June 1, 1937. U. ISMAN ET AL 2,082,399

RAILWAY SLEEPER

Filed March 10, 1933

Fig. 1

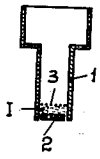


Fig. 2

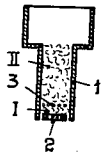


Fig. 3

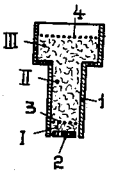


Fig. 4

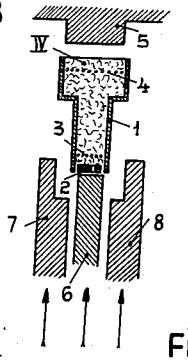


Fig. 5

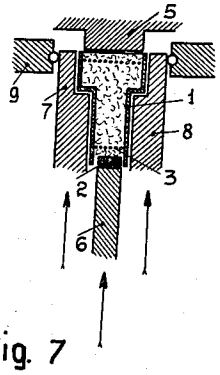


Fig. 6

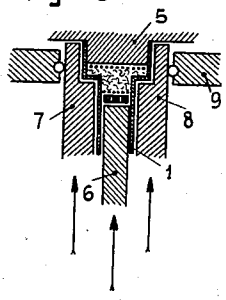


Fig. 7

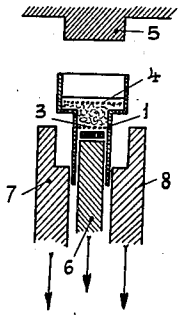


Fig. 8

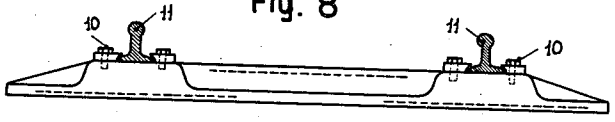


Fig. 9

Fig. 10

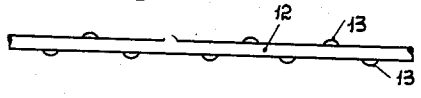


Fig. 11

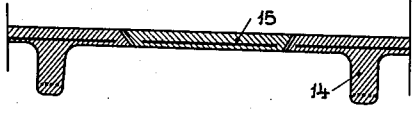
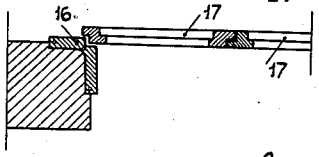


Fig. 12



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2,082,399

RAILWAY SLEEPER

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Application March 10, 1933, Serial No. 660,326
In Italy February 10, 1933

4 Claims. (Cl. 238—91)

This invention relates to and has for its object a process for preparing a material adapted for the manufacture of various articles and constituted by a mixture of cement and fibrous substances, such as asbestos, known under the name of artificial slate extending the use of said material which was until now confined to the manufacture of tubes, roof slabs and the like.

This restricted use of a material having resiliency, strength and structural properties such that it can be worked in the same manner as wood, is due to the manufactory processes now in use, in which the tensile strength, lower than the compressive strength cannot be increased owing to the fact that suitable reinforcements cannot be applied in the known manner and confines the process to the manufacture of articles of uniform thickness and shape. It is well known that the apparati now in use do not allow the incorporation of reinforcement of any kind with the mass.

According to this invention, the quantity of material required for manufacturing an article is brought into a mold of a volume sufficient to contain said material in the loose state. The material is arranged in layers, the weight of which has been exactly determined according to the final desired thickness of the article, suitable reinforcements being inserted at the points most subjected to stresses. The material is then moistened whereupon the mold filled with the material is brought under a press comprising a fixed plunger and a set of movable plungers for compressing the material to the desired degree.

It is thus possible to manufacture beams of various size, which can advantageously be used in the place of profiled irons, ceiling elements, slabs for inner tracks of iron railway bridges, sanitary articles, door and window frames, fittings, plates, material for electric insulation, railway sleepers, etc.

The annexed drawing shows, by way of example, how this process is carried out for the manufacture of railway sleepers; it shows further some articles obtained according to said process.

Figs. 1 to 7 show the successive steps of the manufacture of railway sleepers.

Fig. 8 shows a railway sleeper in elevation.

Fig. 9 is a cross section thereof.

Fig. 10 shows a reinforcement element.

Fig. 11 is a sectional view of a ceiling, and

Fig. 12 shows a door frame in cross section.

Referring to the drawing, the first step consists in preparing a mixture of cement and fibrous material, for instance asbestos. Said fibrous material, the element fibers of which are fully opened, is mixed in variable proportions and in the dry state with cement, so that each fiber is coated with a cement film.

The mixture thus prepared is poured into a mold of perforated sheet 1 provided with a movable base plate 2 which is likewise perforated. A first layer of mixture of the exact desired weight is placed on the base plate 2 and forms a layer of even thickness I, on which iron bars 3 or other suitable reinforcement adding to tensile strength are arranged (Fig. 1).

A second quantity of exact weight of mixture is then poured in and forms the layer II (Fig. 2) of even thickness, then a third layer III (Fig. 3), which will be accurately levelled and on which a second reinforcement 4 is placed at the point subjected to stress. The reinforcement is finally covered with a layer IV of the mixture.

The mold thus filled is then carried to the press (Fig. 4), which comprises a fixed bolster 5 and three plungers 6, 7 and 8. Said plungers are operated by means of a set of press pistons (not illustrated for the sake of clearness), the pressing surfaces of which are proportioned to each other according to the surfaces to be pressed. Thus with the same working pressure in all the press cylinders a constant molding pressure will be applied on the whole surface of the railway sleeper. The ratio between the stroke of the central plunger 6 and the stroke of the side plungers 7 and 8 is equal to the ratio between the final thickness of the wider base side of the railway sleeper and the narrower side thereof.

The addition of water or aqueous solution required for the setting and hardening of the cement can be effected as follows:

(a) Each layer of mixture having been levelled water is spread thereon by means of a sprayer or the like, so that the material will be evenly moistened;

(b) During the step shown in Fig. 4 that is after having filled the mold, the water or aqueous solution is sprayed on the material which will be easily and abundantly impregnated owing to its soft state;

(c) Before introducing the material into the mold, the exact quantity of dry mixture will be passed through a suitable arrangement provided with pulverizers, so that the mixture will acquire the degree of moisture, about 28% to 30% by weight of the binding means strictly necessary for its setting. Notwithstanding said moisture the mixture of cement and fibrous material will be of such consistence as to permit its spreading within the mold in a soft condition in the same way as if dry mixture were used.

When the material is moistened to the degree required for its setting, the pressing is effected.

For this purpose the plungers 6, 7 and 8 are raised until the mold 1 comes into contact with the bolster 5 (Fig. 5). During the further upward movement the central plunger 6 will press the portion corresponding to the layers I and II, while the side plungers 7 and 8, by raising the mold I, will cause the bolster 5 to enter it and press the upper portion corresponding to the layers III and IV.

During the pressing and for the purpose of balancing the transversal pressure of the material in the mold, suitable guiding members 9 are provided for the side plungers 7 and 8 (Fig. 6); said guiding members may consist for instance of pistons arranged on the press sides and working simultaneously with the main pistons.

The water or aqueous solution in excess pressed out of the mass is expelled through the holes of the mold by pressure. The discharge of the liquid through the plungers and the bolster is facilitated by grooves and holes provided in said members.

When the pressing is over, that is when the railway sleeper is of the required size, the pressure is relieved from all the plungers and guiding members; the movable plungers supporting the mold containing the finished railway sleeper are lowered. The sleeper is then carried together with the mold by means of a carriage or other device on a perfectly flat surface where it will remain until setting is completed.

As it appears from Figs. 8 and 9, the metallic reinforcements are arranged at the points which are subjected to tensile stresses and more exactly in the base under the rail supports and at the central part. The pressure can vary according to circumstances from 10 to 200 kilos and more per square centimeter according to the material and the final desired resistance. In special cases the reinforcement may also be arranged in zones subjected to compressive stresses, or in a double layer if convenient, or be dispensed with if the tensile stresses are such that they can be supported by the fibrous mass.

When a double reinforcement is used, the mold will be filled with six layers instead of four as described and when no reinforcement is used, the number of layers will be reduced to two.

According to Figures 8 and 9 the cross irons and clamps generally used in ordinary reinforced concrete are done away with. Said parts having the purpose of supporting the shearing forces are superfluous in railway sleepers according to this invention since the resistance to shearing forces of the fibrous material is more than sufficient to support said stresses.

Fig. 8 shows the clamps 10 for securing the railway sleepers 11 screwed directly to the sleepers; this is possible owing to the toughness of the material used.

For the purpose of increasing the adherence of the iron to the mass of cement and fibrous material, it will be sometimes convenient to make the surface of the round bars rough as much as possible. This can be obtained for instance by providing the round bars with projections or "drops" 13 obtained by electric welding.

The process above described in connection with the manufacture of railway sleepers can be carried out for preparing any material for the manufacture of various objects. Fig. 11 shows by way of example a ceiling comprising T-shaped reinforced beams 14 and beds 15 and Fig. 12 shows a door comprising a frame 16 and wings 17: said parts are provided with reinforcements conveniently arranged.

What we claim is:

1. Railway sleeper composed of a cement and fibrous asbestos agglomerate having a uniform and highly compact structure throughout obtained by compressing a moistened mixture of cement and fibrous asbestos from different directions by forces which are proportional to the areas compressed thereby, reinforcing bars near the lower sleeper face under the rail supports and reinforcing bars near the upper sleeper face in an intermediate section between the rail supports, said second reinforcing bars being separate and independent of the first-mentioned bars and lying in a different horizontal plane from said first-mentioned bars.

2. Railway sleeper composed of a cement and fibrous asbestos agglomerate having a highly compressed, dense structure of uniform density throughout comprising a flat base, a central longitudinal rib of less width than the base and rail supports near the sleeper ends, said base plane, central rib and supports being obtained by compressing a moistened mixture of cement and fibrous asbestos from different directions by forces which are proportional to the areas compressed thereby, reinforcing bars near the lower sleeper face under the rail supports and reinforcing bars near the upper sleeper face in an intermediate section of the rib between the rail supports lying in a higher horizontal plane than said first-mentioned bars, the second-mentioned reinforcing bars being separate and independent of the first-mentioned bars.

3. Railway sleeper composed of a cement and asbestos agglomerate having a uniform and highly compact structure obtained by compressing a moistened mixture of cement and asbestos at a unit pressure uniform at all points of above 100 kg. per cm.^{2} from different directions by forces which are proportional to the areas compressed thereby, reinforcing bars near the lower sleeper face under the rail supports and reinforcing bars near the upper sleeper face in an intermediate section between the rail supports and having their ends overlapping the first-mentioned bars, said second reinforcing bars being separate and independent of the first-mentioned bars and lying in a higher horizontal plane than the first-mentioned bars.

4. Railway sleeper consisting of a cement and asbestos agglomerate having a uniformly and highly compacted structure and comprising a wide base portion, a central longitudinal rib narrower than the base portion and rail supports near the sleeper ends, said base portion, central rib and supports being obtained by compressing a moistened mixture of cement and asbestos to a uniform pressure of above 100 kg. per cm.^{2} from different directions by forces which are proportional to the areas compressed thereby, reinforcing bars located in the base portion near the lower sleeper face under the rail supports and reinforcing bars in the rib near the upper sleeper face in an intermediate section between the rail supports and having their outer end portions overlying the inner end portions of the first-mentioned bars, said second reinforcing bars being separate and independent of the first-mentioned bars and lying in a higher horizontal plane than said first-mentioned bars.

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