

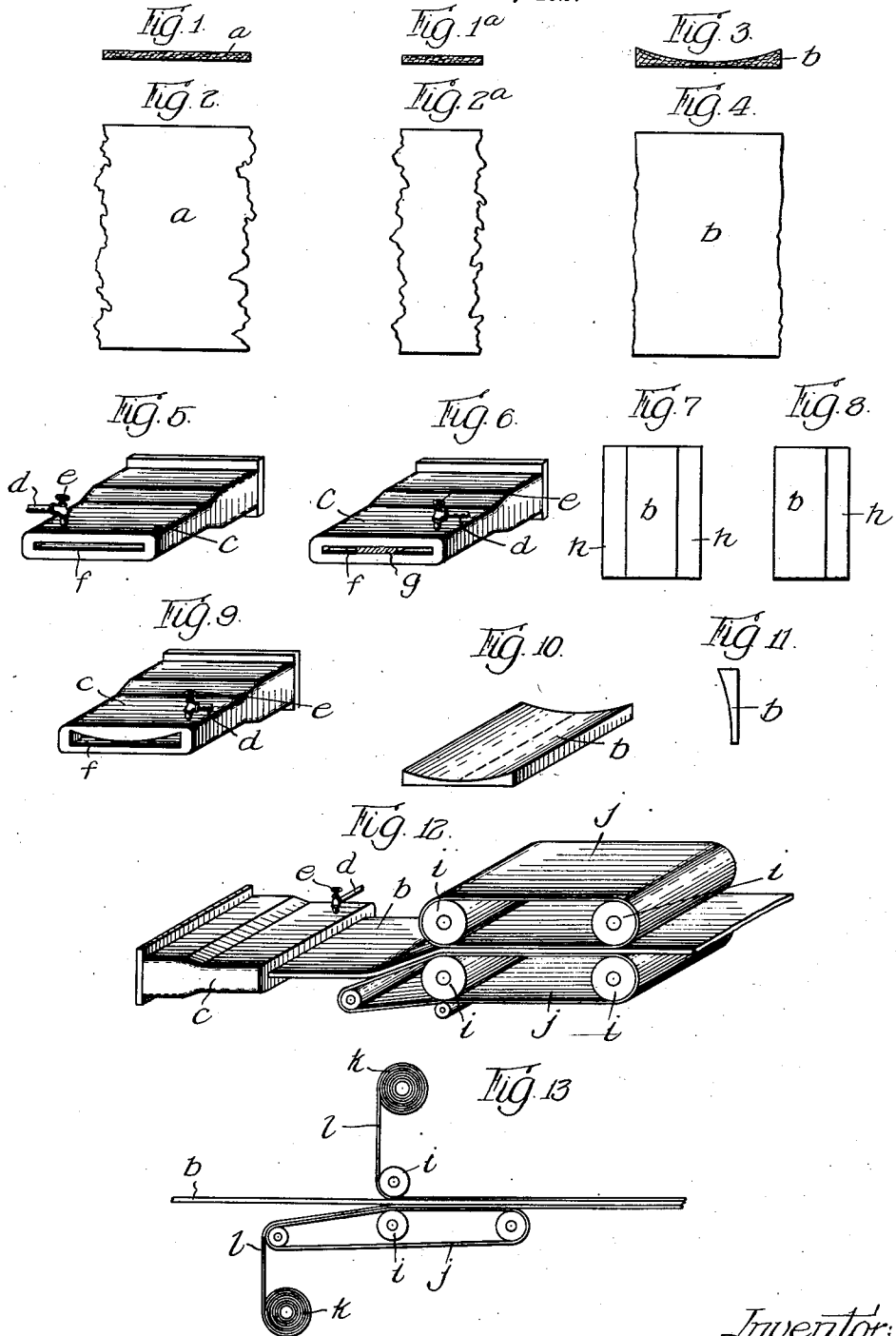
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PROCESS OF EXTRUDING SHEET MATERIAL

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PROCESS OF EXTRUDING SHEET MATERIAL

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9 Claims. (Cl. 154—2)

My process relates to the formation of sheet material composed of a mixture of a waterproofed binder and fibrous material. The waterproofed binder would preferably be blown asphalt, or any suitable pitch, tar, bituminous material, asphalt or other waterproofing material which is of a ductile, plastic nature rather than a hard brittle nature, and which is suitable for waterproofing purposes. The sheet material has a preponderance of waterproofing material. The waterproofing material may likewise have a rubber content in an unvulcanized state, preferably of a cut back or reclaimed type.

The fibrous material is preferably in a coarse condition, that is, it is incorporated in considerable length if it so comes, or in considerable width, and may be felt fibers or cotton fibers, hemp, sisal, flax, jute, coconut,istle, or in fact any linear fiber having length. The fibrous material may be excelsior in coarse or fine condition, the inner bark of trees, which shreds to flat thin strips of fibrous material, or it may consist of large pieces of shavings, or flake material of various kinds, either vegetable or mineral.

The sheet material is primarily for the purpose of manufacturing expansion joints, but it might likewise be used for roofing, flooring or other constructional uses. In the expansion joint art the binder must be ductile, must have a fairly high melting point, at least over 200° F. and must not be brittle in cold temperatures. This is the requirement of the art for proper functioning. It must be as resilient and elastic as possible, and this process of incorporating the coarse material in the waterproofed binder aids such resiliency very materially.

The prior art discloses fiber incorporated in a manner so that it is broken up into small pieces, and it loses much of its value. Likewise in the breaking up of this fiber into small pieces a thin sheet can be prepared, whereas by mixing the material in a coarse manner and preserving in as near a natural state as possible a thin sheet cannot be prepared without a great deal of breaking.

One of the features of my invention is the reduction of the mixing operation, which previously required an hour's time to fabricate a sheet, but which by my process is reduced to fifteen or twenty minutes or even less. The fibrous material may either be previously waterproofed or not, as desired. If it is previously waterproofed it will not require as much new waterproofed binder as if it were not waterproofed.

The mixing operation is done in a steam-heated mixer. The liquid binder is heated and poured

into the mixer, and the fibrous material is incorporated in the liquid binder in a short rapid mix, thus preventing the breaking up of the fiber to any appreciable degree.

I have found that it is impossible to roll such a mixture to sheet form unless same is mixed for some length of time. Ordinarily the mixture should be run for an hour or more. If the fibrous material ran too coarse the sheet would tear apart in rolling. In my present process my object is to mix the ingredients only a short period and keep the fibrous material in as coarse a condition in the mix as possible, thereby gaining tensile strength and body.

I find a satisfactory sheet can be made by taking this mixture and introducing it into an extruding machine in a heated plastic state, and extending thru a steam-heated extruder, having a steam-heated die or head, into a sheet and then rolling the sheet between rollers. The mixture can be extruded into sheets as wide as 26 inches, and down to $\frac{3}{8}$ of an inch in thickness.

If provision is not properly made in the die for the preparation of this sheet so that it will be thicker on the edges than it is at the center, the sheet will tear apart at the edges and much waste material will be obtained. I, therefore, arrange the die by padding the center so that the edges of the sheet are thicker than the center. When a sheet of uniform dimension is pressed between pressure rolls the friction at the edges forces the edges apart and the center is not affected, with the result that the edges are badly torn. If, however, I arrange to have the edges taper inward to the center and then make the center over a given distance uniform I will receive a sheet of increased dimension, with little if any breaking of the edges. This is very important in manufacturing constructional material of various kinds and obviates extruding in a heavy slab section and reducing it under pressure by rolling. In fact a heavy slab rolled down under pressure, containing coarse material, pulls apart, that is, a coarse section travels forward and leaves a ragged hole in the reduced material, but by extruding as previously described, and when rolling so that $\frac{3}{8}$ inch compression is obtained or more, I find the sheet is not damaged but kept practically perfect, and that a very strong sheet containing coarse fibrous material can be formed. Likewise, by extruding a sheet with thicker edges for certain purposes, for instance, sewer pipe belts, tapered shingles, or the like I can extrude a sheet or strip of a given width, having heavy edges and tapering to the center. By cutting thru the center of the strip I

obtain two strips of sewer pipe belt suitable for caulking sewer pipes. Likewise in this same process I find that by locking the center of the extruder opening I can obtain two strips and introduce a third strip in the center, uniting the two strips on either side of the third strip, so that my invention relates to, first, a process of mixing, second, a process of extruding a sheet that is thicker at its edges than at its center, third, the process of extruding strips and introducing an intervening section, and uniting the extruded strips to the intervening section. A fourth process comprises the manufacture of sewer pipe belt, which comprises extruding a sheet having its edges thicker than its center, and by cutting thru the center manufacturing a wedge-shaped belt for sewer pipe caulking. The primary process is the formation of a sheet having thicker edges and then rolling said sheet to obtain a uniformly thick sheet without breaking the edges, and this is my preferred form, but I do not wish to be limited to this particular process, as the process may apply in other ways and for the manufacture of different constructional materials, as described.

The main process is the rapid mixing of a waterproof material and coarse fibrous material, introduced into a steam-heated extrusion machine, and extruding the sheet so that the edges are thicker than the center, for the purpose of rolling the sheet to obtain a sheet of uniform thickness with its edges comparatively free of breaks.

Referring to the drawing. Figure 1 represents a uniform sheet of material; (a) represents the material.

In Figure 2, a represents the material reduced to sheet form. Where the sheet has been introduced into a steam-heated extruder and where the sheet has been extruded to a uniform thickness and then subjected to pressure rolls, it can be readily seen that the sheet is an economic loss.

Figures 1a and 2a represent cross sections and face views of a blown sheet of ductile material extruded and rolled in the same manner as Figures 1 and 2, the difference being that in Figures 1a and 2a the sheet has no fiber content.

Figure 3 shows a sheet b extruded so that the edges are thicker than the center.

Figure 4 shows the result of the sheet b, in which the edges are practically perfect, due to the fact that it has been extruded with thickened edges, presented to pressure rolls, and by reason of the thick edges is produced practically free from breaks.

Figure 5 shows an extruder head provided for steam-heat, c represents the head, d the steam conveyance, e the valve, f the slot in the extruder. If the slot in the extruder, as at f, is left undisturbed it will extrude a uniform sheet. If a slide interference is arranged in the center of the opening then the sheet will be thicker at the center and thicker at the sides.

Figure 6 shows an interference placed in the groove of the extruder, in which g represents the interference. This will cause two strips to flow from either side of the interference.

Figure 7 shows a sheet in which the material b is introduced between the two strips h—h, which are run alongside of the introduced strip b, and the edges h—h being formed by the extruder head.

In Figure 8 strip b is introduced and strip h is run along one edge thereof.

In Figure 9 an extruder head is shown provided with steam-heat, in which the groove is formed

so that the edges of the sheet will be thicker than the center.

Figure 10 illustrates the sheet b, which when cut in the center results in the strip shown in Figure 11.

Figure 11 indicates the strip b suitable for sewer pipe caulking.

Figure 12 illustrates an extruder head c, provided with steam conveyance d and a valve e, forming a plastic sheet b, introducing said plastic sheet between rollers i—i, said rollers having belts around them and so arranged that the sheet can first rest upon the lower belt and then feed up to the pressure rolls i—i, said rolls being surrounded by canvas belts, said belts j—j containing lime dust to prevent adhesion, and the sheet b is reduced to proper size by the pressure rolls i—i and drawn between the belts j—j. If the sheet b was not provided with heavier edges the pressure rolls would break the edges, as shown in Figure 2.

Figure 13 illustrates a departure from Figure 12, in that the extruded sheet b is fed between two sheets of saturated felt l—l unrolled from rollers k—k, the lower sheet traveling upon a belt j around rolls i—i, the sheet b finally resting thereon, the upper sheet l passing below the roller i, and said saturated sheets being pressed against the sheet b without seriously breaking the edges of the sheet, thus preventing waste forming a finished sheet.

It can be readily understood that the process will work equally well where the sheet is formed with a homogeneous mixture into a single thickness, or where the sheet b with the heavy edges is pressed between sheets of saturated felt. In either case it will fill out the edges and save waste.

I am the first to extrude a bituminous, fibrated sheet 26 inches in width, and introduce said sheet to a set of rolls, producing a sheet of lesser dimension with unbroken edges.

I am not claiming a two or three inch thick slab of uniform dimension reduced to a thinner dimension in which the edges of the sheet are broken. I do claim any slab formed of bituminous material and fiber, in which the slab is thicker at the edges than the center and reduced to a thinner dimension, in which the entire sheet becomes uniform in thickness and is free from broken edges.

I likewise claim a bituminous sheet formed with thicker edges and tapered to the center, in which the center is later cut and used as strips for caulking pipes, tapered shingles or the like.

I claim:

1. The process of forming sheet material characterized by mixing a heated waterproofed binder and coarse fibrous material, presenting said heated mixture to a steam heated extrusion machine and extruding said mixture thru a steam heated die, with the edges of the sheet so extruded thicker than the center, and reducing said sheet to uniform thickness.

2. The process of forming sheet material characterized by mixing a heated waterproofed binder and coarse fibrous material, presenting said heated mixture to a steam heated extrusion machine and extruding said mixture thru a steam heated die, with the edges of the sheet so extruded heavier than the center, presenting said heated, plastic sheet with thickened edges to pressure rolls and reducing said sheet to a sheet of uniform thickness and free from broken edges.

3. The process of forming sheet material characterized by mixing a heated waterproofed bind-

- er and coarse fibrous material, presenting said heated mixture to a steam heated extrusion machine and extruding said mixture thru a steam heated die, with the edges of the sheet so extruded thicker than the center, presenting said sheet between upper and lower saturated felt sheets, running said saturated felt sheet containing the plastic sheet with thicker edges and uniform center between pressure rolls, and forming a sheet of uniform thickness without unfilled edges.
4. The method of making construction sheet material consisting in forming a plastic mass, feeding same to an extruding device, extruding the material into sheets, applying a reenforcing layer to the face of the sheet, and thereafter subjecting the composite structure to pressure to reduce same to the desired thickness.
5. The method of making construction sheet material consisting in forming a plastic mass, feeding same to an extruding device, extruding the material into sheets, applying a reenforcing layer to both faces of the sheet, and thereafter subjecting the composite structure to pressure to reduce same to the desired thickness.
6. The method of making constructional material comprising mixing a warm plastic mass, feeding same to an extruding device, extruding the mass into a sheet of tapering transverse thickness, and dividing the sheet into strips.
7. The method of making constructional material comprising mixing a warm plastic mass, feeding same to an extruding device, extruding the mass into a sheet of tapering transverse thickness, and dividing the sheet longitudinally into strips.
8. The method of making constructional material comprising mixing a warm plastic mass, feeding same to a forming device, forming the mass into a sheet of tapering transverse thickness, and dividing the sheet along the longitudinal medial plane into uniform strips.
9. The method of making constructional material comprising mixing a warm plastic mass, feeding same to a forming device, forming the mass into a sheet of increasing thickness from the center to the side edges, and dividing the sheet longitudinally along the line of its minimum thickness.
- ALBERT C. FISCHER.

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