US 20130205703A1

(19) **United States**

(12) **Patent Application Publication**

Baumer

(10) **Pub. No.: US 2013/0205703 A1**

(43) **Pub. Date: Aug. 15, 2013**

(54) **METHOD FOR CONSTRUCTING A BUILDING USING BRICKS CONNECTED USING DRY JOINTS**

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(21) Appl. No.: **13/805,057**

(22) PCT Filed: **Jun. 20, 2011**

(86) PCT No.: **PCT/FR11/51415**

§ 371 (c)(1),
(2), (4) Date: **May 1, 2013**

(30) **Foreign Application Priority Data**

Jun. 18, 2010 (FR) 1002585

Publication Classification

(51) **Int. Cl.**
E04B 2/18 (2006.01)

(52) **U.S. Cl.**
CPC ***E04B 2/18*** (2013.01)
USPC **52/572**; 52/747.12; 52/742.14

(57) **ABSTRACT**

The invention relates to a brick (**1**) made from a material comprising vegetable fibres agglomerated using a binder (such as hemp concrete), said brick being provided with a groove (**9**, **11**) and a tongue (**5**, **7**) allowing the dry-joint connection of bricks. The invention also relates to a method for constructing a building using such bricks.

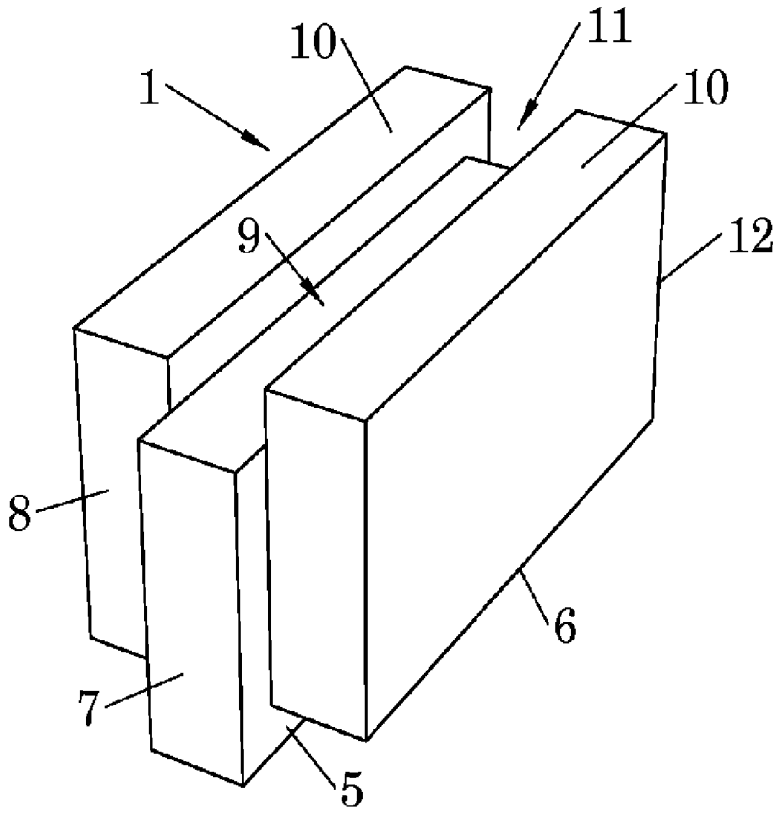


FIG.1

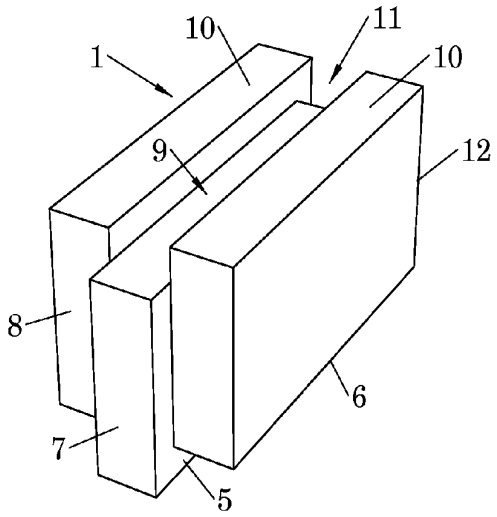


FIG.2

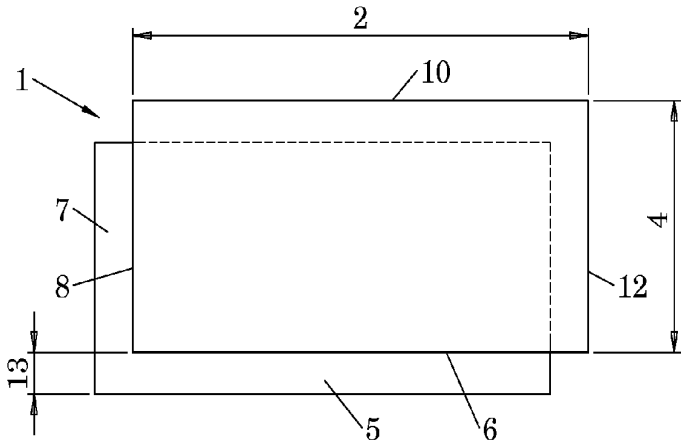


FIG.3

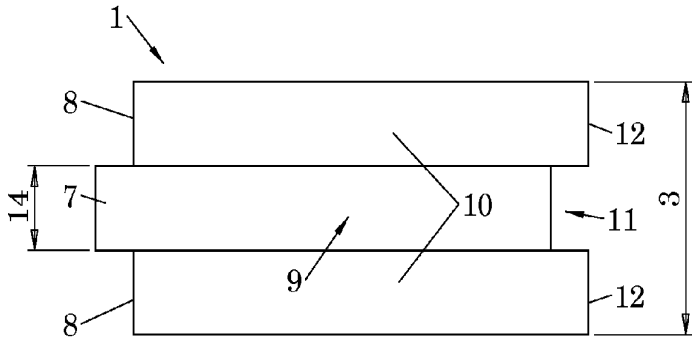


FIG.4

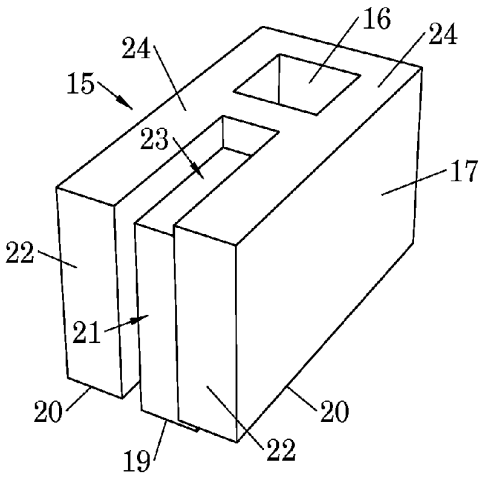
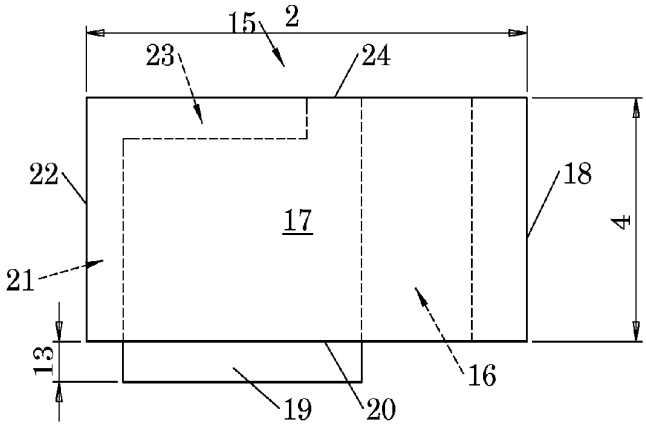


FIG.5



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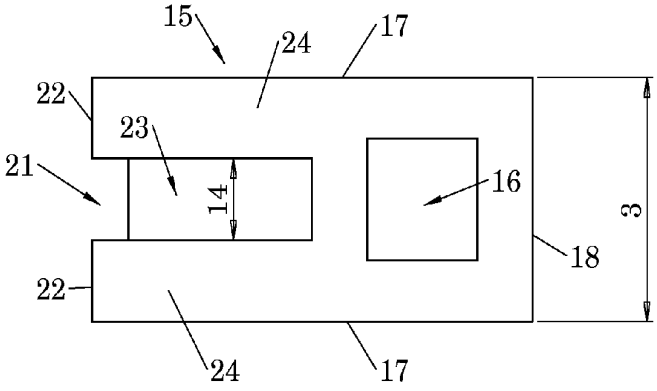

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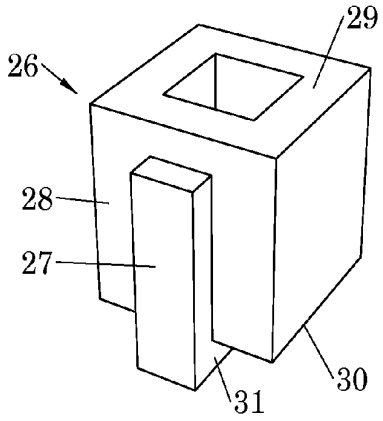

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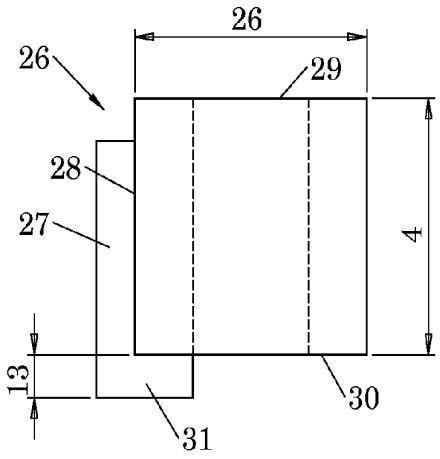
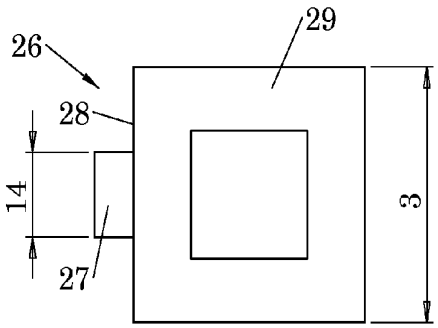


FIG.9



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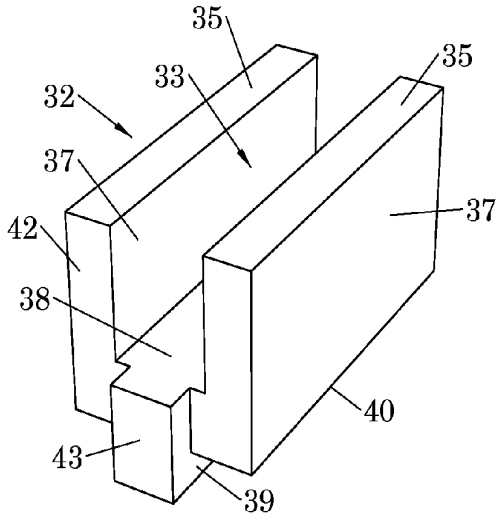

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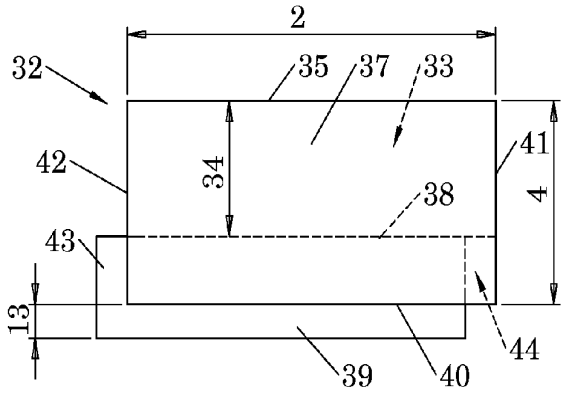
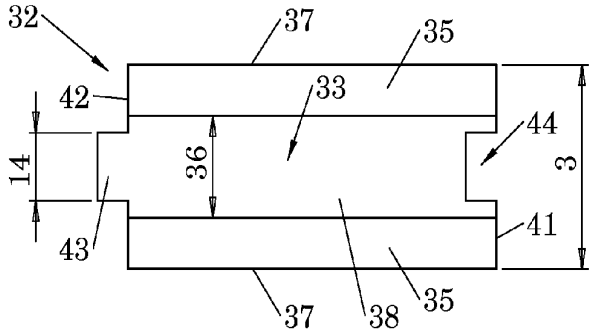


FIG.12



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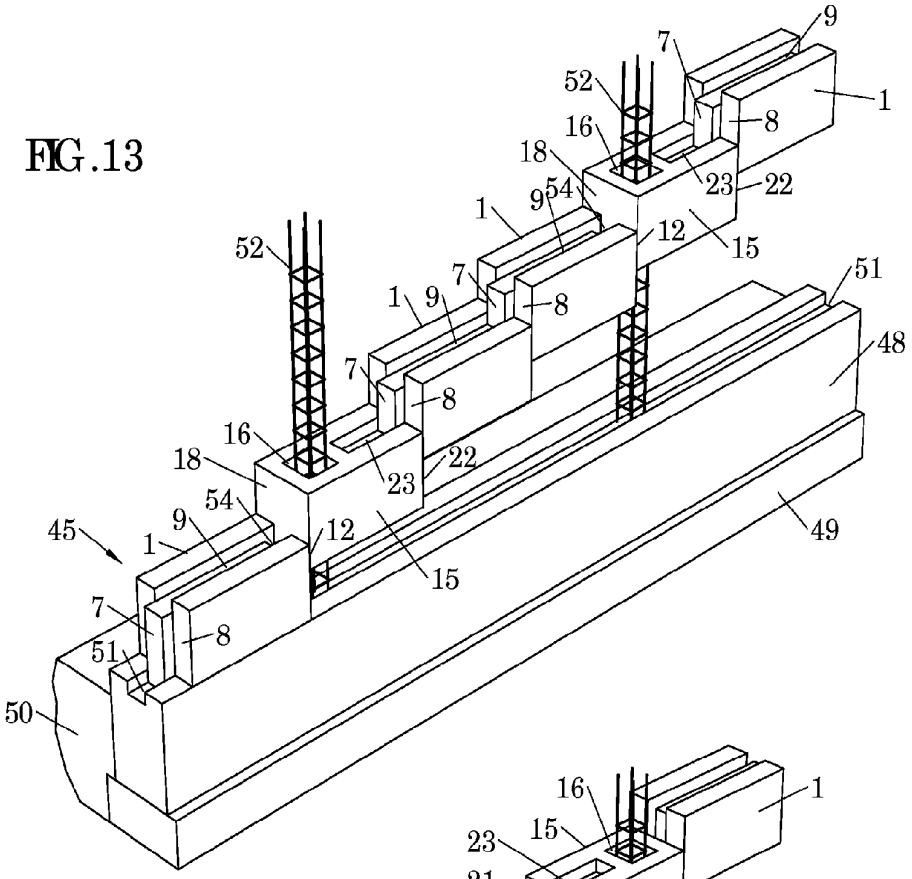
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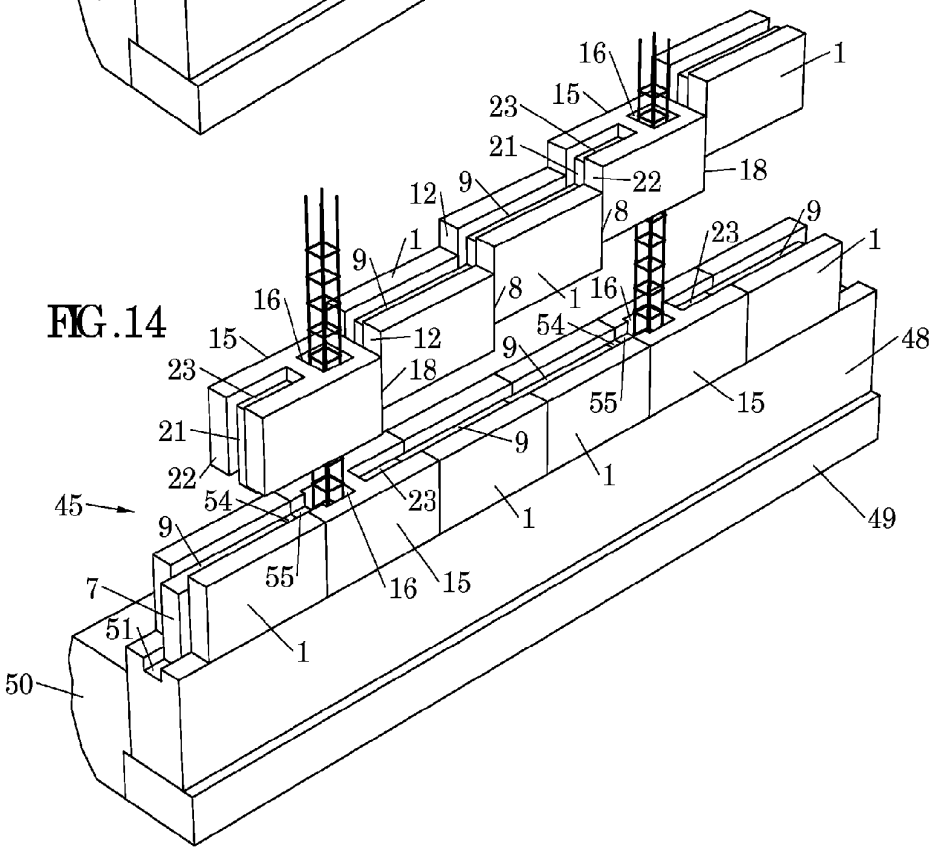
FIG.14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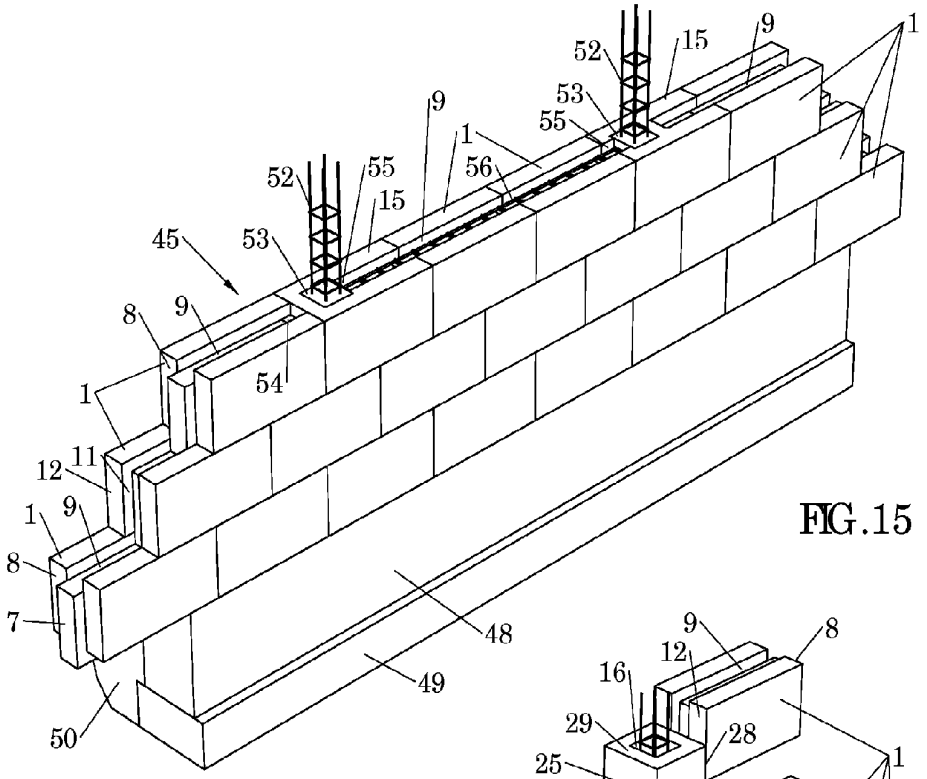
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FIG.15

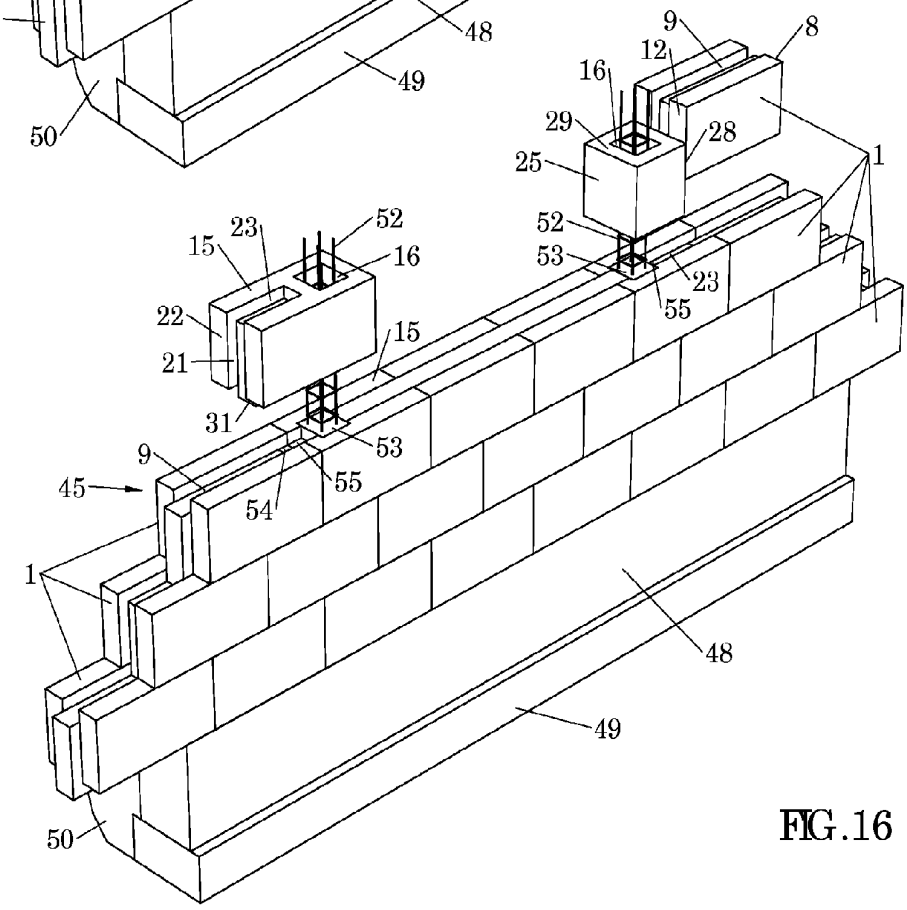
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FIG.16

FIG.17

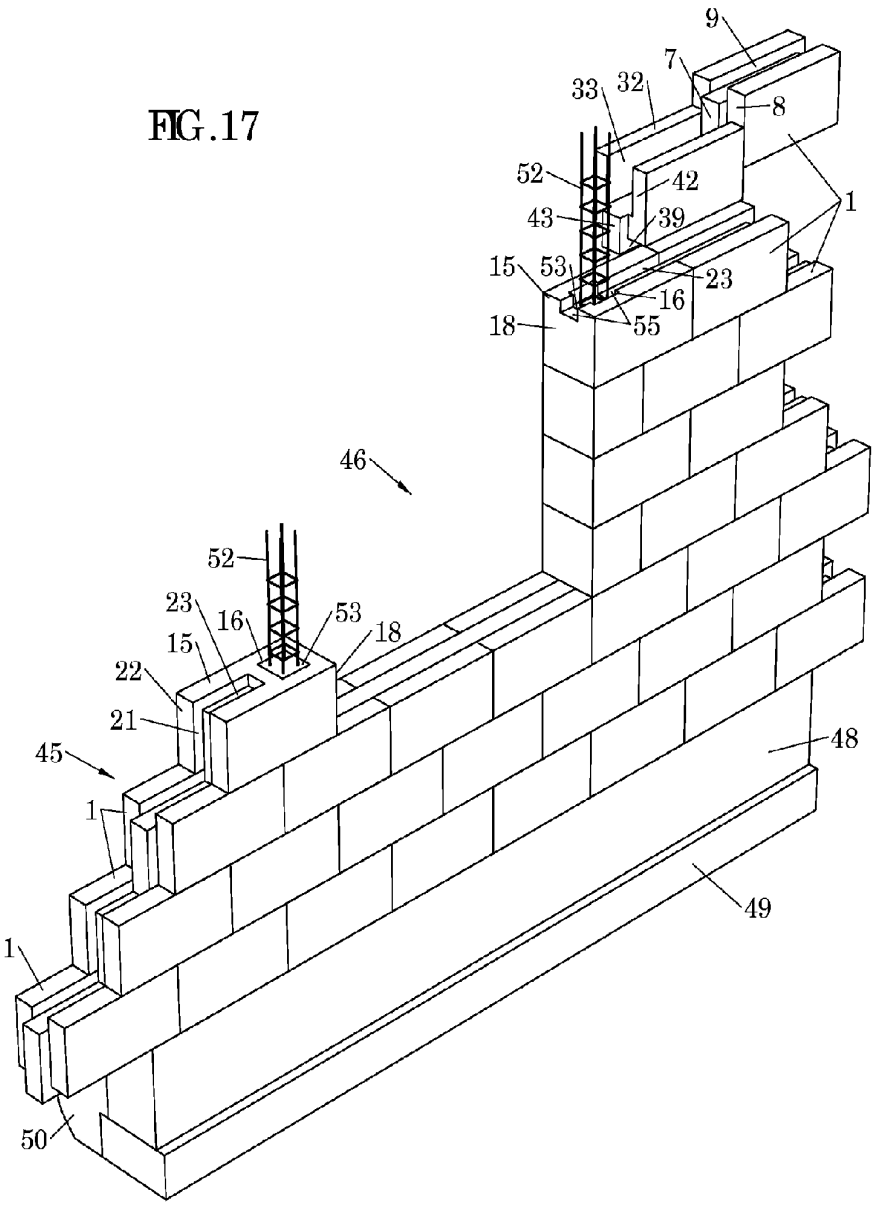
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FIG.18

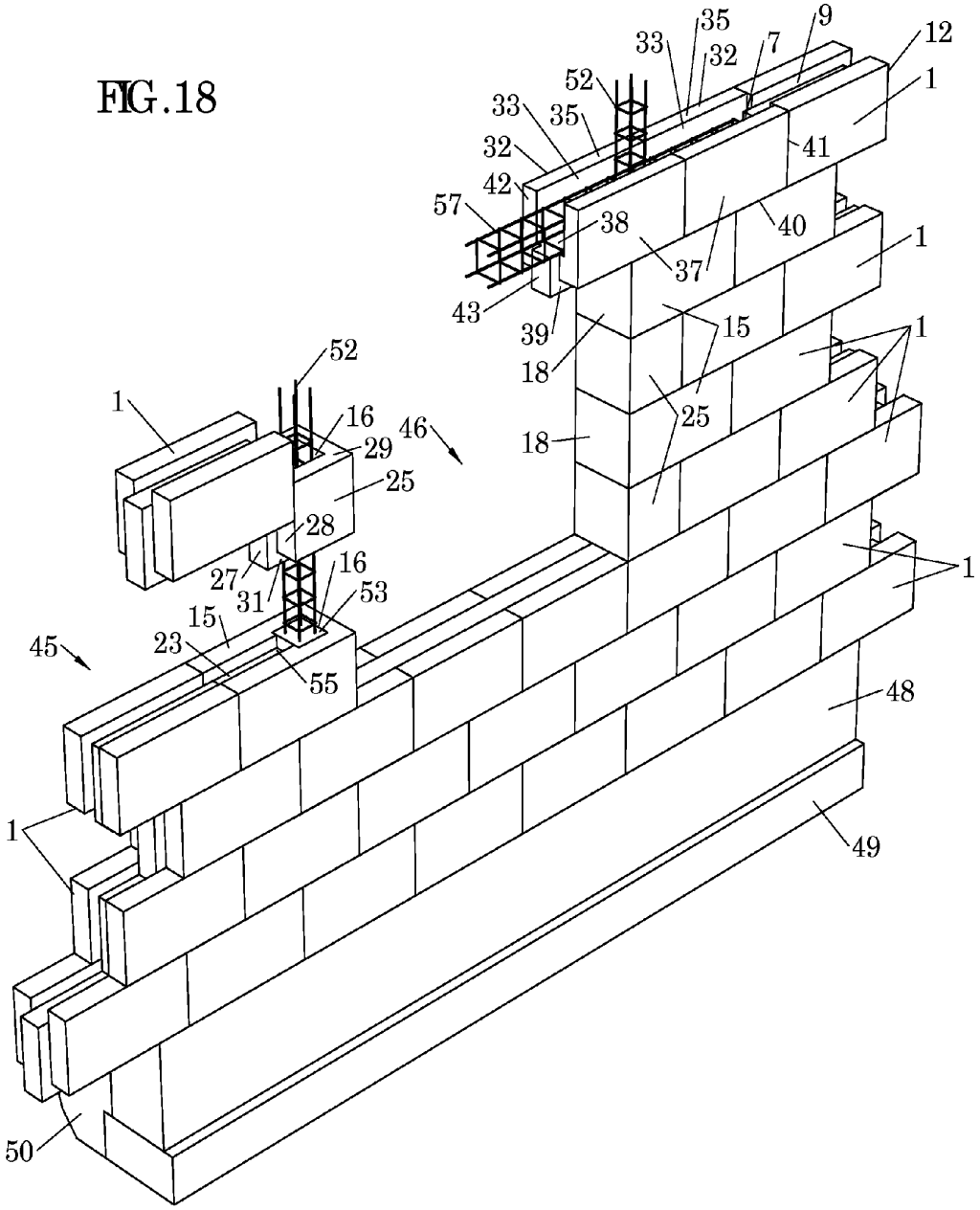
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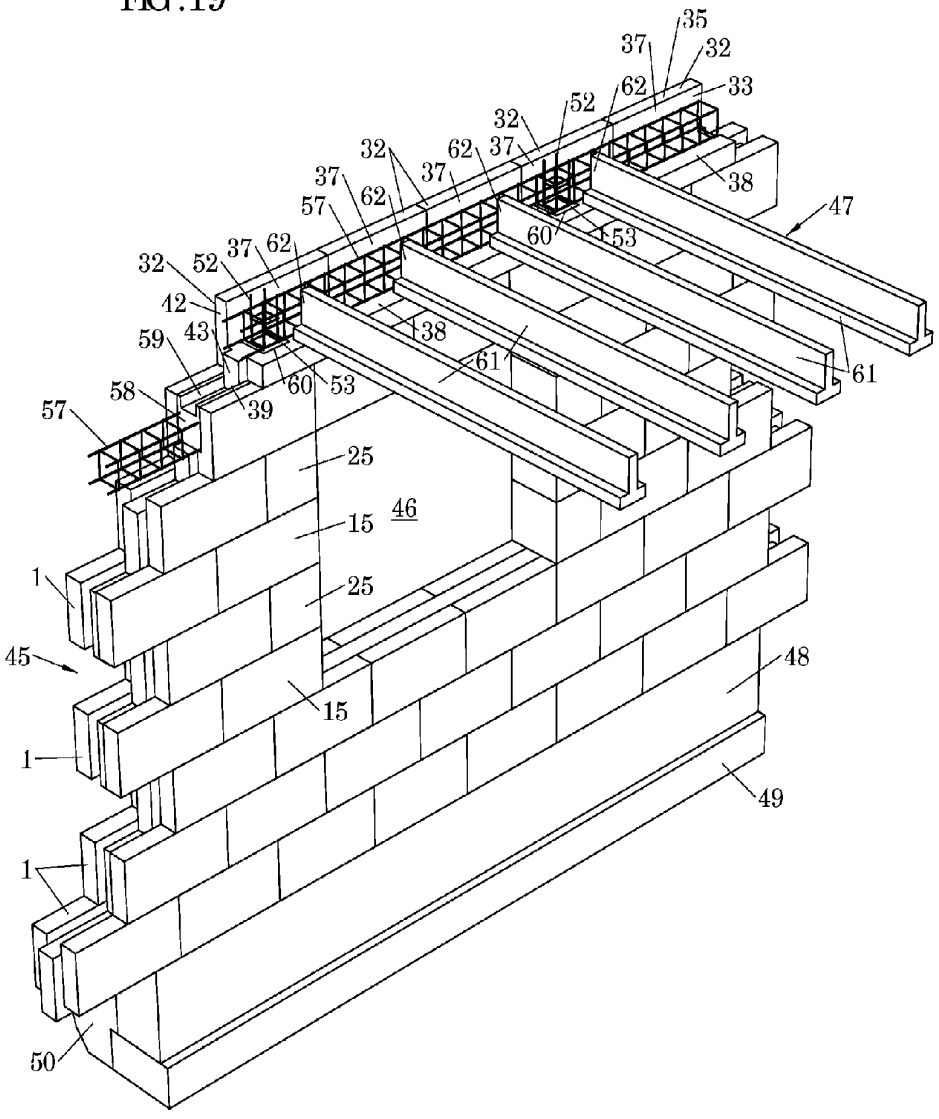
FIG.19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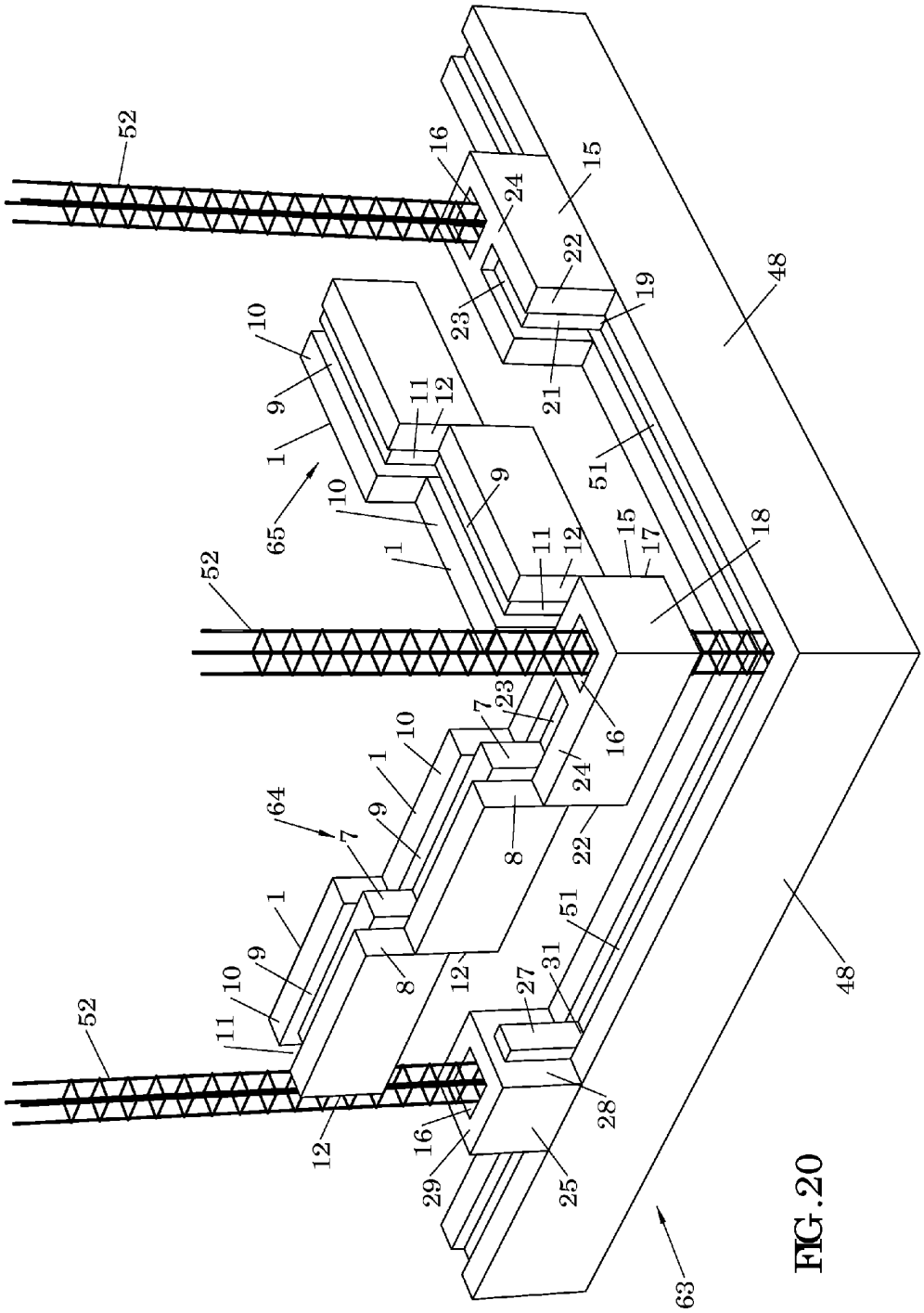
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FIG. 20

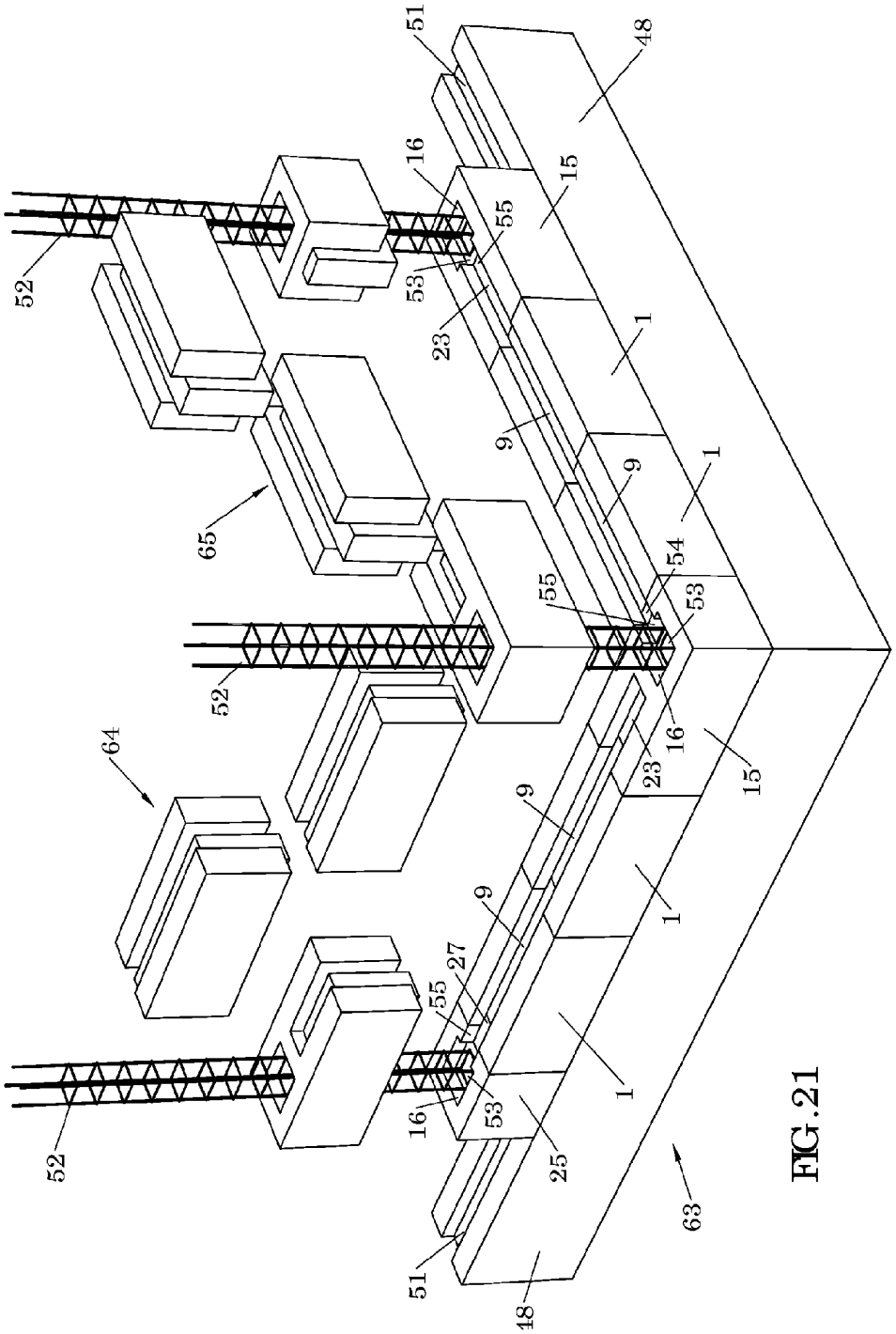

FIG.21

METHOD FOR CONSTRUCTING A BUILDING USING BRICKS CONNECTED USING DRY JOINTS

TECHNICAL FIELD

[0001] The invention relates to the field of construction. More specifically, it relates to a method for making a building from prefabricated and interlocking elementary bricks, made from a material comprising plant fibers (hemp, straw, flax, etc.) agglomerated using a binder (in particular dirt, non-hydraulic or hydraulic lime).

BRIEF DESCRIPTION OF RELATED ART

[0002] The use of plant fibers to construct buildings, and more specifically to produce walls and partitions, has been known for some time. Examples include laterite mud, made up of a matrix of clay (or more generally dirt) and agglomerated plant fibers (in particular straw).

[0003] Hemp fibers have also been used in construction. One traditional technique consists of preparing a concrete (commonly, although wrongly, called hemp "concrete") in situ from a plant aggregate (hemp chaff) and a binder (non-hydraulic or hydraulic lime), and filling a wooden framework wall using such a concrete.

[0004] Hemp concrete may also be used to produce concrete slabs, insulating coats, or insulation per se, which is for example poured into the rakes of a roof before placing a cover.

[0005] A number of recipes and applications exist for hemp concrete. The *Association Construire en Chanvre* specifically defined hemp concrete and formulated professional rules for building with hemp concrete. These rules were published in a volume entitled *Construire en Chanvre* (ISBN 978-2-915162-92-9). For an exhaustive list of works, articles and publications relative to hemp-based construction, see the bibliography published on the Association's website: http://www.construction-chanvre.asso.fr/.

[0006] While the ordinary techniques, today offered by several companies (including the company BCB, which offers hemp concrete under the Tradical registered trademark), may be deemed satisfactory in terms of mechanical, acoustic and thermal performance (greater than or equal to that of ordinary quarry stone constructions), they are nevertheless flawed by a high degree of technicality and difficult implementation, which limit their use to building professionals.

[0007] Techniques have been proposed to resolve these drawbacks and democratize the use of hemp in construction. One of these techniques, described in French patent application FR 2 871 487 in the name of the company Développement Construction Ecologique (see also the American equivalent US 2008/272270), consists of making a wall from prefabricated blocks that are assembled in situ. These blocks are provided with vertical shafts in which wooden posts are inserted to form a framework. The shafts are then sealed in the blocks using a filler, such as a binder of the lime milk type.

[0008] It is true that the use of prefabricated blocks makes it possible to save on the on-site preparation of the hemp concrete. However, the savings are marginal, since the insertion, then sealing of many posts in the shafts of the blocks are lengthy and tedious operations, which also require the in situ preparation of a large quantity of binder.

[0009] Due to the aforementioned drawbacks of the known techniques, including the most recent, the share of hemp concrete in construction is progressing little if at all, traditional quarry stone construction continuing to represent the vast majority of the market.

BRIEF SUMMARY

[0010] The invention aims to improve the use of plant fibers (in particular hemp) in construction, by proposing an implementation that is both simple and fast, capable of equaling or even surpassing the ordinary construction techniques (in particular terra cotta bricks or cement concrete quarry stone).

[0011] To that end, the invention first proposes a method for constructing a building using prefabricated bricks made from a material (such as hemp concrete) comprising plant fibers agglomerated using a binder, provided with grooves and tongues allowing the dry-joint connection thereof.

[0012] According to one embodiment, this method comprises the combined placement of solid base bricks, provided with a groove and a tongue that can be joined together, and honeycomb stiffening bricks, provided with a groove and a tongue, that can be joined together as well as a cell with the passage of a reinforcing post.

[0013] The following operations may be provided:

[0014] producing a mortar base;

[0015] placing a series of posts in the base;

[0016] placing stiffening bricks at the posts, with insertions of said posts into the cells of the stiffening bricks;

[0017] placing base bricks between the stiffening bricks.

[0018] Each post for example comprises a metal framework embedded in (cement) concrete.

[0019] It is also possible to provide an operation for placing, at a post and above the stiffening brick, a half-stiffening brick, provided with a tongue to allow it to be joint-connected on the stiffening brick and a cell for the passage of the post, and having a length equal to half the length of the stiffening brick.

[0020] The following operations may also be provided:

[0021] placing linking bricks comprising a tongue allowing them to be joint-connected in the grooves of other bricks, and a central cavity delimiting two side walls and a bottom;

[0022] placing a metal framework in the cavity;

[0023] filling in the cavity using concrete.

[0024] Likewise, the following operations may be provided:

[0025] placing linking bricks comprising a tongue allowing them to be joint-connected in the grooves of other bricks, and a central cavity delimiting two side walls and a bottom;

[0026] cutting out side walls;

[0027] placing a slab resting directly on the bottom of the linking bricks.

[0028] The invention secondly proposes, for the implementation of the aforementioned method, a hemp concrete brick, provided with a tongue designed to be joint-connected in a groove, said tongue having a protrusion whereof the ratio to an effective height or effective width of the brick is comprised between 1/10 and 1/4, preferably approximately 1/5.

[0029] According to one embodiment, the tongue also has a width whereof the ratio to an effective width of the brick is comprised between 1/4 and 1/2, preferably approximately equal to 1/3.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] Other aims of advantages of the invention will appear in light of the following description, done in reference to the appended drawings, in which:

[0031] FIG. **1** is a perspective view of a first type of hemp concrete brick;

[0032] FIG. **2** is a side view of the brick of FIG. **1**;

[0033] FIG. **3** is a top view of the brick of FIG. **1**;

[0034] FIG. **4** is a perspective view of a second type of hemp concrete brick;

[0035] FIG. **5** is a side view of the brick of FIG. **4**;

[0036] FIG. **6** is a top view of the brick of FIG. **4**;

[0037] FIG. **7** is a perspective view of a third type of hemp concrete brick;

[0038] FIG. **8** is a side view of the brick of FIG. **7**;

[0039] FIG. **9** is a top view of the brick of FIG. **7**;

[0040] FIG. **10** is a perspective view of a fourth type of hemp concrete brick;

[0041] FIG. **11** is a side view of the brick of FIG. **10**;

[0042] FIG. **12** is a top view of the brick of FIG. **10**;

[0043] FIGS. **13** to **19** are perspective views showing different successive steps for producing a building from the bricks of FIGS. **1** to **12**;

[0044] FIGS. **20** and **21** are perspective views showing two successive steps for producing a corner wall from the bricks of FIGS. **1** to **9**.

DETAILED DESCRIPTION

[0045] FIGS. **1** to **12** show four different types of prefabricated hemp concrete elementary bricks. The concrete is prepared from hemp or hemp chaff aggregate, which is the fragmented inner part of the hemp stalk. The hemp chaff used meets the recommendations of hemp producers for use in construction, cf. the aforementioned volume Construire en Chanvre. The density of the dry hemp chaff used is approximately 100 kg/m^3 bulked (i.e. not tamped). The binder used may comprise non-hydraulic or hydraulic lime (standard NF EN 459-1 to 3), potentially with added pozzolana (standard NF P 18-308), but in the case at hand is preferable to use pure non-hydraulic lime. The composition also comprises quick-setting cement and mixing water (meeting the stipulations of standard NF EN 1008).

[0046] The proportions by volume of the preferred composition are as follows: hemp chaff 73%; non-hydraulic lime 8%; quick-setting cement 4%; water 15%, i.e., for 100 l (10 kg) of hemp chaff, approximately 11 l of non-hydraulic lime, 5.5 l of quick setting cement and 20 l of water.

[0047] After mixing and stirring of the composition, each type of brick is made by pressurized molding (the pressure is done by compaction of the still-wet composition). Once folded, each brick is stripped, then undergoes air drying for several weeks, or may be placed in a drying oven for accelerated drying.

[0048] A first type of brick **1** is illustrated in FIGS. **1** to **3**. This brick **1**, called a base brick, is solid. It has an effective length **2** of 600 mm, an effective width **3** of 300 mm, and an effective height **4** of 300 mm.

[0049] The base brick **1** comprises:

- **[0050]** a lower tongue **5** protruding on a lower surface **6**;
- **[0051]** a front tongue **7** protruding on a front surface **8**,
- **[0052]** an upper central groove **9** hollowed in an upper surface **10** of the brick **1** and that runs over the entire length thereof, including on the front tongue **7**;
- **[0053]** a rear groove **11** hollowed in a rear surface **12** of the brick **1** and that runs over the entire height thereof, including over the lower tongue **5**.

[0054] The tongues **5**, **7** have a (protruding) height **13** of 50 mm and a width **14** of 100 mm. The grooves **9**, **10** have a depth **13** of 50 mm and a width **14** of 100 mm.

[0055] A second type of brick **15** is illustrated in FIGS. **4** to **6**. This brick **15**, called a stiffener, has a cellular structure. Like the base brick **1**, it has an effective length **2** of 600 mm, an effective width **3** of 300 mm, and an effective height **4** of 300 mm.

[0056] The stiffener **15** comprises a cell **16** with a square section pierced over the entire height thereof, the sides of which measure 150 mm and are spaced apart from the side **17** and rear **18** surfaces of the stiffener **15** by 75 mm.

[0057] The stiffener **15** comprises:

- **[0058]** A lower tongue **19** protruding on a lower surface **20**, which is interrupted at the boundary of the cell **16** (cf. FIG. **5**);
- **[0059]** A front groove **21** hollowed in a front surface **22**, which runs over the entire height of the brick **15**, including over the lower tongue **19**;
- **[0060]** An upper central groove **23** hollowed in an upper surface **24** of the brick **15** and which extends forward as far as the front groove **21** and is interrupted toward the back at a distance of 75 mm from the cell **16**.

[0061] The lower tongue **19** has a protruding height **13** of 50 mm and a width **14** of 100 mm; the grooves **21**, **23** have a depth **13** of 50 mm and a width **14** of 100 mm.

[0062] A third type of brick **25** is illustrated in FIGS. **7** to **9**. This brick **25**, called a half-stiffener, has a cellular structure. It has a generally cubic shape with an equal effective length **26**, width **3** and height **4** of 300 mm. In this way, the effective length **26** of the half-stiffener **25** is equal to half the effective length **2** of the base brick **1** and the stiffener **15**. The half-stiffener **25** comprises a cell **16** with a square section pierced over the entire height thereof, the sides of which measure 150 mm and are spaced apart from the four side surfaces of the half-stiffener **25** by an equal distance of 75 mm. The half-stiffener **25** comprises:

- **[0063]** a front tongue **27** protruding on a front surface **28**, which is interrupted toward the top at a distance of 50 mm from an upper surface **29** of the brick **25**, and is extended downward beyond a lower surface **30** of the brick **25** over a distance of 50 mm;
- **[0064]** a central lower tongue **31**, which protrudes over the lower surface **30** of the brick **25**, is interrupted toward the rear at the boundary of the cell **16**, and extends forward beyond the front surface **28** to form a block with an L-shaped profile with the front tongue **27**.

[0065] The tongues **27**, **31** have a protruding height **13** of 50 mm and a width **14** of 100 mm.

[0066] A fourth type of brick **32** is illustrated in FIGS. **10** to **12**. This brick **32**, called a linking brick, is hollow and has a U-shaped profile in transverse section. It has an effective length **2** of 600 mm, an effective width **3** of 300 mm, and an effective height **4** of 300 mm. These sides are identical to those of the base brick **1** and those of the stiffener **15**.

[0067] The linking brick **32** comprises:

- **[0068]** a central cavity **33**, hollowed out over the entire length of the brick **32**, over a height **34** of 200 mm from an upper surface **35**, and over a width **36** of 150 mm, the central cavity **33** thus delimiting two sidewalls **37** with a

same thickness (75 mm) spaced apart from the width **36** of the cavity **33**, and a bottom **38** with a thickness of 100 mm;

[0069] a central lower tongue **39**, which protrudes over a lower surface **40** of the brick, is interrupted toward the back at a distance of 50 mm from a rear surface **41** of the brick **32**, and extends toward the front beyond a front surface **42** of the brick **32**, over a distance of 50 mm;

[0070] a front tongue **43** that protrudes from the front surface **42** of the brick **32** in the extension of the lower tongue **39** and is interrupted toward the top at the central cavity **33**;

[0071] a rear groove **44** hollowed in the bottom **38**, and which extends over the height of the lower tongue **39**.

[0072] The tongues **39**, **43** have a protruding height **13** of 50 mm and a width **14** of 100 mm.

[0073] The four types of prefabricated elementary bricks that have just been described make it possible to produce any masonry construction, and in particular to build walls and partitions.

[0074] To that end, the bricks **1**, **15**, **25**, **32** may be combined with each other. They are in fact designed to fit together both horizontally and vertically. Thus:

[0075] the lower tongue **5** of each base brick **1** may fit into the upper groove **9** of another base brick **1**, in the upper groove **23** of a stiffener **15**, or in the cavity **33** of the linking brick **32** (the difference in width being able to be filled in with concrete);

[0076] the front tongue **7** of each base brick **1** can fit into the rear groove **11** of another base brick **1**, in the front groove **21** of a stiffener **15**, or in the rear groove **44** of a linking brick **32**;

[0077] the lower tongue **19** of the stiffener **15** can fit into the upper groove **9** of the base brick **1**, in the upper groove **23** of another stiffener **15**, or in the cavity **33** of a linking brick **32** (the difference in width being able to be filled in with concrete);

[0078] the lower tongue **31** of a half-stiffener **25** can fit into the upper groove **9** of the base brick **1**, in the upper groove **23** of another stiffener **15**, or in the cavity **33** of a linking brick **32** (the difference in width being able to be filled in with concrete;

[0079] the front tongue **27** of a half-stiffener **25** can fit into the rear groove **11** of the base brick **1**, in the front groove **21** of the stiffener **15**, or in the rear groove **44** of a linking brick **32**;

[0080] the lower tongue **39** of a linking brick **32** can fit into the upper groove **9** of the base brick **1**, in the upper groove **23** of a stiffener **15**, or in the cavity **33** of another linking brick **32** (the difference in width being able to be filled in with concrete, as will be illustrated hereafter);

[0081] the front tongue **43** of a linking brick **32** may fit into the rear groove **44** of another linking brick **32**, in the rear groove **11** of the base brick **1**, or in the front groove **21** of the stiffener **15**.

[0082] As will be seen below, these fittings may be done as dry-joint connections (i.e. without jointing mortar), without harming the stability of the construction one wishes to make, owing to the size ratios between the sides (height and width) of the grooves and tongues, and the effective size ratios of the bricks.

[0083] In this way, the ratio between the width **14** of the tongues **5**, **7**, **19**, **27**, **31**, **39**, **43** (equal to that of the grooves **9**, **10**, **21**, **23**, **44**) and the effective width **3** of the bricks **1**, **15**, **25**, **32** is preferably comprised between 1/4 and 1/2. A ratio of approximately 1/3, which corresponds to the quoted values provided above, is a good compromise between good shearing strength of the tongues **5**, **7**, **19**, **27**, **31**, **39**, **43**, which guarantees good strengths of the walls with respect to forces in the orthogonal direction (in particular wind and bearing forces) on the one hand, and a sufficient bearing surface of the bricks **1**, **15**, **25**, **32** on one another, on either side of the tongues **5**, **7**, **19**, **27**, **31**, **39**, **43**, guaranteeing good stability of the walls, on the other hand.

[0084] Furthermore, the ratio between the height of the tongues **5**, **7**, **19**, **27**, **31**, **39**, **43** (equal to the depth of the grooves **9**, **10**, **21**, **23**, **44**) and the effective height (or the effective width, equal to the effective height) of the bricks **1**, **15**, **25**, **32** is preferably comprised between 1/10 and 1/4. A ratio of approximately 1/6, which corresponds to the quoted values provided above, is a good compromise between a certain ease of assembly on the one hand, and the need to maximize the contact surfaces between the bricks **1**, **15**, **25**, **32** (i.e. the friction therebetween), so as to stiffen the structure, on the other hand.

[0085] FIGS. **13** to **19** show different successive steps in the construction of a structure comprising a straight wall **45**, provided with an opening **46** (in this case a window) and topped by a slab **47**.

[0086] The wall **45** is built on a base **48** (forming a compression slab) made from water-repellent cement mortar, which is poured on a concrete foundation **49** situated below ground level as defined by a finished (i.e. tamped) outside terrain **50**. As shown in FIG. **13**, the base **48** is partially buried in the ground **50**, and has a protruding upper portion in which a groove **51** is followed with a width and depth respectively equal to the width and the depth of the grooves of the bricks. Thus, in this case, the groove **51** has a width of 100 mm and a depth of 50 mm.

[0087] In anticipation of the production of the opening **46** on the one hand, and to consolidate the wall **45** on the other hand, two metal frameworks **52** with a square section are vertically implanted in the base **48** for the subsequent production of reinforcing posts **53**, while being spaced apart by a predefined value corresponding to three brick lengths (i.e. 1800 mm), this measurement being done on the central axis of the frameworks **52**. The frameworks **52** are preferably pre-positioned during pouring of the base **48**, so as to be embedded therein, but it is also possible to consider making the base **48** first, then later drilling housings as a function of the desired positioning of the frameworks **52**, in the scenario where that positioning is not known when the base **48** is poured.

[0088] The wall **45** is then erected through the successive stacking of rows of bricks fitted into each other both horizontally and vertically. FIG. **13** illustrates the placement of a first row of bricks, the lower tongues of which are fitted into the groove **51** of the base **48**. This first row alternates between base bricks **1**, fitted into the base **48** at locations with no frameworks **52**, and stiffeners **15** fitted into the base **48** at the frameworks **52**. More specifically, as shown in FIG. **13**, the stiffeners **15** are positioned such that the frameworks **52** extend through their cells **16**. From a practical perspective, in the case where the frameworks **52** are pre-positioned in the base **48**, the stiffeners **15** are simply slipped through the top on the frameworks **52**, to then fit into the groove **51** of the base **48**.

[0089] The base bricks **1** are all oriented in the same direction (their rear surface **12** here turned toward the back in FIG. **13**). The stiffeners **15** are also oriented in the same direction, but opposite the base bricks **1**. In this way, each stiffener **15** is framed by two base bricks **1**: a first whereof the rear surface **12** is simply pressed against the rear surface **18** of the stiffener **15**, and a second whereof the front tab **7** is fitted into the front groove **21** of the stiffener **15**.

[0090] This first row is placed dry, without mortar joints, by simple fitting of the bricks **1**, **15** into the base **48**. Given the identical quoted values (for the height and width) of the groove **51** of the base **48** and the tongues **5**, **7**, **19** of the bricks **1**, **15**, there is no functional play between the groove **51** and the tongues **5**, **7**, **19**. This lack of play does not, however, prevent the fitting, due to the relative elasticity of the material of the bricks **1**, **15** (unlike cement concrete, for example, which is extremely rigid).

[0091] Before placing the second row of bricks, the following two operations are carried out:

[0092] filling in, preferably using hemp concrete, a gap **54** existing between the rear surface **18** of each stiffener **15** and the rear groove **11** of the adjacent base bricks **1**;

[0093] producing a cutout **55** in the front surface **24** of each stiffener **15**, on the side of its rear surface **18**, to extend the upper groove **9** of the adjacent base bricks **1** as far as the cells **16** and thereby allow the unencumbered placement of the higher row of bricks.

[0094] The second row of bricks can then be placed. As shown in FIG. **14**, the bricks of that second row are turned opposite the bricks of the first row, so as to arrange the bricks in staggered rows from one row to the next. Owing to the cutout **55** made in the upper surface **24** of the stiffeners **15** of the first row, each stiffener **15** of the second row can fit without obstacle, straddling the stiffener **15** of the first row and the adjacent base brick **1**, on the side of its rear surface **12**. As for the first row, the second row (and subsequent rows) is placed dry, without mortar joints, by simple fitting of the bricks of the second row into one another and into the bricks of the first row. In light of the identical quoted values (in terms of projection and width) of the grooves and the tongues, there is no functional play in the fittings, which does not hinder the placement due to the relative elasticity of the hemp concrete. The lack of joints has three advantages:

[0095] the placement time is considerably reduced as a result;

[0096] a large quantity of material (water, cement, aggregate) is saved, benefiting the costs of the construction and its environmental qualities;

[0097] the wall thus erected has few or no thermal bridges, its thermal and acoustic insulation capacities thus being increased.

[0098] Once the second row of bricks is placed, the same filling in and cutting out operations are carried out in the stiffeners **15** of the second row as those done in the stiffeners **15** of the first row, so as to allow the placement of the third row. The third row is then placed, the base bricks **1** and the stiffeners **15** being oriented in the same direction as those of the first row (and therefore opposite those of the second). As before, the fitting is simple, with no mortar joints.

[0099] The cells **16** of the stiffeners **15** can then be filled in using a cement concrete, thereby embedding the frameworks **52** and forming reinforced posts **53** that vertically stiffen the wall **45** and form a reveal for the window **46**.

[0100] The third row delimiting a support for the window **46**, no fourth row bricks are placed between the frameworks **52**. However, to horizontally stiffen the frame of the window, the following operations are carried out:

[0101] a cutout **55** is made in the upper surface **24** of each stiffener **15**, to extend the upper groove **9**, **23** of the bricks of the third row between the frameworks **52** on either side as far as the cells **16** (FIG. **15**);

[0102] a horizontal metal framework **56** is placed in said groove **9**, **23** and extends from one vertical framework **52** to the other (FIG. **15**);

[0103] the groove **9**, **23** is filled in using a cement concrete to embed that the horizontal framework **56** and thereby produce a reinforcing beam to support the window (FIG. **16**).

[0104] In order to allow the stiffeners **15** of the subsequent row to be fitted, as before, cutouts **55** are made in the upper surfaces **24** of each stiffener **15**. The bricks of the following row are then placed (the fourth, in the illustrated example). As shown in FIG. **16**, in order to continue erecting the wall **45** with a distribution of the bricks in staggered rows, a half-stiffener **25** is fitted on the stiffener **15** of the third row turned opposite the opening **46**, with its front tongue **27** turned opposite the opening **46**. A base brick **1** is then horizontally fitted on the half-stiffener **25**. Stiffeners **15** and half-stiffeners **25** of this row and the following rows together form a reveal for the window **46** thus delimited.

[0105] As shown on the right in FIG. **17**, and on the left in an exploded view in FIG. **18**, stiffeners **15** and half-stiffeners **25** are alternated in each successive row to mount the reveal for the window **46** while preserving the staggered rows. As before, cutouts are made in the upper surfaces of the stiffeners **15** and half-stiffeners **25** to allow the fitting of each higher row.

[0106] Once the reveal for the window **46** has reached the desired height (which in this case corresponds to four rows of bricks, or a height of 1200 mm), an additional row of linking bricks **32** is placed that will participate in producing a lintel for the window **46**.

[0107] As shown in FIG. **18**, the linking bricks **32**, simply fitted together vertically in the groove **9**, **27** of the bricks of the lower row, and horizontally into each other, are horizontally stiffened using a metal framework **57** lying in the central cavity **33**, which is then filled in using a cement concrete that will embed the framework **57** and thereby form a lintel beam **58** for the window **46**. As shown in FIG. **19**, the lintel beam **58** is nevertheless hollowed out (for example using a furring that is removed once the cement has set) by a groove **59** with the dimensions (same depth, same width) of the tongues **39**, so as to allow fitting of the upper row (see below).

[0108] In order to allow the passage of the vertical frameworks **52**, the bottom **38** of the linking bricks **32** placed overhanging the reveal for the window **46** are also cut out with an opening **60** with a square section, said opening **60** being filled in using a cement concrete to complete the vertical reinforcing post **53** of the wall **45** (and the window **46**).

[0109] As illustrated in FIG. **19**, the following row is made up of linking bricks **32** vertically fitted into the grooves **9** of the base bricks **1** of the preceding row and in the groove **59** hollowed out in the lintel beam **59**.

[0110] Furthermore, in order to allow the placement of the slab **47** resting on that last row of bricks **32**, side walls **37** are cut out (in this case by complete leveling) on an inner side of the linking bricks **32**. As shown in FIG. **19**, the slab **47**

comprises profiled girders **61** (for example with a T-shaped transverse section, as illustrated), one end **62** of which is placed directly on the bottom **38** of the linking bricks **32**, owing to the cutout made. The girders **61** do not, however, extend as far as the side opposite side walls **37** of the linking bricks **32**: they are in fact spaced to allow the placement, between the side walls **37** and the end **62** of the girders, of a metal framework **57** for reinforcing the border of the slab **47**, which will subsequently be embedded in a cement concrete.

[0111] As also shown in FIG. **19**, the vertical metal frameworks **52** extend as far as the slab **47**, through square openings **60** cut in the bottoms **38** of the linking bricks **32** situated overhanging the reveal for the window **46** and filled in with a cement concrete completing the vertical reinforcing posts **53**.

[0112] The subsequent fastening of jambs (doors, windows) is done directly in the posts, supports, reveals and lintels of the openings. To access them, one need only form mortises in the bricks to allow the passage of fastening tongues of the jambs.

[0113] FIGS. **20** and **21** show, as an illustrative example, the production of a corner wall **63** using base bricks **1**, stiffeners **15** and half-stiffeners **25**. Only the placement of a first and second row of bricks are illustrated, the subsequent rows being done identically alternating between the first two rows.

[0114] As previously described, the corner wall **63** rests on a base **48** provided with a groove **51** hollowed on an upper surface, and poured over a foundation (not shown) situated below the ground level of the finished terrain. The wall **63** is made up of two wall faces **64**, **65** (which are arbitrarily called left face **64** and right face **65**, in reference to the orientation chosen for FIG. **20**) forming an angle (a right angle in the case at hand), and comprises at least one corner post **53** stiffened by a metal framework **52** vertically implanted in the base **48**. In the illustrated example, two other frameworks **52** are each implanted in a base face **48**, at predetermined equal distances (**1800** mm) from the corner framework **52**.

[0115] The first row of bricks comprises a first stiffener **15** fitted on the base in the corner of the wall **63**, with the metal corner framework **52** slipped into the cell **16** of the stiffener **15**. This first stiffener **15** may be oriented differently along either of the wall faces **64**, **65**. In the drawing of FIG. **20**, we have arbitrarily chosen to orient the stiffener **15** along the left face **64**.

[0116] The first row of bricks also comprises several (two in the case at hand) base bricks **1**, fitted on the base **48** in each face. In the left face **64**, where the corner stiffener **15** extends, the base bricks **1** are oriented toward the corner, the front tongue **7** of the base brick **1** adjacent to the corner stiffener **15** fitting into the front groove **21** thereof. As illustrated, a half-stiffener **25** is fitted on the base **48** at the framework **52** of the left face **64**, which is slipped in its cell **16**. The half-stiffener **25** is oriented toward the corner, such that its front tongue **27** fits into the rear groove **11** of the adjacent base bricks **1**.

[0117] In the right face **65**, the (two) base bricks **1** are oriented opposite the corner, the rear surface **12** of the base brick **1** adjacent to the corner stiffener **15** being pressed flat against a side surface **17** thereof. As also illustrated, a stiffener **15** is fitted on the base **48** at the framework **52** of the right face **65**, which is slipped into its cell **16**. The stiffener **15** is oriented toward the corner, such that the front tongue **7** of the adjacent base brick **1** fits into the front groove **21** of the stiffener **15**.

[0118] As in the example described in reference to FIGS. **13** to **19**, the bricks are simply fitted into the base **48** and into one another, no mortar joints being used.

[0119] Once the first row is placed, the following two preparatory operations are carried out in anticipation of the placement of the second row:

[0120] the gap **54** between the side surface **17** of the corner stiffener **15** and the rear groove **11** of the base brick **1** adjacent to the right face **65** is preferably filled in, preferably using hemp concrete;

[0121] a cutout **55** is made in the upper surface **24** of the corner stiffener **15**, on the side of the base brick **1** adjacent to the right face **65**, to extend the upper groove **9** of the base brick **1** as far as the cell **16** and thereby allow the unencumbered placement of the second row of bricks;

[0122] a cutout **55** is made in the upper surface **29** of the half-stiffener **25** of the left face **64**, on the side of the adjacent base brick **1**, to extend the upper groove **9** of the base brick **1** as far as the cell **16** and thereby allow the unencumbered placement of the second row of bricks;

[0123] a cutout **55** is made in the upper surface **24** of the stiffener **15** of the right face **65**, on the side of the adjacent base brick **1**, to extend the upper groove **23** of stiffener **15** as far as the cell **16** and thereby allow the unencumbered placement of the second row of bricks.

[0124] It is then possible to place the bricks of the second row, as illustrated in FIG. **21**. As shown in the figure, in that second row, the bricks are oriented opposite those of the first row. In this way, the second row comprises an angularly offset corner stiffener **15** (in this case at a right angle) relative to the corner stiffener **15** of the first row, and is fitted overlapping thereon and on the adjacent base brick **1** of the right face **65**. The base bricks **1** of the right face **65** are oriented toward the corner of the wall **63**, and a half-stiffener **25** is placed at the framework **52** of the right face **65**, also oriented toward the corner, its front tongue **27** fitting into the rear groove **11** of the adjacent base brick **1**.

[0125] Likewise, the base bricks **1** of the left face **64** of the second row are oriented opposite the corner, and a stiffener **15** is placed at the framework **52** of the left face **64**, such that the front tongue **7** of the adjacent base brick **1** fits into the front groove **21** of the stiffener **15**. No mortar joint is used between the bricks. As shown in FIG. **21**, the cells **16** of the stiffeners **15** and half-stiffeners **25** may be filled with cement concrete for placement of the second row. This filling may nevertheless be done at a later time, after the placement of the second row or even higher rows, to form the reinforced vertical posts **53**.

[0126] One can see that, irrespective of the configuration of the construction to be built, the use of the hemp bricks described above allows an easy and rapid construction, in particular owing to the absence of jointing, which allows considerable savings in terms of time and material. As an example, the construction of a traditional building with a ground surface area of 150 m^2, which requires approximately 1000 bricks (in all), of the various described types, may be completed (excluding light work) in one week with one single person on the worksite, i.e. time savings of more than 50% relative to the known methods, or ordinary quarry stone-based masonry, or hemp-based masonry set on a wooden frame, or hemp concrete block-based masonry jointed and placed on a wooden frame.

[0127] By using a reinforced concrete frame to produce the posts (which may also serve as a rigid frame for the openings) and slabs, the erection, from the hemp bricks described

above, of a multi-floor construction does not suffer any restrictions, whereas the professional rules regarding hemp concrete constructions made traditionally on a wooden frame limit the height of the structures to two floors (ground floor with one upper four).

[0128] The combination of solid base bricks and cellular stiffener bricks for the erection of the walls limits the number of reinforcing posts and avoids the use of a frame requiring the intervention of a specialized carpenter, while the quantity of cement concrete is nevertheless limited and the environmental qualities of the construction are preserved. However, it is fully possible to consider replacing the reinforced concrete posts with wooden pillars or non-reinforced lime concrete, just as it is possible to consider replacing the support and lintel reinforcements of the openings made from reinforced concrete with wooden beams or non-reinforced lime concrete.

1. A method for constructing a building using prefabricated bricks made from a material comprising plant fibers agglomerated using a binder, provided with grooves and tongues allowing them to be fitted together, wherein the bricks are conned through dry-joint connection.

2. The method according to claim **1**, further comprising the combined placement of solid base bricks, provided with a groove and a tongue wherein that can be joined together, and honeycomb stiffening bricks, provided with a groove wherein and a tongue, that can be joined together as well as a cell with the passage of a reinforcing post.

3. The method according to claim **2**, further comprising:

producing a mortar base;

placing a series of posts wherein in the base;

placing stiffening bricks at the posts wherein, with insertions of said posts into the cells of the stiffening bricks; and

placing base bricks between the stiffening bricks.

4. The method according to claim **3**, wherein each post comprises a metal framework embedded in concrete.

5. The method according to claim **3**, comprising an operation for placing, at a post and above a stiffening brick, a half-stiffening brick, provided with a tongue to allow it to be joint-connected on the stiffening brick and a cell for the passage of the post, and having a length equal to half the length of the stiffening brick.

6. The method according to claim **3**, further comprising:

placing linking bricks comprising a tongue allowing them to be joint-connected in the grooves of other bricks, and a central cavity delimiting two side walls and a bottom;

placing a metal framework in the cavity;

filling in the cavity using concrete.

7. The method according to claim **3**, further comprising:

placing linking bricks comprising a tongue allowing them to be joint-connected in the grooves of other bricks, and a central cavity delimiting two side walls and a bottom;

cutting out side walls;

placing a slab resting directly on the bottom of the linking bricks.

8. A brick made from a material comprising plant fibers agglomerated using a binder to implement the method according to claim **1**, provided with a tongue designed to be joint-connected in a groove, wherein the tab has a height whereof the ratio to an effective height or an effective width of the brick is comprised between 1/10 and 1/4.

9. The brick according to claim **8**, wherein the ratio between the height of the tongue and the effective height or the effective width of the brick is approximately 1/6.

10. The brick according to claim **8**, wherein the material is hemp concrete.

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