A generally rigid batt for use as wall board, insulating paneling or acoustic paneling. The batt is formed of wood chips, recycled paper and a binder synthetic fibers, and a binder which are thoroughly mixed and evenly dispersed throughout. The wood chips, recycled paper and synthetic fibers are compressed into a batt of desired density, height and width. The shaped batt is heated causing the binder to become molten and bond the synthetic fibers, wood chips and reconstituted paper together. The shaped batt is cooled forming a generally rigid structure.
Fig. 3
BATT FOR USE AS BUILDING MATERIAL

BACKGROUND OF THE INVENTION

[0001] The instant invention is directed to batt formed of wood chips, reconstituted or shredded paper and synthetic fibers. The instant batt may be used as insulating paneling, acoustical paneling and wall board.

[0002] The primary object of the present invention is the provision of a batt which is structurally sound so that it is usable as a building material.

[0003] Another object of the invention is the formation of a batt utilizing waste material.

[0004] Another object of the invention is the formation of a batt which is inexpensive.

SUMMARY OF THE INVENTION

[0005] The above objects are accomplished according to the present invention by the provision of a batt which is comprised of wood chips, recycled and shredded paper, and synthetic fibers. The batt forming components are thoroughly blended together to be evenly distributed throughout. The blend of components is then configured and compressed to have a dimension of height, width and length. A bonding agent is utilized to bond the shaped fibers, wood chips and paper into a rigid or semi-rigid form.

[0006] The batt may include up to 50% by volume wood chips or recycled paper. These materials may or may not be treated with a flame retardant.

[0007] The synthetic fibers are preferably bi-component polyester fibers. Also, a component of the bi-component fibers may act as the bonding agent.

[0008] The top, bottom and side dimensions of the batt may, individually, be planar or smooth, or they, individually, may have a roughened texture. The end sections have a roughened surface.

[0009] The invention includes the method of forming a batt for use as fiberboard, insulating paneling or acoustical paneling which includes the steps of delivering wood chips, recycled paper and synthetic fibers into a mixing chamber and causing them to be evenly distributed. Moving the evenly distributed combination of wood chips, recycled papers and synthetic fibers into a forming chamber where the combination is shaped and compressed to have a width and height of desired dimensions, inter-dispersing a bonding agent throughout combination and causing said bonding agent to bond said wood chips, said reconstituted paper and synthetic fibers together as a unitary entity. Allowing the wood chips, reconstituted paper and synthetic fibers to cool, forming a generally rigid and stable structure. Cutting the formed structure at spaced intervals forming individual batt members.

[0010] The synthetic fibers may comprise multi-component polyester fibers with one component comprising the bonding agent.

DESCRIPTION OF THE DRAWINGS

[0011] The construction designed to carry out the invention will hereinafter be described, together with other features thereof.

[0012] The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings forming a part thereof, wherein an example of the invention is shown and wherein:

[0013] FIG. 1 is a perspective cutaway view of the batt of the invention;

[0014] FIG. 2 is a top view of the batt of FIG. 1;

[0015] FIG. 3 is a cutaway side view of a batt forming machine.

DESCRIPTION OF A PREFERRED EMBODIMENT

[0016] Turning now to FIGS. 1 and 2, batt 60 is shown in a perspective view and in a top view. As seen, batt 60 is generally rectangular in shape having top 64, bottom 66 and opposed sides 62. Top 64, bottom 66 and sides 62 are formed to a desired width and height, while the batt is formed to have a desired weight and density.

[0017] Batt 60 is formed of recycled or shredded paper 72, wood chips or wood shavings 68 and synthetic fibers 70. Preferably, the paper 72 is comprised of old newsprint which is usually considered to be waste and is readily available. Other types of discarded papers may be used. The wood chips 68 are generally small and are preferably comprised of chips or shavings which are discarded as waste in furniture manufacturing or other wood working plants. The synthetic fibers are preferably bi-component polyester fibers of known construction and composition with one component having a lower melt temperature than the other. The lower melt component acts as the binder securing the batt components together. It is noted, if desired, that a separate binder may be mixed with wood chips, reconstituted papers and single component synthetic filaments during the mixing process for securing the batt components together. In either case, when the batt is heated, the binder becomes molten and acts to bind the wood chips, the recycled paper and synthetic yarns together forming the batt as a semi-rigid member of desired size, rigidity and density.

[0018] Turning now to FIG. 3, recycled paper, wood chips and synthetic fibers are fed in selected quantities into feed chutes 10 and 12. The materials are fed in a mix of selected quantities through chutes 10 and 12, i.e. cellulose or recycled paper comprising between 40-80%, wood chips comprising between 5-60% and binder materials comprising synthetic fibers and a binder between 8-30%. It is noted that a fire retardant may be included with the binder material. Also, the synthetic fibers may be bi-component with one of the components comprising the binder. Chutes 10 and 12 are connected with housing 14 which is formed within cabinet 15.

[0019] Feed rolls 18 and 20 are driven by independent drive motors 181, 201 which are each controlled to drive the feed rolls at selected RPM’s. The speed selected is determined by sensors which usually control feed rolls 18 and 20 to have the same peripheral speed. A median peripheral speed for feed rolls 18 and 20 is between 0 and 20 m/min. In cases where the mixture of materials from chutes 10 and 12 is to be different or unequal, the relative peripheral speed between rolls 18 and 20 is adjusted to obtain the desired mixture.

[0020] The feed rolls deliver the materials into mixing chamber 22 where it is further blended to further disperse or mix the reconstituted paper, the fibers and the wood chips. At the lower end of mixing chamber 22 there is located a combing roll 24 and a beater roll 26. Combing roll 24, along with feed roll 20, act to engage the materials in the mixing chamber while the beater roll 26 continues to blend the materials and move them through the mixing chamber during delivery into receiving end 28 of forming chute 30.
[0021] Comber roll 24 and beater roll 26 are driven by motors 24' and 26' at selected speed. The selected speed chosen for each of rolls 18, 20, 24 and 26 is determined by the blend desired and by the volume necessary to form the batt at the desired density and weight in forming chute 30.

[0022] The peripheral surfaces of feed rolls 18, 20 of comber roll 24 and of beater roll 26 are preferably formed of pin-like members of usual construction. Normally, the pins are arranged in parallel transverse rows, however, in the case of at least feed roll 20, it has been found to be desirable to arrange the pin rows in a helical pattern. Such a pattern of teeth acts to more evenly wipe the materials onto beater roll 26.

[0023] Forming chute 30 is of rectangular shape with an upper wall and a lower wall 34 spaced by a pair of equal sized sides. The upper wall includes a housing 35, one side of which comprises vibrating plate 36. Vibrating plate 36 extends across the width and length of the upper wall of forming chute 30 from adjacent its upper end at 28 to adjacent its lower or delivery at 40. Vibrating plate 36 is driven in a rocking motion about a pivot by motor 36' through linkage 38. The structure of chute 30 is maintained relatively constant because vibrating plate 36 remains in a relatively constant position relative to lower wall 34.

[0024] Hood 35 may include a conduit 80 which connects with blower or fan 81. A second conduit 82 connects blower 81 with housing 14 and mixing chamber 22. The lower surface of vibrating plate 36 is perforated as indicated by the arrows. This structure allows blower 81 to force air in the direction of the arrows through plate 36 and housing 35 creating the following scenario.

[0025] An air flow is pushed through conduit 82 and into mixing chamber 22. The velocity of the air flow is lower than the velocity of beater roll 26 and plays no significant role in moving the blended materials into receiving end 28 of chute 30. As the air flow moves through chute 30, it acts to move or urge the blend of materials toward the upper side of chute 30. This assists in maintaining the blend of materials more evenly distributed throughout chute 30 and prevents compacting toward the lower side of the batt adjacent wall 34 which is moved by the movement of packing belt 42. The air flow further helps to maintain the blend oriented in all directions providing greater stability and uniformity for the batt.

[0026] A binder material may be fed through opening 80a and blown into chamber 22 where it is blended with the fibers, wood chips and recycled paper. In this scenario, the fibers need be only mono-component fibers.

[0027] As the air flow moves down chute 30, it is drawn through the openings in the upper wall and vibrating plate 36 and into hood 35. From the hood, the air is circulated back to blower 81 and through conduit 60 where the cycle is repeated.

[0028] The velocity of the air flow is preferably lower than the velocity of the blend of materials which is created by beater 26. The preferred velocity of the air flow is lower than 1 meter/second and the pressure of the air flow is between 1-50 millimeters water gauge.

[0029] Lower wall 34 supports packing belt 42 which covers substantially its entire area terminating just short of delivery end 40. Packing belt 42, which is continuous, passes around rollers 44 which are arranged near the upper and lower ends of lower wall 34. Motor 42' drives rollers 44 and packing belt 42 in a clockwise direction. The packing belt acts along with the just described air flow to physically assist the movement of the blend of materials from receiving end 28 into and down the forming chute forming the web. The air flow may, if desired, also act to physically treat the blend which further assists in more evenly maintaining them throughout the batt forming chute. Also, the material density throughout the batt is more evenly maintained between its bottom and top surfaces. The entire process which moves the materials into and through chute 30 acts to assemble the recycled paper, wood chips and fibers throughout the formed batt in proper proportions.

[0030] Compression rolls 46, 47, which are driven by motor 46', act to compress and draw the formed batt out of delivery end 40 of the batt forming chute.

[0031] It is the combined operations of vibrating plate 36 and packing belt 42 which draw and urge sufficient quantities of blend of materials into chute 30 and toward delivery end 40. The volume of materials is controlled by the speed of rolls 24, 26, vibrator plate 36, the air velocity, and the speed of packing belt 42. Compressor rolls 46, 47 act on the formed batt to compact it to a desired height, width and density or a desired weight, width and height. These factors are adjusted to vary the batt characteristics by changing the density, weight and height as desired.

[0032] As the materials move through the compression rolls, they are compressed to a density of between 100-500 kg/m³ (kilograms per cubic meter) forming the batt to a thickness and width desired depending upon the intended use. Generally, the batts are formed to a thickness of between ⅝”-2” and a width of about 8’. It is noted that when the batt is compressed to even higher densities, it may become sufficient to be used as a protective material.

[0033] A conveyor belt 48, arranged adjacent delivery end 40 and compression rolls 46, 47 receives the web emerging from the compression rolls.

[0034] Conveyor belt 50 passes about rollers 50', Motor 54 drives both belt 48 and belt 50.

[0035] Mounted intermediate rollers 50'' is a heating element H which acts to heat the batt emerging from compressor rolls 46, 47 and moved by conveyor belt 50. Heating element H acts to render molten the binder which then acts to bond with the other batt forming components forming the batt to be generally rigid.

[0036] Now bonded, as the batt passes over roll 50'', cutter C is selectively actuated to cut the batt into lengths as desired and forming opposed ends 74.

[0037] The batt 60 may be formed with its outer surfaces having a textured or rough surface. Alternatively, the outer surfaces may have a planar surface. The manner in which the blend of materials is moved through forming chute 30 and the actions of packing belt 42, vibrating plate 36 and blower 61, along with the ratio of wood chips and paper determines the outer texture of the batt. Generally, upper and lower surfaces 64 and 66 and opposed sides 62 are rough while the opposed ends 74 are smooth. Alternatively, any one of the top, bottom or side surfaces may present a smooth or textured surface. The end surfaces are always smooth.

[0038] Any number of batt or fiber web forming apparatus may be modified and used to form the batt of the invention. An exemplary few of such devices are disclosed in U.S. Pat. Nos. 6,609,521, 5,950,282 and 6,421,884.

[0039] While a preferred embodiment of the invention has been described using specific terms, such description is for illustrative purposes only, and it is to be understood that changes and variations may be made without departing from the spirit or scope of the following claims.
What is claimed is:

1. A batt for use as wall board, insulation paneling and acoustical paneling wherein:
   said batt comprises wood chips, recycled paper and synthetic fibers blended to be substantially evenly distributed throughout, said blended wood chips, recycled paper and bi-component polyester fibers being configured to form said batt with a dimension of width, height and length;
   said fibers being bonded with said wood chips and recycled paper, causing said batt of desired width, height and length dimension to be substantially rigid.

2. The batt of claim 1 wherein said wood chips comprise up to 60% volume of said batt.

3. The batt of claim 1 wherein said recycled paper comprises between 40% and 80% volume of said batt.

4. The batt of claim 1 wherein said synthetic fibers are bi-component polyester fibers with one of said bi-component fibers acting as a binder and bonding others of said fibers, said wood chips and said recycled paper together forming said batt.

5. The batt of claim 1 wherein said batt consists of about 50% of said wood chips, about 30% of said recycled papers and about 10% of said synthetic fibers.

6. The batt of claim 1 wherein said recycled paper at least partially comprises shredded, discarded newspapers treated with a fire retardant.

7. The batt of claim 1 wherein said batt is compressed to between 100 to 500 kg/m$^3$.

8. A batt for use as insulation panels, wall board panels and acoustical panels comprising:
   bi-component fibers, irregular sized wood chips and shredded reconstituted paper mixed to be evenly dispersed, said mixture being shaped to form said batt of a desired width, height and length and heated to cause a meltable component of said bi-component fibers to bond said bi-component fibers, reconstituted paper and wood chips into a substantially rigid structure.

9. The batt of claim 8 wherein at least one of end, upper, lower and side surfaces of said batt are planar.

10. The batt of claim 8 wherein at least one of upper, lower and side surfaces of said batt are irregular.

11. The batt of claim 8 wherein end surfaces of said batt are planar.

12. A method of forming generally rigid batts for use as insulating wall board, insulating acoustical paneling or acoustic paneling including the steps of:
   delivering wood chips, recycled cellulose and synthetic fibers into a mixing chamber and causing said wood chips, said recycled cellulose and said synthetic fibers to be evenly inter-dispersed;
   moving said combined wood chips, recycled cellulose and said synthetic fibers into a forming chamber and shaping by compression said wood chips, recycled cellulose and synthetic fibers into a batt of desired density with fixed dimensions of height and width;
   combining a binder with said combined wood chips, recycled cellulose and synthetic fibers;
   moving said shaped batt into a heating chamber and causing said binder to become molten and bond with said synthetic fibers, said wood chips and said recycled cellulose forming said batt into a generally rigid stable entity;
   moving said batt into a cutting area and cutting said batt into dimensions of desired length forming said batt at a desired width, height and length.

13. The method of claim 12 including utilizing bi-component fibers as said synthetic fibers and causing a component of said bi-component fibers to act as said binder.

14. The method of claim 12 including forming said batt with a top, a bottom, opposed sides, and opposed ends each having a surface of one of planar and roughened.

15. The method of claim 12 including forming said batt with roughened ends and planar sides, top and bottom.

16. The method of claim 12 including compressing said batt to between 100-500 kg/m$^3$.

17. The method of claim 12 including compressing said batt to be between ⅜" to 2" thick.

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