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WOODEN GIRDER

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Fig. 1.

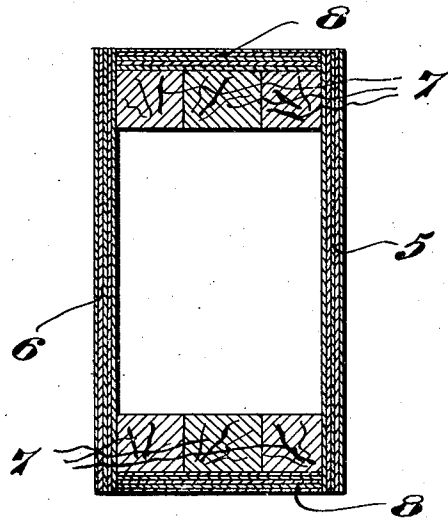
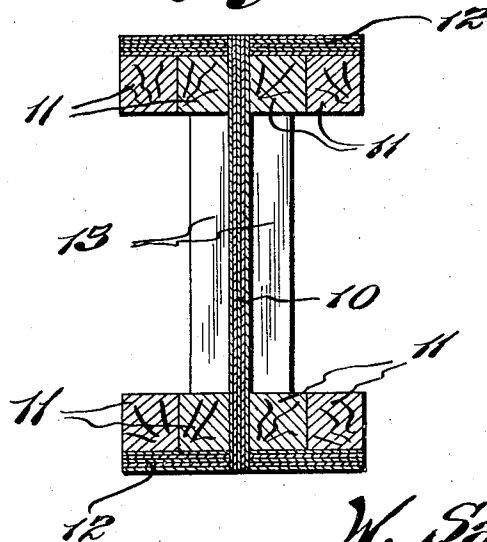


Fig. 2.



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UNITED STATES PATENT OFFICE

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WOODEN GIRDER

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2 Claims. (Cl. 20-0.5)

This invention relates to known girders of box-cross-section, T-cross-section, I-cross-section and π -cross-section, in which the web or webs made of thin wood plates are united with the flanges consisting of rectangular timber only by gluing with the aid of an artificial resin binder.

It has already been proposed in the case of wooden girders to make the web or webs of plywood. Girders of this kind are relatively cheap and are consequently particularly suitable for the building trade, more particularly as the girders have the requisite strength. The endeavour greatly to increase the span of halls and other structures with the use of such wooden girders leads to the requirement considerably to increase the strength of the said girders.

The invention solves this technical problem by employing girders, in which the flanges are glued with their end surfaces to the side walls of the web or of each web. According to the invention the flanges consist in this case just as the web or webs of so-called "layered wood," that is to say, plates which are built up by a large number of very thin beech-wood veneers being superposed on one another with interposed films of artificial resin or other materials and by uniting the whole pile under high pressure and temperature to form a plate. With such layered wood there will be at least five veneers per 1 cm. of wall thickness of the plate. According to the invention the webs and flanges of the wooden girder consist of this "layered wood." In addition there is arranged on the inside of each flange a reinforcement consisting of softwood rectangular timber. These rectangular timbers are glued both to one another and to the flange and to the web with the aid of an artificial resin binder.

In this way the excellent properties of layered wood (coefficient of elasticity up to 215,000 kg./cm.²) are fully utilised, without the cost of the girder exceeding the amount spent for wooden girders in the building trade. The gluing according to the invention of a reinforcement consisting of cheap soft rectangular timber (pine, spruce) to the inside of each flange of the layered wood makes it possible not only to use relatively thin flanges, thus saving expensive layered wood, but also increases the relatively slight resistance of the layered wood to bulging.

In the accompanying drawing two constructional examples of the wooden girder according to the invention are illustrated.

Fig. 1 shows in cross-section a box-girder according to the invention.

Fig. 2 shows in cross-section an I-girder according to the invention.

The box-girder shown in Fig. 1 consists of the two web plates 5 and 6 and the two flanges 8. The flanges are glued with their end surfaces to the side walls of the webs 5 and 6. The webs and the flanges consist of layered wood. On the inside of each flange 8 a reinforcement is provided, which consists of three rectangular pieces 7 of wood from coniferous trees. The rectangular pieces of wood 7 are united with one another, with the flange and with the web plates 5 and 6, by gluing. In all cases an artificial resin binder is used and the glued places are pressed against one another during binding with a pressure of about 4 atmospheres. For the rectangular pieces of wood 7 wood from coniferous trees, which has a maximum moisture content of 18% (calculated on the dry mass), is preferably used.

The arrangement is made such that the rectangular pieces of wood 7 are only in that region, within which the stressing of the girder in cross-section lies below 150 kg./cm.². The flange 8 consisting of layered wood is thus in a zone in which the stressing of the cross-section reaches values lying above 150 kg./cm.².

In order to utilise the entire cross-section, the moment of inertia, the moment of resistance and the surface of the ideal cross-section are calculated, the difference of the building materials as regards their elastic properties being taken into account, as in the case of reinforced concrete construction, by forming the ratio of the two moduli of elasticity.

In the I-girder shown in Fig. 2 the web 10 consisting of layered wood has the full height of the girder and each flange 12 consists of two halves. Each half is glued with its end surface to the side wall of the web 10. At the inside of each flanged half is provided a reinforcement consisting of two pieces of rectangular wood 11. All parts are glued at their contact surfaces with the aid of an artificial resin binder under the application of suitable pressure.

In order to reinforce the web plate 10 two pieces of rectangular timber 13 are arranged between the upper and lower rectangular timber reinforcement (11) of the flange 12.

In both illustrated constructional forms the glued surfaces which connect the flanges reinforced by the rectangular pieces of wood with the web or the webs are large enough to be able to transmit the shearing forces there occurring with a margin of safety of at least three times.

What I claim is:

1. A wooden girder consisting of at least one web and at least one flange fixed with its end surface to the side wall of the web, the web and flange each consisting of superposed plates of beech-wood veneers which are so thin that there are at least five veneers per 1 centimeter wall thickness, said veneers being compressed to form plates, and a reinforcement consisting of soft wood rectangular timbers arranged on the inside of the flange, the said rectangular timbers being glued both to one another and to the web and also to the flange and extending over the entire area of the flange.
2. A wooden girder consisting of at least one web and two flanges fixed with their end surfaces to the side walls of the web, the web and both flanges consisting each of superposed plates of beech-wood veneers which are so thin that there are at least five veneers per 1 centimeter wall thickness, the veneers of the web and flanges being compressed to form plates, and reinforcements consisting of soft wood rectangular timbers arranged on the inside of each flange, the said rectangular timbers being glued both to one another and to the web and also to the flanges and extending over the entire area of the flanges.

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