Arrangement for construction a structural building, in particular a residential house as well as a commercially used building such as an office building or a warehouse, with a load-bearing structure (10) that is at least partially built of sheet piles and at least partially surrounds the rooms of the building to be used. The sheet piles (14) are anchored in the ground and are, at least in sections, connected to one another through engaging interlocks (16, 20, 30, 46, 50, 54) in order to form the load-bearing structure (10). The engaging interlocks (16, 20, 30, 46, 50, 54) that form the load-bearing structure (10) are dimensioned and designed such that the interlock components that engage in each other essentially have only punctiform contact in the cross-sectional view.
BUILDING MADE OF SHEET PILES

CROSS-REFERENCE TO RELATED APPLICATIONS


FIELD

[0002] The invention concerns building structures including residential houses and commercial buildings such as office buildings and warehouses, together with the components used to construct such buildings.

BACKGROUND

[0003] Typically, sheet piles are used to secure excavation pits, to support areas close to the shore as well as in harbor construction because sheet piles are able to withstand great attacking forces and at the same time can be installed relatively quickly and easily.

[0004] For some time now, attempts have been made to use sheet piles for the erection of conventional buildings as well. In this context, the term building refers to residential houses, public buildings as well as commercially used buildings such as office buildings or warehouses. In this application, the load-bearing structure; i.e., the supporting formwork, which takes up the building forces and surrounds the rooms of the building to be utilized, is intended to be built—at least partially—by sheet piles as opposed to more conventional uses of brickwork, concrete and the like. The load-bearing structure may be built exclusively of sheet piles, or it can be built from a combination of brickwork, concrete and similar conventional structures with sheet piles are connected.

[0005] To anchor the load-bearing structure in the ground, the sheet piles are either rammed (piles driven) into the ground and/or secured in the ground by other suitable measures such as setting in concrete, for example.

[0006] The load-bearing structure of the building made of sheet piles, is then insulated using suitable insulating materials and then covered both on the outside and on the inside.

[0007] A building, where the load-bearing structure of the building is formed by so-called Larsen sheet piles is described in Published German Patent Application DE 43 24 612 A1. Because of the relatively high tolerances as well as the extremely high forces present at sheet piles that occur when the sheet piles are rammed into the ground, it requires great effort to maintain the tolerances that are typical when erecting buildings.

SUMMARY

[0008] With this as background, it is an objective of the present invention to provide a building wherein the problems described above for setting the sheet piles and erecting the load-bearing structure are largely avoided.

[0009] According to this disclosure, this objective is achieved in that the interlocks that engage with one another when building the load-bearing structure are dimensioned such that the engaging interlocks essentially contact each only punctiform when viewed cross-sectionally.

[0010] When using sheet piles for the erection of load-bearing structures in buildings, it has become apparent that extremely high forces of friction occur in the interlocks, due to the configurations of the interlocks, when the sheet piles are rammed into the ground and/or are connected to one another. Because of the high forces of friction, the sheet piles must be driven into the ground using relatively high forces. This makes accurate and exact positioning of the sheet piles towards each other difficult; therefore, the erection of the load-bearing structure while simultaneously maintaining the narrow distances required by the permitted tolerances requires a great deal of effort.

[0011] Subject to the invention, the interlocks that are used to connect the sheet piles to one another are dimensioned and designed such that the interlocks that engage with one another contact each other in a punctiform manner when viewed in cross-section. To this end, the sections of the interlocks that contact each other during engagement of the interlocks are rounded and their dimensions adjusted to each other such that the sections of the two interlocks essentially contact each other only punctiform. This punctiform contact of the engaging interlocks, for example, a two-point contact or a three-point contact has the effect that the forces of friction that occur in the interlocks when driving the sheet piles into the ground are minimized allowing for an easier insertion and engaging of the interlocks when compared to the state-of-the-art. Another benefit of the disclosed punctiform contact is that the interlocks can move relative to one another within certain limits.

[0012] These and other advantages of the invention become apparent from the subsequent description, including the patent claims and the accompanying drawings.

[0013] In particular, DE 43 24 612 A1, the disclosure of which is hereby incorporated by reference, shows that only buildings with a rectangular or square floor plan can be erected using sheet piles having Larsen interlock. A floor plan design deviating from this rectangular or square floor plan, for example a floor plan where the main house fronts are provided with curvatures, bays, slants, forward structures and the like cannot be realized with the Larsen sheet piles used thus far. In a particularly preferred advancement of the building subject to the present invention, it is, therefore, recommended to connect the sheet piles with interlocks that can be pivoted at a specified angle range in relation to one another without disengaging the interlocks. The preferred angle range is up to ±20°. This pivoting capability in one aspect allows greater leeway with respect to the otherwise more strict permitted dimensional tolerance deviations of the sheet piles to be connected to one another and of enabling the formation of curvatures or corners at other than 90° (for example, less than 90°) in a simple manner without reducing the bearing capacity of the load-bearing structure.

[0014] The use of so-called PZ sheet piles has proven particularly advantageous. These are sheet piles with two different interlocks at the two longitudinal (lateral) edges of the sheet pile. One of the interlocks is formed by a neck bar protruding from the longitudinal edge and by a curved, preferably oval, head bar following the end of said neck bar and oriented perpendicular to its longitudinal direction. The other interlock is formed by a claw bar with a C-shaped
cross-section protruding from the other longitudinal edge. The claw bar is designed complementary to the head bar such that the head bar can be hooked into the claw bar with a play. The curved design of the sections of the interlocks that engage in one another, namely the rounded head bar on the one side and the rounded claw sections of the claw bar on the other side have the effect of ensuring the aforementioned punctiform contact between the head bar and the claw bar, in this case, a two-point contact. In addition, the curved head bar and the curved claws of the cross-sectional C-shaped claw bar allow pivoting of the interlocks in relation to one another in an angle range of up to ±20°.

[0015] Also suitable for use in place of the recommended PZ sheet piles are so-called flat sheet piles in which the engaging interlocks are identically formed. In this case, the interlocks are formed by so-called finger bars with a curved profile and a thumb bar molded onto a curved profile of a corresponding holding bar and running perpendicular to the holding bar.

[0016] Great flexibility when erecting a building according to the teachings of the present invention is provided, especially if so-called connection profiles are used for connecting at least some of the sheet piles of the load-bearing structure. A connection profile is a profile bar, which exhibits a uniform cross-section across its length, with interlocks molded to the base body of the connection profile, which are designed to complement the interlocks of the sheet piles to be connected to one another. By using connection profiles, it is possible to connect the sheet piles to one another at angles as well, while still ensuring a secure connection between the sheet piles.

[0017] It is recommended to use connection profiles with interlocks that are designed on the base body of the connection profile in relation to one another such that the sheet piles to be connected to one another, when hooked into the connection profiles run in their neutral position at a specified angle of 45°, 90°, 120° or 135° to one another. Corresponding to the floor plan of the building, different connection profiles are used for connecting the sheet piles to each other depending on the desired course of the sheet piles to one another. For example, if a 45° corner is to be realized, a simple connection profile for connecting the sheet piles to one another is therefore used in which the interlocks are at an angle of about 45° to one another.

[0018] For certain building structures, it is often necessary to connect more than two sheet piles to one another, for example, to achieve a sufficient bearing capacity for the load-bearing structure. For this reason, it is, according to the invention, further recommended to employ a connection profile that can connect more than two sheet piles together; for example, three or four sheet piles.

[0019] Such a connection profile offers the advantage that the sheet piles connected to one another run together in a defined manner in one point which simplifies the erection of the load-bearing structure and at the same time ensures sufficient flexibility in designing the load-bearing structure.

[0020] For example, in one particularly preferred embodiment of such a connection profile that serves the connection of three sheet piles with each other, it is recommended that two of the three interlocks provided at the connection profile be arranged in relation to each other such that the two sheet piles in their neutral positions are at an obtuse angle to one another, for example an angle of 120° or even of 180°. The third interlock, on the other hand, is arranged in relation to one of the other two interlocks such that the third sheet pile is in its neutral position relative to the other sheet piles at an angle of, for example, 30°, 45°, 90° or even 120°.

[0021] It is furthermore of particular advantage if the interlocks formed at the connection profiles are designed such that the sheet piles hooked into the connection profile can be pivoted from the neutral position described above by a specified angle range of at least ±50° to a maximum of ±200°. This design measure has the effect that with the use of the connection profiles, it is possible to connect the sheet piles securely to each other in almost any imaginable position.

[0022] To be able to provide openings such as doors and windows for the building, it is taught to remove respective openings after erection of the load-bearing structure from the sheet piles, for example by flame cutting, taking into consideration that this must not weaken the load capacity of the load-bearing structure.

[0023] An alternative option is to provide openings that stretch across the entire width of one or more sheet piles by using spacer profiles, and in this manner retaining the load capacity of the load-bearing structure. For this purpose, it is recommended to provide two sheet pile sections above one another for the creation of the opening, for example, a window or a door opening, with said sections at a distance to one another that corresponds to the vertical height of the opening, where, from a vertical perspective, the upper sheet pile section is supported at the lower sheet pile section by the spacer profiles. To this end, the lengths of the spacer profiles are adjusted to the vertical height of the opening. To avoid a separation of the spacer profiles from the load-bearing structure, the spacer profiles are secured to the load-bearing structure, for example by bolting, riveting or welding. As an alternative or as a complement, it is recommended to use spacer profiles that are already designed with interlocks that are complementary to the interlocks of the sheet piles for hooking the space profiles into the interlocks of the sheet piles that define the openings on the sides.

[0024] To further improve the load capacity of the load-bearing structure, it is additionally recommended to integrate additional support elements, preferably T-beams, I-beams or tube piles in the load-bearing structure. To connect the carrier elements with the sheet piles as well, it is presently taught to fasten attachment profiles to the carrier elements in a particularly preferred embodiment. These attachment profiles are to be provided with interlocks as well, which are shaped complementary to the interlocks of the sheet piles that are to be hooked in. Fastening the attachment profiles to the carrier elements can be carried out by welding, for example. In this case, so-called welding profiles are used as the attachment profiles. It is additionally possible to use profiles that are, for example, inserted into and welded to the crossbar of the T-beam. One particularly preferred embodiment uses so-called Peiner beams; i.e., I-beams that are provided with wedge-shaped elevations at the longitudinal edges of the T-bar when viewing the cross-section. The attachment profiles to be connected with them are to be provided with a cross-sectional triangular receiving channel dimensioned appropriately, with which the attachment profile can be pushed onto the Peiner beam.
Moisture and humidity can be prevented from entering the building by at least partially sealing the interlocks engaging in one another. In particular, when the sheet piles are driven into the ground, it is of particular advantage if the engaging interlocks are built watertight to prevent the ingress of groundwater into the building.

Various sealing methods are available. One option is to weld the engaging locks watertight. Another option is to place a sealing element, for example, a cross-sectionally wedge-shaped sealing bar into one of the interlock chambers prior to hooking in the interlocks and to secure said sealing bar by clamping or gluing, such that after setting of the sheet pile walls, the sealing element seals the transfer (voids) between the interlocks.

A thermoplastic sealing compound is used for sealing in a particularly preferred embodiment. Prior to installation of the sheet piles, the thermoplastic sealing compound is applied to at least one of the interlock chambers of the engaging interlocks. When driving in the sheet piles or when connecting the sheet piles with the connecting profiles, a heat is generated by the friction between the engaging interlocks that is sufficient to warm up the sealing compound such that it is distributed in the interlock chamber at least in a slow-moving viscous manner and provides a good sealing effect after cooling down. But one such sealing compound is distributed under the trade name Wadit® and has been found to be particularly suitable as a sealing compound as described above.

To build the building with intermediate ceilings and individual stories as well, it is recommended for a particularly preferred embodiment to provide respective supports at the sheet piles and/or possibly at the specified load-bearing elements, on which the components supporting the ceiling slabs and/or the roof such as beams, wooden trusses and the like can lie and can be fastened.

It is also recommended to provide cross-bracings in the load-bearing structure to further increase the load capacity of the load-bearing structure. In this application, the cross-bracings are connected to the sheet piles and/or the carrier elements. The cross-bracings may be attached to the sheet piles of the carrier elements and/or the beam elements as the supports, for example by appropriately dimensioned bolt connections or weld connections.

At a particularly advantageous embodiment, at least some of the supports and/or at least some of the cross-bracings are hooked in connection profiles that connect the sheet piles to one another. To this end, the supports and/or the cross-bracings are equipped with appropriate interlocks that are hooked into interlocks additionally provided at the connection profiles. The supports provided with interlocks and/or the cross-bracings provided with interlocks are then moved along the connection profiles to the desired location and secured at the connection profile by welding, riveting or bolting, for example.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is explained in greater detail below with reference being made to the accompanying drawing of which:

FIG. 1 is a schematic side view of a section of a load-bearing structure of a building configured according to the teachings of the present invention which comprises sheet piles, Peiner beams and a connection profile;

FIG. 2 is a cross-sectional view taken along line 2-2 in FIG. 1;

FIG. 3 is a cross-sectional view taken along line 3-3 in FIG. 1 and wherein the construction of a window is presented;

FIG. 4 is a top end view of a connection profile for connecting three sheet piles;

FIG. 5 is a top end view of a first variation of the connection profile of FIG. 4 for connecting three sheet piles;

FIG. 6 is a top end view of a second variation of the connection profile of FIG. 4 for connecting three sheet piles;

FIG. 7 is a top end view of a third variation of the connection profile of FIG. 4 for connecting three sheet piles;

FIG. 8 is a top end view of a connection profile for connecting two sheet piles at an angle of 90°;

FIG. 9 is a top end view of a connection profile for connecting two sheet piles at an angle of 135°;

FIG. 10 is a top end view of a connection profile for connecting two sheet piles at an angle of 45°;

FIG. 11 is a top end view of a section of the load-bearing structure, where supports for an interim ceiling are shown; and

FIG. 12 is a top end view of a section of an alternative embodiment of the load-bearing structure shown in FIG. 11.

DETAILED DESCRIPTION

FIG. 1 shows a side view of a first section of a load-bearing structure 10 configured according to the teachings of the present invention. This first section of the load-bearing structure 10 is comprised of two Peiner beams 12 (see FIG. 2) that are at a certain distance away from one another with a total of four PZ sheet piles 14 arranged between them.

In the presented exemplary embodiment, the Peiner beams 12 as well as the PZ sheet piles 14 are driven into the ground to anchor the load-bearing structure 10 in the ground. The ground surrounded by the load-bearing structure 10 has been excavated to a depth just above the maximum insertion depth of the PZ sheet piles 14 and the Peiner beams 12, and the floor of the subterranean room created in this manner has been sealed using concrete. Here, the concrete floor fulfills two functions simultaneously, namely to anchor and support the Peiner beams 12 and the PZ sheet piles 14 in the ground, and to prevent groundwater from entering the building.

FIG. 2 is a cross-sectional view taken along the line 2-2 in FIG. 1 that exemplarily shows each PZ sheet pile 14 exhibiting at its longitudinal edge a first interlock 16 in the shape of a cross-sectional C-shaped claw bar 18 that extends, with a uniform cross-section, down the entire length of the longitudinal edge of the PZ sheet pile 14. A second interlock 20 is formed at the other longitudinal edge of each PZ sheet pile 14, with said second interlock being formed in the shape of a neck bar 22 and an adjacent head...
bar 24. Here too, the second interlock 20 extends down the entire length of the longitudinal edge with a uniform cross-section.

[0047] The rounded cross-sectional shapes of both the claw bar 18 and the head bar 24, as well as their coordinated (conforming) dimensions have the effect that the head bar 24 viewed in a cross section contacts the inside of the claw bar 18 only at two points. It should be appreciated that these points of contact, when viewed in cross-section, represent lines or strip zones of contact running linearly down along the length of a lateral edge of the pile 14. Because of this two-point contact (when viewed cross-sectionally), comparatively low forces of friction act between the two interlocks 16 and 20. Due to the rounded cross-sectional shapes of the two interlocks 16 and 20, it is additionally possible to move (pivot) the PZ sheet piles 14 in the interlocks 16 and 20 by an angle in a range of about 5 to 10° in both directions from the neutral position. This simplifies the erection of the load-bearing structure 10, in particular when ramming the PZ sheet piles 14 into the ground without clamping the interlocks 16 and 20.

[0048] As FIG. 2 also shows, the two PZ sheet piles 14 positioned at the left and right ends of the arrangement are coupled with Peiner beams 12 through a first attachment profile 26 and a second attachment profile 28, respectively. The two attachment profiles 26 (see FIG. 3) and 28 have—at least roughly—the same length as the Peiner beams 12 and the PZ sheet piles 14 and are also rammed into the ground.

[0049] To connect the PZ sheet pile 14 as shown in FIG. 2 at the left to the Peiner beam 12, the first attachment profile 26 exhibits an interlock 30 at its one flat side that is complementarily designed with respect to the claw bar 18 of the PZ sheet pile 14; i.e., exhibits a neck bar 32 and a head bar 34 as well. This has the effect that an interlocking connection is formed between the claw bar 18 of the PZ sheet pile 14 and the head bar 34 such that the interlock connection corresponds to the interlock connections formed between the PZ sheet piles 14. At the back side of the attachment profile 26 that is away from the interlock 30, a cross-sectional approximately rectangular receiving channel 36 is formed, with which the first attachment profile 26 is pushed onto the wedge-like expanding longitudinal edge 38 of the Peiner beam 12. Using this first attachment profile 26, the PZ sheet pile 14 is connected to the Peiner beam 12, whereby small deviations in the position between the PZ sheet pile 14 and the adjacent Peiner beam 12 can be compensated through appropriate dimensioning of both the interlock 30 and the receiving channel 36.

[0050] In a corresponding manner, the second attachment profile 28 is provided with a cross-sectional C-shaped claw bar 40, with which the second attachment profile 28 is connected to an adjacent PZ sheet pile 14 as shown in FIG. 2 on the right. In addition, the second attachment profile 28 exhibits a receiving channel 42 with which the second attachment profile 28 is pushed onto the wedge-like expanding longitudinal edge 38 of the other Peiner beam 12.

[0051] Located between the PZ sheet pile 14 shown in FIG. 2 on the right and the additional PZ sheet pile 14 arranged immediately adjacent to it, is a connection profile 44 that exhibits a C-shaped claw bar as a first interlock 46 and a head bar 52 as a second interlock 50. The first interlock 46 and the second interlock 50 are arranged with respect to each other such that the two PZ sheet piles 14 that are coupled with them are located on one common line. Viewed in a cross-section at a right angle from the connection profile 44 protrudes a third interlock 54, which is formed as a head bar 56 as well. The head bar 56 is designed at the base body of the connection profile 44 such that the head bar 56 runs at least approximately at a right angle to the attachment directions of the first two interlocks 46 and 50. An additional PZ sheet pile 14 is connected to the head bar 56 in FIG. 10, in turn, is designed as a bearing wall of the load-bearing structure 10.

[0052] FIG. 3 shows a sectional view along the section 3-3 in FIG. 1. The section of the load-bearing structure 10 of the example shown in FIG. 1 is provided with a window opening 58. To realize the window opening 58, the two PZ sheet piles 14 shown in FIG. 2 have been shortened, and a spacer profile 60 has been hooked into the first attachment profile 26, while a second spacer profile 62 has been hooked into the C-shaped claw bar 18 of the first interlock 16 of the adjacent PZ sheet pile 14. Here too, the two spacer profiles 60 and 62 are provided with correspondingly designed interlocks 64 and 66 in the form of a C-shaped claw bar and head bar, respectively. In addition, the flat side of the first or second spacer profile 60 or 62 pointing away from the first or second interlock 64 or 66 is provided with a cross-sectional rectangular receiving channel 68 or 70, possessing a frame 72 for a window frame (not shown) to be hung at a later time. The two spacer profiles 60 and 62, respectively, as well as the holding frame 72 are dimensioned in their vertical length such that the two additional PZ sheet piles 14, which are located above the holding frame 72, are supported by the spacer profiles 60 and 62 as well as by the holding frame 72. For securing purposes, the two upper PZ sheet piles 14 (refer to FIG. 1) can be exemplarily secured by spot-welding or riveting.

[0053] In place of the connection profile 44 shown in FIG. 2, which is shown in mirror image in FIG. 4, in a magnified presentation, additional different variations can be used for connecting three sheet piles as shown in FIGS. 5 to 7. These additional connection profiles 74, 76 and 78 differ from the connection profile 44 shown in FIG. 4 only in the arrangement of the interlocks in relation to one another. It should also be noted that the respective PZ sheet piles 14 hooked into these connection profiles 74, 76 and 78, can be pivoted from a neutral position shown with a dashed line by a defined angle α or β due to the design of the interlocks, such that these connection profiles 44, 74, 76 and 78 not only enable a connection of the PZ sheet piles 14 at an angle γ of 90° each, but that the PZ sheet piles can be deflected prior to being driven into the ground, or prior to erecting the load-bearing structure 10. For example, the pivoting angles α shown in FIGS. 4 to 7 are in a range of up to 20°, while the pivoting angle β allows pivoting of up to 10°.

[0054] For load-bearing structures to be erected that can do without the Peiner beam 12 described above, additional connection profiles 80, 82 and 84 are shown in FIGS. 8 to 10. For example, the connection profile 80 shown in FIG. 8 is designed for connecting two PZ sheet piles 14 at an angle γ of 90°, while the connection profile 82 shown in FIG. 9 is designed for connecting the PZ sheet piles 14 at an angle γ of about 135°. The connection profile 84 shown in FIG. 10, in turn, is designed for connecting two PZ sheet piles 14 at
an angle $\gamma$ of about 45°. Also with these three additional connection profiles 80, 82 and 84, it should be noted that the PZ sheet piles 14 can be pivoted from the shown neutral position, shown in a dashed line, with an angle $\alpha$ or $\beta$, whereby the angle $\alpha$ is at about 20°, while the angle $\beta$ is at about 10°.

[0055] The variations shown in FIGS. 4 to 10 present only some of the possible solutions, but even these different variations show how flexibly the load-bearing structure 10 of the building can be modified in many different ways when using these connection profiles 44, 74, 76, 78, 80, 82 and 84.

This opens nearly unlimited design options with regard to the contour of the PZ sheet piles 14 in relation to one another when designing buildings.

[0056] FIG. 11 shows a top view of an additional section of the load-bearing structure 10. In this case, the Peiner beam 12 serves as a corner element for connecting the PZ sheet piles 14 and another variation of an attachment profile 86 being employed, which in FIG. 11 is attached at the upper left end of the Peiner beam 12. At this attachment profile 86, the interlock 88 is molded with its head bar 90 turned by 90° compared to attachment profile 26 shown below, such that the PZ sheet piles 14 can be connected at a right angle at the upper cross bar of the Peiner beam 12 to the PZ sheet piles 14 shown in FIG. 11 below.

[0057] In addition, one connection profile 44 each is positioned between two pairs of PZ sheet piles 14, with said connection profile connecting the PZ sheet piles 14 in the manner described above. However, in this case a support element 92 is hooked in at the second head bar 56 of each of the two connection profiles 44. To this end, each of the two support elements 92 exhibits a C-shaped claw bar 94 as well, with which the support element 92 is hooked into the head bar 56. The C-shaped claw bar 94 of the support element 92 has a comparatively short length, for example 25 cm, and can thus be pushed along the head bar 56 that stretches across the entire length of the respective connection profile 44 and can be secured at said head bar in the respective desired vertical position by welding, riveting or bolting. In this manner, vertical positioning of the support element 92 can be carried out within the load-bearing structure 10. Because of the pivoting ability in the horizontal plane around the head bar 56 of the connection profile 44, respective angle offsets can be compensated for as well.

[0058] A T-beam 96 running perpendicular through the room is fastened at the support element 92 itself, for example by welding or bolting and serves as a support for a ceiling (not shown) to be installed later.

[0059] The support element 92 described above can also be used, for example, to attach and secure cross-bracings, support bracings and the like. Furthermore, the support element 92 can be used as support for the beams and joists of the roof to be placed later.

[0060] Since the load-bearing structure 10 shall, in particular in residential buildings, not be visible, the load-bearing structure is provided with appropriate insulating material 98 and with coverings 100 and 102 on the inside and outside of the load-bearing structure 10, whereby the coverings 100 and 102 are in a known manner are provided with appropriate blocking foils for humidity and steam.

[0061] FIG. 12 shows a top view of a section of an alternative embodiment of the load-bearing structure shown in FIG. 11. In this structure only connection profiles 76 and 80 are used for connecting the PZ sheet piles 14. Instead of the Peiner beam 12 the PZ sheet piles 14 are connected in the corner by means of connection profile 80. Further, the PZ sheet piles 14 are arranged slightly angled so that the thickness of the wall including the insulating material 98 and the coverings 100 and 102 is reduced compared to the wall thickness of the embodiment shown in FIG. 11.

[0062] By way of an alternative description of the inventive embodiments described herein, the figures can be described as illustrating a portion of sections of a building structure forming one embodiment of the presently disclosed invention. The building includes a plurality of angular load bearing walls located at least partially below ground. Each of the walls comprises a plurality of sheet piles, each of which has a widthwise central axis (parallel to the dashed lines of FIGS. 4-9) and each sheet pile laterally terminates in either an elongate bulbous head supported on a necked extension strip or an elongate receiver having an interior trap-space and an elongate opening forming a slotted access port to the trap-space. The slotted access port is configured to accommodate extension of the necked extension strip therethrough with the elongate bulbous head retained in the trap-space. The plurality of sheet piles are coupled together by an interlocked combination of an elongate bulbous head and an elongate receiver. The elongate bulbous head and the elongate receiver each have at least two elongate contact zones that form a pair of elongate essentially punctiform contact strips between the elongate bulbous head and the elongate receiver. The pair of elongate essentially punctiform contact strips are oriented in dependence upon an angular offset of the widthwise central axes of the coupled together sheet piles.

[0063] An elongate adaptor is also disclosed that comprises at least a total of two of the elongate bulbous head and the elongate receiver. It may be two bulbous heads, two receivers, or one of each, for example. The elongate adaptor is interconnected between the angularly offset, coupled together sheet piles.

[0064] The slotted access port has a widthwise opening and the necked extension strip has a widthwise thickness that permits the elongate bulbous head to pivot approximately forty degrees (±20°) in the angularly offset interlocked configuration and thereby accommodates an offset angle of approximately two-hundred degrees between the coupled together sheet piles.

[0065] As alternatives, the invention also takes the form of the walls configured according to these teachings, as well as wall sections and just the arrangements used to couple together such walls.

What is claimed is:

1. A structural building such as a residential house or commercial building taking the form of an office building or warehouse, said building comprising:

a load-bearing structure (10) at least partially built of sheet piles and that at least partially surround rooms of the building, said sheet piles (14) being anchored in the ground and being interconnected through engaging interlocks (16, 20, 30, 46, 50, 54), said engaging interlocks (16, 20, 30, 46, 50, 54) being dimensioned and designed such that interlocking components
thereof engage each other with essentially only punctiform contact therebetween in a horizontal cross-sectional perspective.

2. The building as recited in claim 1, wherein the engaging interlocks (16, 20, 30, 46, 50, 54) are pivotable relative to one another through an angle ranging up to ±20°.

3. The building as recited in claim 1, wherein said sheet piles are composed of I/Z sheet piles (14) exhibiting an interlock (16, 20) at each longitudinal edge thereof and whereby one interlock (20) is formed by one neck bar (22) starting at the longitudinal edge and by a preferably oval head bar (24) following at its end and oriented perpendicular to the neck bar (22) and the other interlock (16) is formed by a cross-sectional C-shaped claw bar (18) protruding from the longitudinal edge whereby the claw bar (18) is designed as a complementary interlock for receiving the head bar (24).

4. The building as recited in claim 1, further comprising a connection profile (44, 76, 78, 80, 82, 84) used for connecting at least two adjacent sheet piles (14) and said interlocks (46, 50, 54) are complementary formed to the interlocks (16, 20) of the sheet piles (14) to be connected.

5. The building as recited in claim 4, wherein the locks (46, 50, 56) formed at the connection profile (80, 82, 84) are arranged to each other such that the sheet piles (14) to be connected to one another in their neutral position are oriented at a specified angle (γ) of one of 45°, 90°, 120° and 135°.

6. The building as recited in claim 4, wherein the connection profile (44, 74, 76, 78) is configured for interconnecting more than two sheet piles (14) to one another.

7. The building as recited in claim 4, wherein the connection profile (44, 74, 76, 78) is used to connect three sheet piles (14) to one another and exhibits three interlocks (46, 50, 54), where two of the three interlocks (46, 50) provided at the connection profile (44, 74, 76, 78) are arranged to each other such that two of the sheet piles (14) in their neutral position form an obtuse angle, preferably an angle of 120° or 180° towards each other, while the third interlock (54) is arranged in relation to the other two interlocks (46, 50) such that the third sheet pile (14) in its neutral position is at an angle (γ) of 30°, 45°, 90° or 120° in relation to one of the other sheet piles (14).

8. The building as recited in claim 6, wherein at least one of the sheet piles (14) that is hooked in the connection profile (44, 76, 78, 80, 82, 84) can be pivoted in a specified angle range (α, β) of at least ±5° and less than ±20° from the neutral position.

9. The building as recited in claim 1, wherein two sheet pile sections (14) are used to form an opening for one of a window and a door, said sheet pile sections being arranged one above the other and being at a distance to one another that corresponds to the opening, whereby the top sheet pile section (14) when viewed vertically is supported through spacer profiles (60, 62) at the lower sheet pile section (14).

10. The building as recited in claim 9, wherein two sheet pile sections (14) are housed between in two sheet piles (14), whereby each of the spacer profiles (60, 62) that supports the top sheet pile section is equipped with an interlock (64, 66) with which the spacer profile (60, 62) is hooked into the interlock (16, 20) of the respective adjacent sheet pile (14).

11. The building as recited in claim 1, further comprising carrier elements taking the form of one of a T-beam, an I-beam and a tube pile.

12. The building as recited in claim 11, wherein at least a portion of the sheet piles (14) are connected to the carrier elements (12) through attachment profiles (26, 28, 86) whereby the attachment profiles (26, 28, 86) are fastened to the support elements (12) and complementary interlocks (30) are provided with each of the interlocks (16, 20) to be hooked into the sheet piles (12).

13. The building as recited in claim 1, wherein at least some of the engaging interlock pairs (16, 20, 30, 46, 50, 54) are at least partially sealed.

14. The building as recited in claim 13, wherein the sealed interlock pairs (16, 20, 30, 46, 50, 54) are sealed by a thermoplastic sealing compound in interlock chambers of the two interlocks (16, 20, 30, 46, 50, 54).

15. The building as recited in claim 1, wherein support profiles (92) for supporting ceilings in the building are connected with the sheet piles (14).

16. The building as recited in claim 1, wherein cross-bracings (98) for strengthening the building are connected with the sheet piles (14).

17. The building as recited in claim 16, wherein at least one of the support profiles (92) and at least some of the cross-bracings are hooked into connection profiles (44, 74, 76, 78, 80, 82) that connect the sheet piles (12) to each other.

18. A building structure comprising:

   a plurality of angular load bearing walls located at least partially below ground and each of said walls comprising:

   a plurality of sheet piles, each sheet pile having a widthwise central axis and laterally terminating in one of: (i) an elongate bulbous head supported on a necked extension strip and (ii) an elongate receiver having an interior trap-space and an elongate opening forming a slotted access port to the trap-space, said slotted access port configured to accommodate extension of said necked extension strip therethrough with said elongate bulbous head retained in said trap-space; and

said plurality of sheet piles coupled together by an interlocked combination of an elongate bulbous head and an elongate receiver, said elongate bulbous head and said elongate receiver each having at least two elongate contact zones that form a pair of elongate essentially punctiform contact strips between said elongate bulbous head and said elongate receiver, said pair of elongate essentially punctiform contact strips being oriented in dependence upon an angular offset of the widthwise central axes of the coupled together sheet piles.

19. The building structure of claim 18, further comprising:

   an elongate adaptor comprising at least a total of two of said elongate bulbous head and said elongate receiver and said elongate adaptor interconnected between said angularly offset, coupled together sheet piles.

20. The building structure of claim 18, wherein said slotted access port has a widthwise opening and said necked extension strip has a widthwise thickness that permits said elongate bulbous head to pivot approximately forty degrees in the angularly offset interlocked configuration and thereby accommodates an offset angle of approximately two-hundred degrees between the coupled together sheet piles.
21. An angularly configured load bearing wall for a building structure, said wall comprising:

a plurality of sheet piles, each sheet pile having a widthwise central axis and laterally terminating in one of: (i) an elongate bulbous head supported on a necked extension strip and (ii) an elongate receiver having an interior trap-space and an elongate opening forming a slotted access port to the trap-space, said slotted access port configured to accommodate extension of said necked extension strip there-through with said elongate bulbous head retained in said trap-space; and

said plurality of sheet piles coupled together by an interlocked combination of an elongate bulbous head and an elongate receiver, said elongate bulbous head and said elongate receiver each having at least two elongate contact zones that form a pair of elongate essentially punctiform contact strips between said elongate bulbous head and said elongate receiver, said pair of elongate essentially punctiform contact strips being oriented in dependence upon an angular offset of the widthwise central axes of the coupled together sheet piles.

22. The load bearing wall of claim 21, further comprising:

an elongate adaptor comprising at least a total of two of said elongate bulbous head and said elongate receiver and said elongate adaptor interconnected between said angularly offset, coupled together sheet piles.

23. The load bearing wall of claim 21, wherein said slotted access port has a widthwise opening and said necked extension strip has a widthwise thickness that permits said elongate bulbous head to pivot approximately forty degrees in the angularly offset interlocked configuration and thereby accommodates an offset angle of approximately two-hundred degrees between the coupled together sheet piles.

24. A pivotal fastening arrangement for interconnecting a plurality of sheet piles configured to be pile-driven into the ground to form an angular load bearing wall of a building structure, said arrangement comprising:

a plurality of sheet piles, each sheet pile having a widthwise central axis and laterally terminating in one of: (i) an elongate bulbous head supported on a necked extension strip and (ii) an elongate receiver having an interior trap-space and an elongate opening forming a slotted access port to the trap-space, said slotted access port configured to accommodate extension of said necked extension strip there-through with said elongate bulbous head retained in said trap-space; and

said plurality of sheet piles coupled together by an interlocked combination of an elongate bulbous head and an elongate receiver, said elongate bulbous head and said elongate receiver each having at least two elongate contact zones that, when said sheet piles are coupled together in an angularly offset interlocked configuration, form a pair of elongate essentially punctiform contact strips between said elongate bulbous head and said elongate receiver, said pair of elongate essentially punctiform contact strips being oriented in dependence upon the angular offset of the coupled together sheet piles.

25. The pivotal fastening arrangement of claim 24, further comprising:

an elongate adaptor comprising at least a total of two of said elongate bulbous head and said elongate receiver and said elongate adaptor configured to be interconnected between said angularly offset, coupled together sheet piles.

26. The pivotal fastening arrangement of claim 24, wherein said slotted access port has a widthwise opening and said necked extension strip has a widthwise thickness that permits said elongate bulbous head to pivot approximately forty degrees in the angularly offset interlocked configuration and thereby accommodates an offset angle of approximately two-hundred degrees between the coupled together sheet piles.