US 20030005661A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2003/0005661 A1

Collavino (43) Pub. Date: Jan. 9, 2003

(54) PRESTRESSED HOLLOWCORE CONCRETE PLANK LEVELER DEVICE

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(21) Appl. No.: 09/898,268

(22) Filed: Jul. 3, 2001

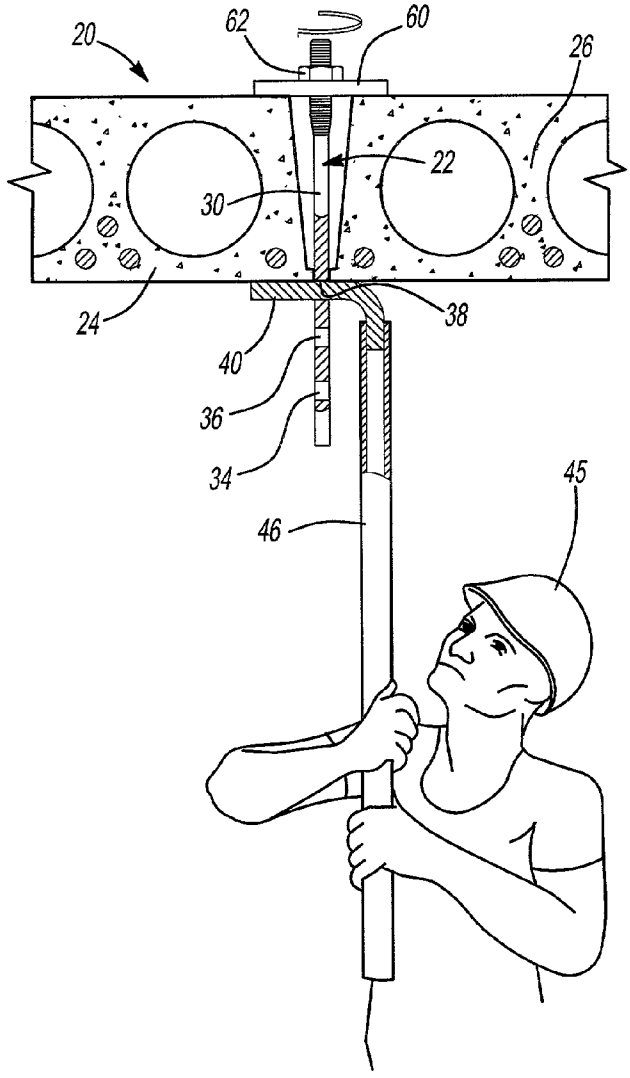
Publication Classification

(51) Int. Cl.[7] E04G 21/18

(52) U.S. Cl. 52/749.13; 52/126.1; 52/745.05; 52/747.12; 52/749.1

(57) ABSTRACT

A device for leveling or aligning adjacent prestressed hollowcore concrete planks includes an insert member that is received between the planks at a grout joint. One end of the insert member supports a first alignment member that is received against one side of the planks. The other end of the insert member cooperates with a second alignment member that is received against an opposite side of the planks. An adjustment member adjusts the spacing between the first and second alignment members to provide a desired alignment between the planks.



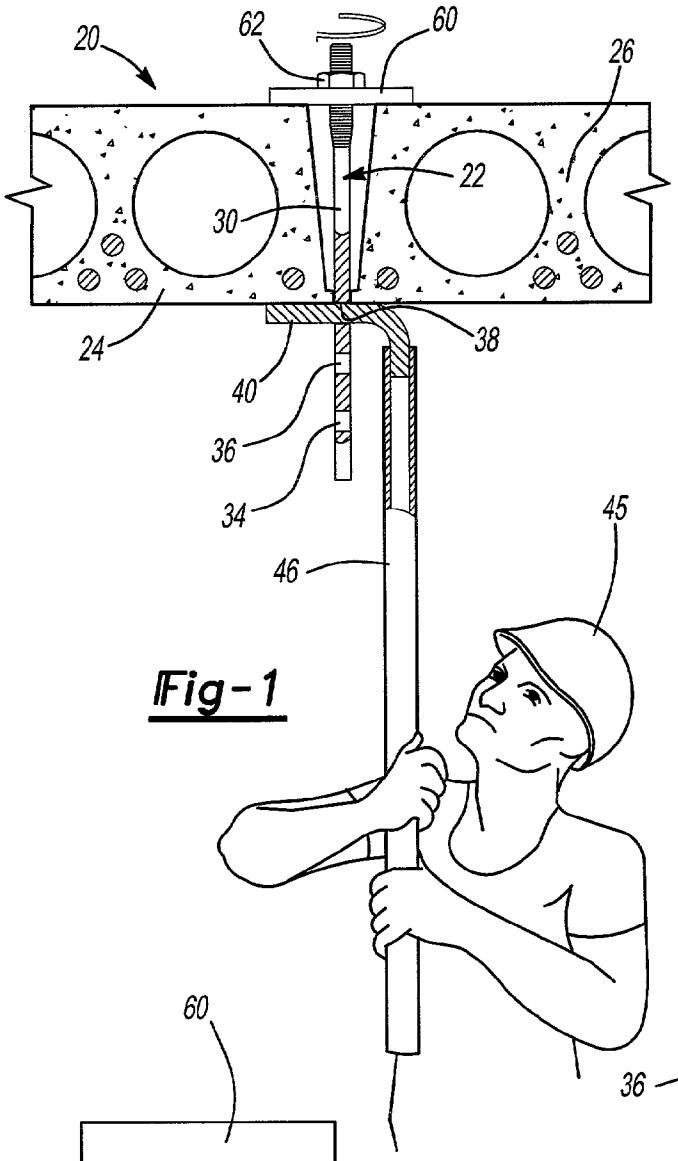


Fig-1

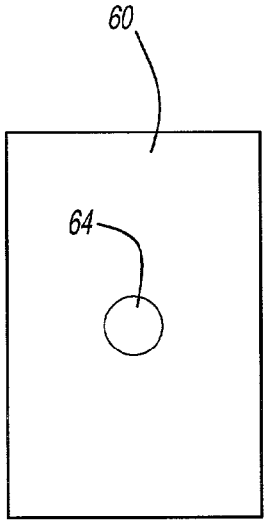


Fig-4

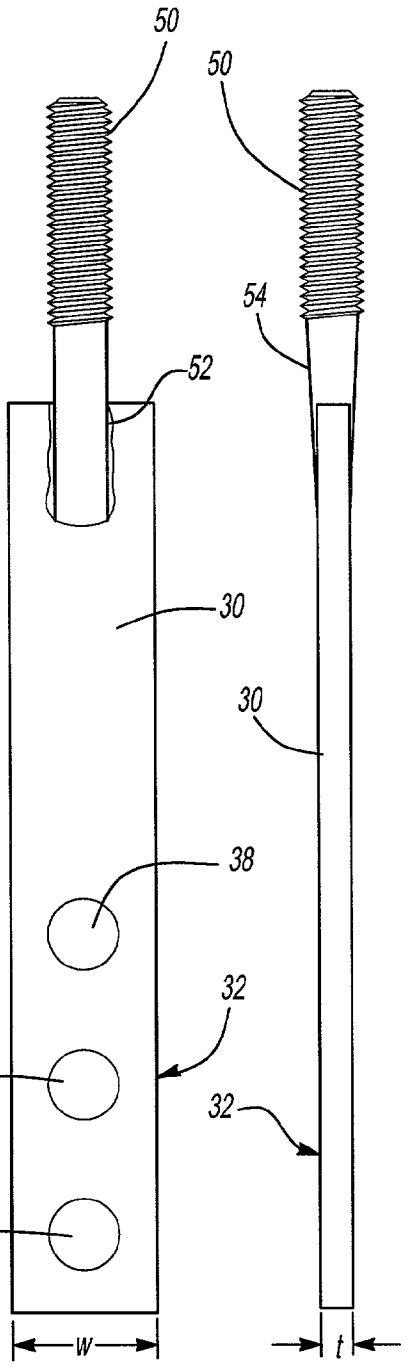


Fig-2

Fig-3

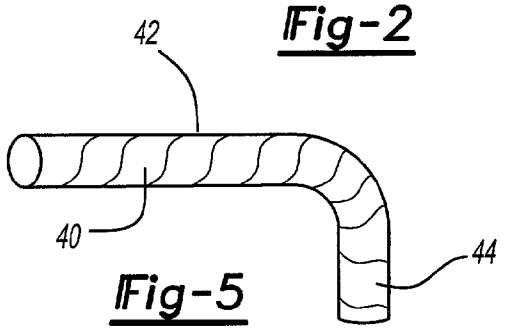


Fig-5

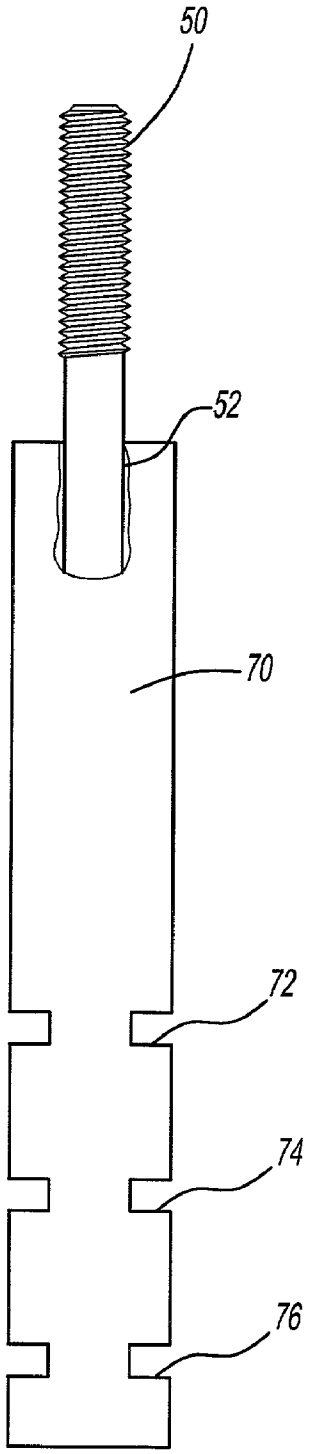


Fig-6

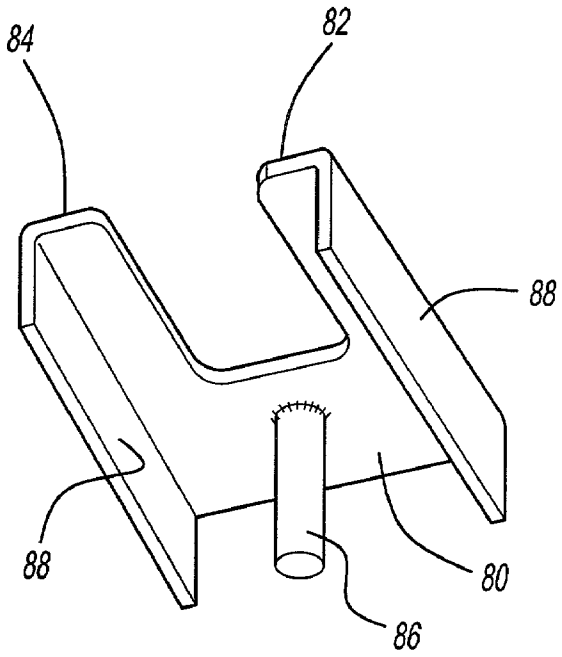


Fig-7

PRESTRESSED HOLLOWCORE CONCRETE PLANK LEVELER DEVICE

BACKGROUND OF THE INVENTION

[0001] This invention generally relates to a device for aligning or leveling adjacent prestressed hollowcore concrete planks.

[0002] Prestressed hollowcore concrete planks have been used for many years in constructing various types of structures such as apartment buildings, schools, motels, etc. A variety of challenges are presented to those assembling such structures. One particular challenge is to properly align or level adjacent planks. This is particularly important at the interface between the planks to achieve a consistent elevation or surface profile across an entire level.

[0003] Prestressed hollowcore concrete planks are well known. Each plank includes a plurality of prestressed cables running the length of the plank. A plurality of cavities or openings run parallel to the prestressed cables. The nature of the concrete material and the presence of the prestressed cables creates the possibility for there to be camber variations in different planks. The amount of camber in a plank typically depends on the size of the plank, the length of the plank and the amount of exposure to natural elements during storage. This presents a problem when assembling structures because varying amounts of camber in the planks causes variations in the floor elevation on the top of the planks and corresponding variations in the ceiling surface of the lower side of the planks. It is necessary to bring adjacent planks into alignment to assure a consistent profile along the surfaces of the planks. This problem is particularly apparent in situations where planks of different lengths are necessary to accommodate a building design. Longer planks tend to have larger amounts of camber than smaller planks.

[0004] One attempt at compensating for variations in plank camber has been to use an elongated bolt that is positioned between adjacent planks. In a conventional arrangement metal plates typically are placed against the planks and nuts are placed on the opposite ends of the bolt. Adjusting the positions of the nuts assists in drawing the planks into alignment with each other.

[0005] One drawback associated with the elongated bolt technique is that the spacing between the planks must be set wide enough to accommodate the bolt. This introduces variations along the surface provided by the planks because adjacent planks that do not need camber adjustment have a very small gap (on the order of one-quarter of an inch) while adjacent planks that require adjustment have a much wider gap (on the order of one inch). Such variations in the gap size between adjacent planks does not provide a consistent surface appearance, which is undesirable.

[0006] Another drawback associated with the elongated bolt technique is that a worker typically needs to climb a ladder at the position of each bolt in order to be able to secure the nut on the end of the bolt that extends down from a lower side of one of the levels of planks. This introduces additional labor, safety concerns and expense into a job.

[0007] There is a need for a plank leveler device that facilitates more economically aligning adjacent planks to accommodate variations in camber. Additionally, there is a need for a device that permits more consistent spacing between adjacent planks so that a better overall surface profile is achieved. This invention meets those needs while avoiding the shortcomings and drawbacks of prior devices.

SUMMARY OF THE INVENTION

[0008] In general terms, this invention is a device for aligning adjacent prestressed hollowcore concrete planks. A novel insert member is configured to readily fit between adjacent planks. A first alignment member is supported by the insert member and is adapted to be received against a first side of the planks. A second alignment member is supported by the insert member and adapted to be received against a second side of the planks. A jacking member allows a worker to adjust a spacing between the first and second alignment members such that the surfaces of the adjacent planks are drawn into alignment with each other.

[0009] In one example, the insert member includes a threaded portion on one end that extends beyond the planks and an opposite end that includes at least one opening. One of the alignment members is received within the opening on one side of the planks while the other alignment member is received over the threaded portion. By adjusting a nut over the threaded portion, the spacing between the alignment members is adjusted and the planks are drawn into a desired position.

[0010] This invention is particularly well suited for use in aligning adjacent prestressed hollowcore concrete planks. The various features and advantages of this invention will become apparent to those skilled in the art from the following detailed description of the currently preferred embodiment. The drawings that accompany the detailed description can be briefly described as follows.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] **FIG. 1** diagrammatically illustrates a device designed according to this invention.

[0012] **FIG. 2** is a front view of an insert member designed according to this invention.

[0013] **FIG. 3** is a side view of the insert member of **FIG. 2**.

[0014] **FIG. 4** illustrates an example alignment member designed according to this invention.

[0015] **FIG. 5** illustrates another example alignment member designed according to this invention.

[0016] **FIG. 6** illustrates an alternative insert member.

[0017] **FIG. 7** illustrates another alignment member, which is intended to be used with the example of **FIG. 6**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] A system **20** includes a device **22** for aligning adjacent prestressed hollowcore concrete planks **24** and **26**. The planks include tensioned cables **28** and openings **29** that extend the length of the planks as known in the art. An insert member **30** is positioned between the two planks preferably by inserting one end **32** through the grout joint between the planks **24** and **26**. The first end **32** preferably includes at least one receiver portion. The illustrated example of FIGS. **1-3** includes three openings **34**, **36** and **38**, each of which is

adapted to receive an alignment member **40**. Multiple openings are shown in the illustrated embodiment to accommodate different plank thicknesses.

[**0019**] A significant advantage provided by this invention is that the insert member **30** allows for consistent spacing between adjacent planks regardless of whether camber adjustment is necessary. The insert member preferably has a thickness t that is small enough to permit tight spacing between adjacent planks so that the spacing is consistent across an entire surface. The preferred arrangement includes a thickness on the order of approximately ¼ inch. In one example, the thickness t is 5/16 inch.

[**0020**] The insert member **30** preferably also includes a width w that is approximately eight times as great as the thickness t. In one example, the width w is two inches. The larger width permits the thickness t to be small enough to accommodate tight spacing between adjacent planks while still providing enough strength in the insert member to withstand the forces necessary for jacking the adjacent planks into alignment.

[**0021**] The insert member **30** preferably is made from a steel material. The preferred embodiment includes a high strength leaf spring steel. One such steel is sold under the trade name Viking 100 High Strength Steel by Nelson Steel Company.

[**0022**] A first alignment member **40** preferably is received within one of the receiver portions **34**, **36** or **38**. The example first alignment member **40** of **FIGS. 1 and 4** is made from a piece of reinforcing bar that is bent into a generally L-shape configuration. One edge **42** of the bar preferably is ground flat and adapted to be received against one side of the concrete planks **24** and **26**. In one example, the length of the surface **42** on the alignment member **40** is approximately six inches.

[**0023**] In the illustrated example, the first alignment member **40** is received against the underside (according to the drawings) of the planks **24** and **26**. One portion **44** of the alignment member **40** preferably extends away from the planks so that a worker **45** can use a handle **46** to maneuver the alignment member **40** into position as needed. The alignment member **40** preferably is centered relative to the insert member **30** and the planks **24** and **26** for accuracy and stability.

[**0024**] The insert member **30** preferably includes a threaded end **50** opposite from the end **32**. The illustrated example includes a threaded rod that preferably is welded at **52** onto the insert member **30**. In one example, the insert member includes a punched hole in a body portion of the insert member **30** into which a corresponding portion of the threaded member is received prior to being welded in place.

[**0025**] Another example insert member is formed from a single stamping. In this example, the body of the insert member and the threaded rod portion are formed as one piece and no welding is necessary.

[**0026**] The illustrated example includes a tapered portion **54** on the threaded rod **50** that preferably tapers down to a thickness consistent with the body portion of the insert member **30** (i.e., approximately ¼ inch).

[**0027**] A second alignment member **60** is a generally flat metal plate in the illustrated example. A jacking member or nut **62** preferably is threaded onto the threaded end **50** after the plate **60**, which includes a hole **64**, is received over the threaded end of the rod **50**. The spacing between the first alignment member **40** and the second alignment member **60** can be readily adjusted by turning the nut **62** about the threaded portion of the rod **50**. The shape of the insert member prevents the insert member from spinning while adjusting the nut **62**. Adjusting the spacing between the alignment members jacks the planks **24** and **26** into an aligned position as needed and secures them in place.

[**0028**] A preferred way of using the illustrated example includes positioning the plate **60** and nut **62** onto the threaded end **50**. The insert member **30** is then inserted into the grout joint between the planks **24** and **26**. The worker **45** then slides the second alignment member **40** into one of the receiver openings in the end **32** of the insert member **30**. The jacking member **62** is then adjusted until the planks **24** and **26** are aligned as desired. It is preferred to utilize the adjustment of the jacking member **62** to bring the planks as close as possible into a level and aligned position without over-tightening or causing damage to the planks. Then, the planks are ready for a conventional application of concrete grout. It is preferred to leave the leveling device **22** in position for at least two days after the grout is applied before removing the leveling device. Those with experience in the field will realize how many devices **22** are required along an interface between planks to achieve a desired result.

[**0029**] The device **22** may be used to assist in aligning the planks by adjusting the spacing between the alignment members. Alternatively, the device **22** may be used to maintain an alignment of the planks that is established independent of the device **22**.

[**0030**] **FIG. 6** illustrates an alternative embodiment of an insert member **70**. In this example, a plurality of notches **72**, **74** and **76** are formed in one end **78** of the insert member body. The main difference between the example of **FIG. 6** and that of **FIGS. 2 and 3** is the nature of the receiving portions. In the example of **FIG. 6, a** plurality of notches are used while in the example of **FIGS. 2 and 3** a plurality of openings through the insert member are used.

[**0031**] A modified alignment member **80** is illustrated in **FIG. 7**. This example includes a generally flat portion having arms **82** and **84** extending in the same direction parallel to each other. A spacing between the arms **82** and **84** is set so that the alignment member **80** is slidably received onto the insert member **70**. Specifically, the arm portions **82** and **84** are received within a chosen set of notches on the end **78** of the insert member **70**.

[**0032**] A dowel portion **86** preferably extends away from one side of the body of the alignment member **80** so that the handle **46** is useful for selectively positioning the alignment member **80** into the receiver portions on the insert member **70**.

[**0033**] The example of **FIG. 7** includes reinforcing portions **88** that extend generally perpendicularly from the body portion of the alignment member **80**. Having the reinforcing portions provides greater stiffness to the alignment member **80**, which is beneficial for maintaining a desired alignment between adjacent planks without deforming the alignment member **80**.

[**0034**] One advantage to an alignment member as illustrated in **FIG. 7** compared to the one illustrated in **FIGS. 1**

and 5 is that the contact surface area between the alignment member and the surface of the concrete planks is increased. Greater surface area contact better distributes the forces associated with jacking the adjacent planks into a desired alignment. This lessens the possibility for causing any cracking or other damage to the planks in the area where adjustment is being made.

[**0035**] This invention provides an efficient and economical arrangement for aligning and leveling adjacent prestressed hollowcore concrete planks. The description provided here is exemplary rather than limiting in nature. Variations and modifications to the disclosed examples may become apparent to those skilled in the art that do not necessarily depart from the essence of this invention. The scope of legal protection given to this invention can only be determined by studying the following claims.

I claim:

1. A device for aligning adjacent prestressed hollowcore concrete planks, comprising:

an insert member that is adapted to be received between the concrete planks, the insert member having a thickness and a width that is greater than the thickness;

a first alignment member supported by the insert member that is adapted to be received against a first side of the planks;

a second alignment member supported by the insert member that is adapted to be received against a second side of the planks; and

a jacking member that adjusts a spacing between the first and second alignment members such that the planks are drawn into a desired alignment.

2. The device of claim 1, wherein the insert member includes a threaded portion and the jacking member comprises a nut that is received on the threaded portion and rotated to adjust the spacing between the alignment members.

3. The device of claim 1, wherein the first alignment member is slidably received at least partially within a corresponding receiver portion on the insert member.

4. The device of claim 3, including a plurality of receiver portions on the insert member.

5. The device of claim 4, wherein the receiver portions each comprise an opening through the insert member.

6. The device of claim 3, wherein the first alignment member comprises a rod having at least one generally flat surface portion that is adapted to be received against the concrete planks.

7. The device of claim 6, including a handle that is selectively received over a portion of the rod to slide the rod into a selected position relative to the receiver portion of the insert member and the planks.

8. The device of claim 1, wherein the second alignment member comprises a steel plate.

9. The device of claim 8, wherein the insert member includes a threaded end that is received through an opening in the steel plate and the adjustment member comprises a nut that is received over the threaded end, the nut being rotated to adjust the spacing between the alignment members.

10. The device of claim 1, wherein the insert member comprises a generally flat plate having a length that is greater than a thickness of the concrete planks, the plate having at least one opening at one end for at least partially receiving the first alignment member and a threaded portion at an opposite end that cooperates with the adjustment member.

11. The device of claim 10, wherein the threaded portion is rounded at a distal end and tapered on two sides into a configuration that corresponds to a thickness of the generally flat plate.

12. The device of claim 1, wherein the insert member thickness is about ⅛ the width.

13. The device of claim 12, wherein the thickness is approximately ¼ inch and the width is approximately 2 inches.

14. The device of claim 1, wherein the insert member includes at least one set of notches and the second alignment member includes arm portions that are received at least partially within the notches.

15. A method of aligning adjacent concrete planks comprising the steps of:

inserting an insert member between the two planks at the interface of the planks;

positioning a first alignment member near one end of the insert member such that the first alignment member is positioned against one side of the planks;

sliding a second alignment member in a direction that is generally perpendicular to the insert member until the second alignment member is supported on the insert member and the second alignment member is positioned near an opposite side of the planks; and

adjusting a spacing between the alignment members to provide a desired alignment of the planks.

16. A device for aligning adjacent concrete planks, comprising:

a first member that is adapted to be inserted between adjacent concrete planks;

a second member that cooperates with the first member and is received against one side of the planks;

a third member that is slidably received at least partially within a receiver portion on the first member and that cooperates with the first member and is received against a second side of the planks; and

an adjuster that adjusts a position of the third member relative to the second member to provide a desired alignment between the planks.

17. The device of claim 16, wherein the first member has a thickness and a width that is much greater than the thickness.

18. The device of claim 17, wherein the width is approximately eight times greater than the thickness.

19. The device of claim 16, wherein the third member comprises a rod having a first segment that is adapted to be received against the planks and a second segment that extends generally perpendicular from the first segment.

20. The device of claim 16, wherein the third member includes a generally flat body portion and a dowel extension that extends generally perpendicularly away from the flat body portion.

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