June 1, 1971 J. A. ARDUSER 3,582,421

METHOD OF FORMING A ROLLED PACKAGE OF BONDED MINERAL FIBERS

Filed Dec. 21, 1967 2 Sheets-Sheet 1

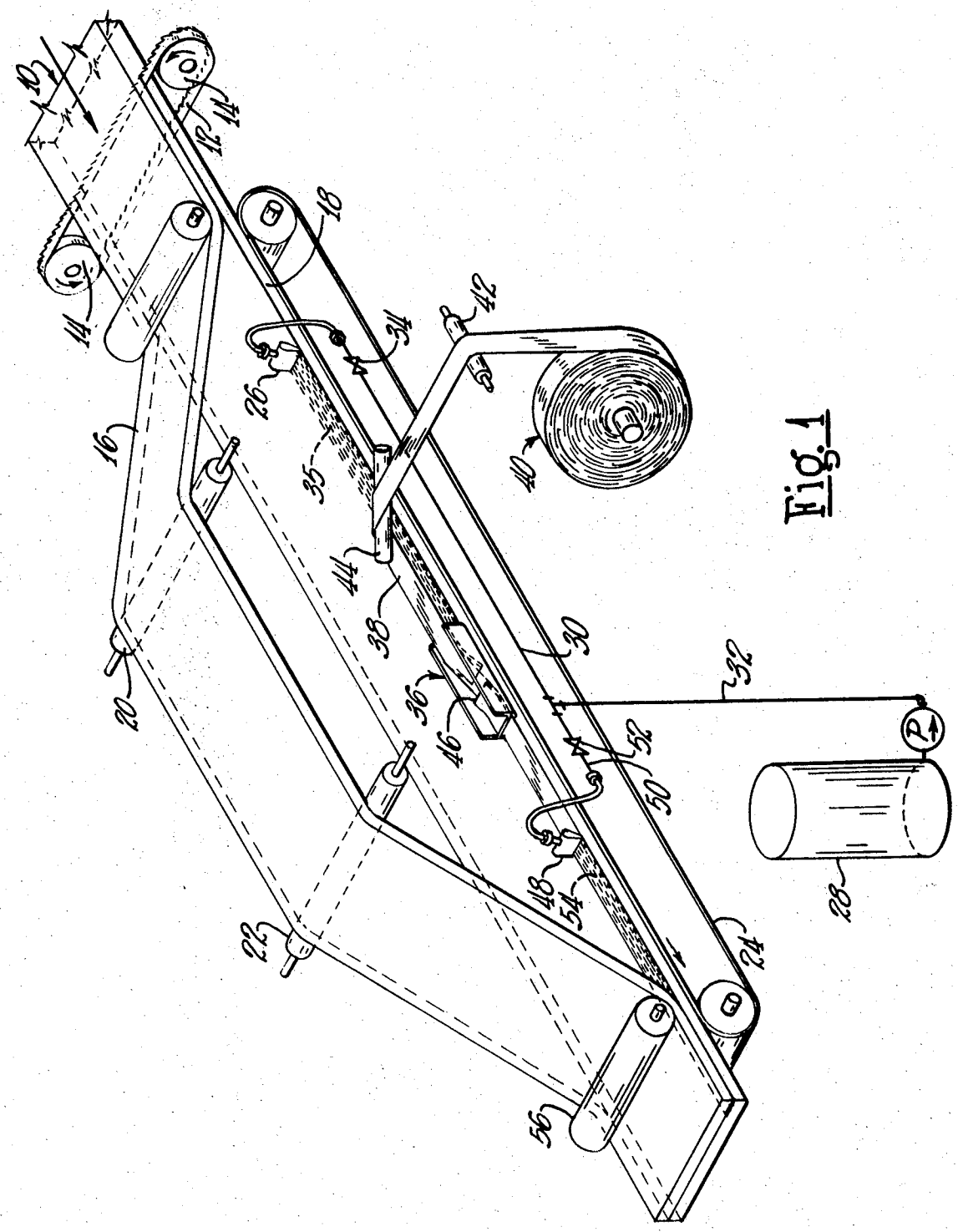

Fig. 1

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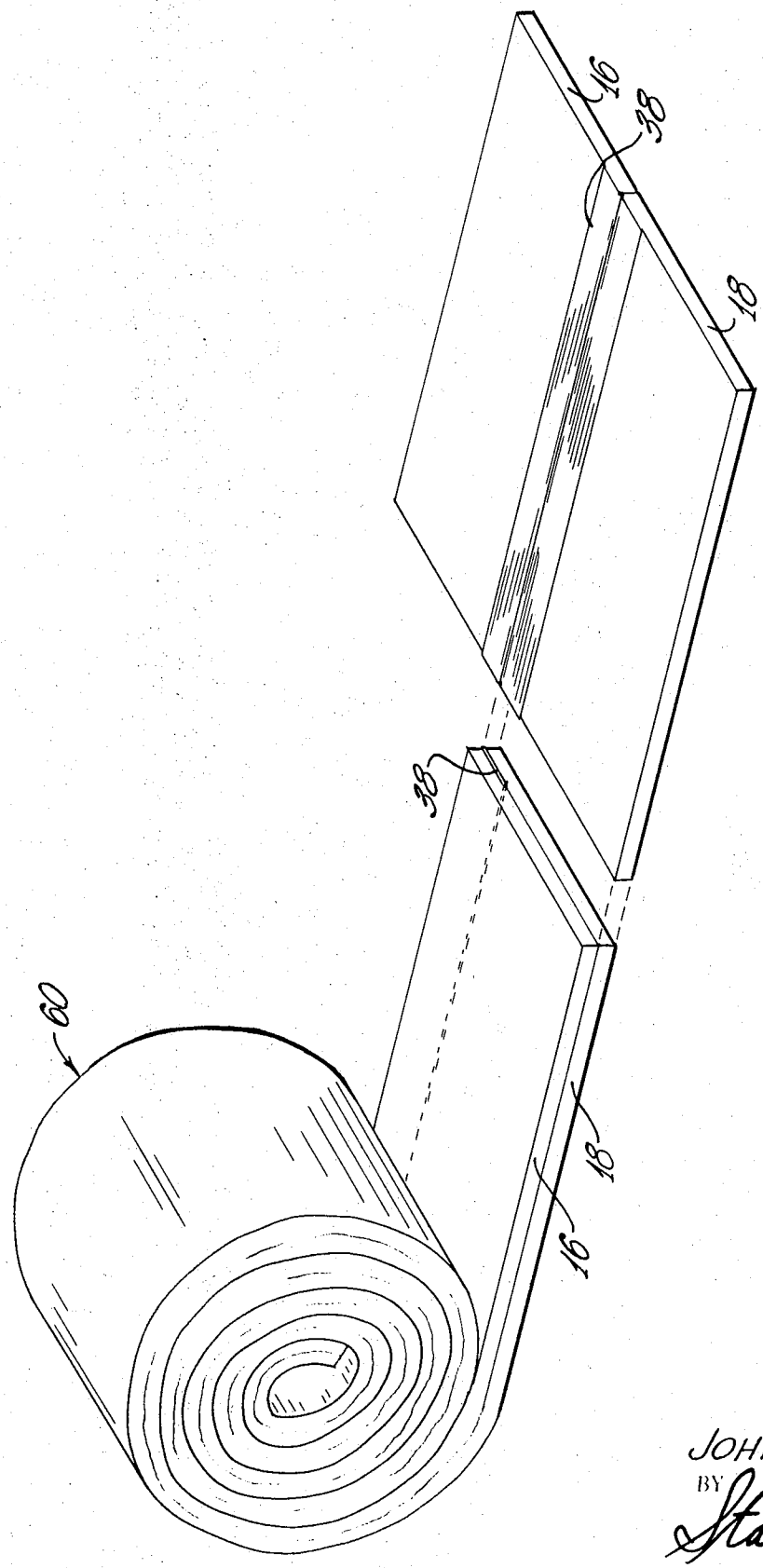

Fig. 2

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METHOD OF FORMING A ROLLED PACKAGE OF BONDED MINERAL FIBERS

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U.S. Cl. 156—192 4 Claims

ABSTRACT OF THE DISCLOSURE

An insulating material of mineral fibers formed in part by splitting a low density continuous pack of bonded fibers and applying a folded splice strip along two adjacent edges of the split batt which may be rolled up at the point of manufacture in superposed relation, and may be unrolled and unfolded to a double width at the situs of use.

BACKGROUND OF THE INVENTION

(1) Field of the invention

The invention relates to batts of mineral fibers for use primarily as a ceiling and wall structures and to the method of making the same.

(2) Description of the prior art

Bonded packs of fibrous glass have been split leaving flat clean surfaces on both sides of the cut which are employed as the main exterior face of the boards being produced. However, in installations where it is desirous to span rather large zones, the narrower boards or sections of the pack of fibrous material were necessarily spliced or otherwise joined at the situs of installation. Manifestly, this is a timely and thereby costly procedure.

SUMMARY

The invention provides a fibrous insulating product which may be satisfactorily manufactured into rolled packages of a width dimension at least half of the width of the finished product. More specifically, the invention contemplates splitting a low density continuous pack of bonded fibers by use of any suitable means such as a band saw which cuts clearly through the light body of fibers and leaves flat clean surfaces on both sides of the cut. In the event the pack were two inches in thickness, the splitting is preferably accomplished at the center pack to produce two sections each approximately one inch in thickness. The two sections are then separated and a folded splicing paper is inserted between two adjacent edges of the respective sections and adhesively secured thereto. Typically, the splicing paper is adhesively secured along the edge portion of the upper surface of the lower section, while the sections are separated, and then adhesively secured along the respective edge portion of the lower surface of the upper section by bringing the two sections into superposed contacting relation. The thus formed product is then rolled and packaged. When the ultimate user unwraps the package at the situs of installation, the product is unrolled, cut to the desired length, and unfolded preparatory to use. The unfolded product has a width dimension which is double the width of the folded product and is thereby capable of being used to span greater areas.

It will be understood that the size of the fibers used in fabricating the product is determined by the type and control of the forming equipment utilized. Such equipment conventionally employs air, steam, or combustion gases for attenuating molten threads of glass issuing from small orifices. The fibers are collected at the forming station in pack form with an uncured binder component dispersed throughout. A binder composed of a combination of melamine and phenol formaldehyde resins in proportion of roughly one to two, has acceptable strength in fire resistant characteristics. Other fibrous glass bonding agents are well known and would be quite equally effective for use. These may include epoxy, urea, and polyester resins, and run in an amount dependent upon the balance desired between sturdiness and fire protection.

Of course, the pack of fibers with the uncured binder dispersed throughout is conventionally caused to be passed through an oven, while under compression between parallel spaced flights of a pair of conveyors. The heat applied within the oven cures or sets the resin binder, and the pack is thus permanently established in its compressed state.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing features and advantages of the invention, as well as others, will become manifest to those skilled in the art from reading the following detailed description of an embodiment of the invention when considered in the light of the attached drawings in which:

FIG. 1 is an isometric diagrammatic view of a section of a production line capable of carrying out the steps of the invention and producing the fibrous product of the invention; and

FIG. 2 is a perspective view of the product of the invention being unrolled from the final package and being cut into desired lengths for use preparatory to the installation thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, there is illustrated in FIG. 1 a continuous pack **10** of a bonded fibrous glass material which has been previously compressed between conveyor flights and dimensionally stabilized by the curing of the binder content in an oven (not shown).

With the fibers of the preferred size, it is recommended that the density of the pack be set between one and one quarter, and two and one quarter pounds per cubic foot, and the binder content be present in a proportion of twelve percent by weight. These specifications are satisfactory for relatively thin products intended for acoustical insulation use. The specifications, of course, can vary depending on the ultimate intended use of the product. In the event the material is to be used for thermal, as well as acoustical insulation, the pack **10** may need the extra strengthening provided by increasing the density to as much as four pounds per cubic foot, and the binder content as high as sixteen percent.

As the pack **10** is caused to travel in the direction of the arrow (FIG. 1) over suitable conveyors (not shown),

it is horizontally split in half by a horizontally disposed band saw **12**, for example, which turns on a pair of spaced drums **14**. The compressed pack delivered to the band saw **12** may have a thickness of two inches, for example, and as being split by the saw **12** into two equal sections **16** and **18** nominally one inch in thickness. A pack three inches thick may be split into two or three sections depending up on the thickness and the desired width of finished product, as will be explained in greater detail hereinafter.

It has been found that in certain instances it is desirable to have each section retain one side or face of the pack **10**. The strengthening properties of an original side of the pack, due to the extra binder therein and the ironing effect of the compression under heat, contributes to maintaining the material against sagging when it is suspended in a ceiling installation. Accordingly, whatever the thickness of the pack **10**, it has been found advantageous to split the pack **10** once to produce only two sections. In the manufacturing operation, the upper split section **16** of the pack **10** is caused to travel upwardly over a pair of horizontally spaced apart guiding carry-over rollers **20** and **22**. The lower section **18** is caused to travel over a conveyor **24**. Located downstream of the band saw **12** there is disposed a liquid adhesive applicator head **26** which is connected to an adhesive reservoir **28** through conduits **30** and **32**. The conduit **32** may be provided with a fluid flow control valve **34** to meter the flow of liquid adhesive material to the applicator head **26** from the reservoir **28**. The applicator head **26** applies a line **35** of adhesive material to the marginal edge portion of the upper surface of the lower section **18**.

Downstream of the applicator head **26** is a guide channel **36** adapted to guide a web of folded flexible material **38** which is delivered thereto from a supply roll **40**. It has been found that the material **38** can be papers, as well as other flexible sheet materials. The web of folded material **38** is guided in its travel from a supply roll **40** to the guide channel **36** by a pair of spaced apart guiding idler rollers **42** and **44**. The guide channel **36** is formed with a slot **46** through which the web of folded material **38** travels and is brought into intimate contact with the line **35** of adhesive material on the upper surface of the lower section **18** of the pack **10**. The web of folded material **38** is applied to the lower section **18** in such a fashion that the fold line or folded edge faces outwardly and is adjacent the outer edge of the lower section **18**.

Another liquid adhesive applicator head **48** is located downstream of the applicator head **26** and is connected to the reservoir **28** through conduits **50** and **32**. The conduit **50** may be provided with a fluid flow control valve **52** to meter the flow of liquid adhesive to the applicator head **48** from the reservoir **28**. The applicator head **48** is effective to apply a line **54** of liquid adhesive to the upper surface of the web of folded material **38** which has previously been adhesively secured to the lower section **18**. It will be understood that the liquid reservoir **28** is provided with suitable pumping means diagrammatically illustrated in FIG. 1. In the preferred method it has been found desirable to employ a quick drying liquid adhesive, it being understood that other adhesives could be used where the manufacturing techniques permit.

The upper and lower sections **16** and **18**, respectively, are caused to be joined by being directed between a press roller **56** and the conveyor **24**. The coaction of the conveyor **24** and the press roller **56** effectively forces the marginal edge of the lower surface of the upper section **16** into intimate contact with the adhesive line **54** formed on the upper portion of the web of folded material **38**. In the typical installation, the press roller **56** is vertically adjustable to accommodate material of various thicknesses. Thus, the upper and lower sections of the fibrous material are joined together by the web

of folded material **38** to form a finished insulating product which is typically rolled into a package **60**, illustrated in FIG. 2. The rolled package **60** may be transported to the user where it is unrolled and cut into the desired lengths by the mechanic performing the installation.

While the above description has made reference to the web of folded material **38** being paper, other flexible materials, such as for example fabric or plastic tape may be satisfactorily employed. Also, the web of folded material could be coated with an adhesive of the pressure sensitive type without departing from the spirit of the invention.

In the event it is desired to obtain a wider dimension of the finished product, the pack **10** could be split into multiple sections so long as the alternate adjoining edges are suitably spliced together in a manner such as illustrated and described in respect of FIG. 1.

Where the decorative effect is of major concern, the web of folded material **38** could be made of a width dimension to span the entire surface formed by splitting the pack **10**. In such an instance, the surface containing the folded material would be exposed to the interior of the associated room in which the finished product is being installed. It will be obvious that plastic films such as, for example, polyethylene, plasticized polyvinyl chloride, polyvinylidine chloride, nylon, polycarbonate and polyvinyl fluoride may be utilized in lieu of paper. Such materials could be readily adhered to the fibrous material by adhesive materials which would include elastomeric compositions such as solutions, dispersions, or emulsions of butadiene-styrenes, nitriles, or neoprenes with a fire-resisting component therein. Various other thermoplastic, thermosetting and other elastomeric adhesives may give good service for joining the web of folded material **38** to the split sections of the pack.

It will be manifest that numerous modifications may be made without departing from the spirit of the invention and no limitation is therefore intended which is not set forth in the appended claims.

What I claim is:

1. A method of forming a foldable product of bonded mineral fibers including the steps of:

directing a pack of bonded mineral fibers along a path;

splitting said pack into at least two sections;

disposing a hinge element of foldable flexible sheet material along cooperating adjacent longitudinal edges of said sections; and

adhesively securing the hinge element to the respective longitudinal edges of said sections.

2. A method of forming a foldable product of bonded mineral fibers including the steps of:

directing a pack of bonded mineral fibers along a path;

splitting said pack into at least two sections;

separating said sections;

disposing a hinge element of foldable flexible sheet material along one of the respective longitudinal edges of one of said sections;

adhesively securing said hinge element to said section; and

adhesively securing the cooperating longitudinal edge of the other of said sections to said hinge element.

3. A method of forming a foldable product of bonded mineral fibers including the steps of:

flowing streams of molten glass from a source;

collecting said stream in a randomly arrayed mass of fibers to form a pack;

directing said pack of fibers along a path;

splitting said pack into at least two sections;

disposing a hinge element of foldable flexible sheet material along cooperating adjacent longitudinal edges of said sections;

adhesively securing the hinge element to the respective longitudinal edges of said sections; and

rolling said hinged sections into a rolled package.

4. A method of forming a foldable product of bonded mineral fibers including the steps of:

directing a pack of bonded mineral fibers along a path;

splitting said pack into at least two sections;

separating said sections;

disposing a hinge element of foldable flexible sheet material along one of the respective longitudinal edges of one of said sections;

adhesively securing said hinge element to said section;

adhesively securing the cooperating longitudinal edge of the other of said sections to said hinge element; and

rolling said hinged sections into a rolled package.

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