation of the die illustrated in FIG. 3, the forming member 28 is moved upwardly out of the die cavity and wood flakes are deposited in the die cavity portions 24 and 26. It will be noted that the die cavity portions 24 and 26 are several times deeper than they are wide, and a large quantity of wood flakes can be deposited in the die cavity portions in a loosely felted relation. In the illustrated arrangement the die assembly is configured to form a product wherein the die cavity portions be filled with wood flakes simultaneously such that those flakes in the area of the transverse cavity portion 24 will project into the elongated cavity 26 and be interleaved with the wood flakes in the elongated cavity portion 26 and such that the wood flakes 18 forming the transverse elongated members 16 will form integral bonds in an interleaved relationship with the wood flakes 18 forming the elongated member 14.

The wood flakes 18 forming the elongated members 14 and 16 are mixed with a binder in the amounts of 2 to about 15 weight percent of binder and optionally of about 0.5 to 2 weight percent, based on the dry weight of the wood flakes, of a wax to provide waterproof protection. In a preferred form of the invention and wood flakes will have a thickness of approximately 0.02 inches, though the thickness of the wood flakes vary from approximately 0.005 to 0.04 inches. It is preferred that a substantial majority of the wood flakes, however, have a thickness of approximately 0.02 inches in order to produce a product having maximum strength. The employment of wood flakes having increased thicknesses produces a product with decreased strength. If the wood flakes are too thick, the wood flakes will not be pressed together completely and this results in incomplete binding of the flakes together and strength is decreased. If on the other hand, the flakes are thinner than 0.02 inches, a large amount of binder is required to coat the surfaces of the wood flakes, and the cost of the composite wood flake product is increased.

While in the illustrated arrangement the molded product includes elongated members joined together so as to form a generally planar structure, in other arrangements and with the employment of other die assemblies, products having various constructions can be formed and including non-planar configurations. For example, while in the illustrated arrangement the product described comprises a planar chair back, with suitable press apparatus, the chair back and at least a portion of the frame for the chair seat, could be formed in one piece. Additionally, while FIG. 1 shows a chair embodying the invention, the invention could be employed in the construction of a variety of products otherwise produced from fabricated parts. By way of illustration, while conventional sofas include a frame constructed of wood, such frames could be manufactured using the method and apparatus referred to above. It should also be understood that whereas the elongated members shown above are linear, in other arrangements the members integrally joined together could be curved and have a variety of configurations.

Various features of the invention are set forth in the following claims.

I claim:

1. A molded unitary product comprised of wood flakes intermixed with a binder, the product comprising a first discrete elongated member having a first longitudinal axis, said first elongated member including elongated wood flakes compressed and bonded together with a binder, said wood flakes having a
grain direction extending generally parallel to the longitudinal axis thereof and said wood flakes being oriented generally in alignment with the first longitudinal axis of said first elongated member, and a second discrete elongated member having a second longitudinal axis, the longitudinal axis of said first elongated member being transverse to said second longitudinal axis, and a portion of said second elongated member intersecting a portion of said first elongated member, and said portion of said second elongated member being integrally joined to said portion of said first elongated member, said second elongated member including elongated wood flakes compressed and bonded together with a binder, said wood flakes having a grain direction extending generally parallel to said second longitudinal axis thereof and being oriented generally in alignment with said second longitudinal axis, and said wood flakes forming said portion of said second elongated member intersecting and being interleaved with said wood flakes of said portion of said first elongated member to form an integral molded joint between said first elongated member and said second elongated member.

2. A molded unitary product as set forth in claim 1 wherein said first elongated member comprises a first elongated structural member of an article of furniture and wherein said second elongated member comprises a second structural member of an article of furniture.

3. A molded unitary product as set forth in claim 1 wherein said elongated wood flakes have an average length of about 2 inches, an average width of between 1/8 and 1/2 inches, and an average thickness of about 0.005 to about 0.04 inches.

4. A molded unitary product as set forth in claim 2 wherein said elongated wood flakes have an average length of about 2 inches, an average width of between 1/8 and 1/2 inches, and an average thickness of about 0.005 to about 0.04 inches.