ABSTRACT: A self-contained waler bracket for attachment either directly to a waler or to a waler-reinforcing stud and including a helical split wedge which engages an inwardly facing shoulder afforded by an enlarged head on a tie rod for placing the tie rod under tension, and further including a wedge-spanning hoodlike strap which engages an outwardly facing reaction shoulder on the head to prevent inward movement of the bracket and consequently of the waler and the side of the concrete wall form that is served thereby.
WALER BRACKET FOR A CONCRETE WALL FORM

The present invention relates generally to a concrete wall form and has particular reference to a novel, self-contained, two-piece waler bracket which consists essentially of a baseplate and a pivoted and generally helical wedge latch, the baseplate being adapted to be secured to a wooden, panel-reinforcing waler or to a wooden, waler-reinforcing stud and the wedge latch being moveable from a retracted position to an advanced or operative position wherein it underlies an enlarged head on the adjacent end of a horizontal tie rod which passes through aligned holes in the baseplate and the timber (waler or stud) to which the baseplate is secured, thus applying pressure to the tie rod and forcing the timber inwardly and hard against the panels of the adjacent side of the concrete wall form.

Waler brackets of the helical pivoted wedge latch type are currently in general use, and when such brackets are operatively installed in a concrete wall form, the inward reaction they normally applied to the associated timbers is assimilated by the usual spreader cones which surround the associated tie rods and bear at their inner ends against breakback deformations in the tie rods and at their outer ends against the inner faces of the associated panels of the form. In the absence of such spreader cones, form braces are usually employed in order to prevent inward collapse of the two opposite, spaced apart sides of the concrete wall form.

According to the present invention, the novel waler bracket is provided with a hoodlike reaction strap which overlies the enlarged head on the adjacent end of the associated tie rod. Since the pivoted edge latch of the bracket underlies this head while the strap overlies the head, and since the wedge latch and strap are, in effect, integral, when the wedge latch is driven to its home or fully operative position, the head is securely clamped between the body of the wedge latch and the hoodlike strap so that relative shifting between the bracket and tie rod in an axial direction is prevented. Since the bracket is fixedly secured to the associated timber, and since the timber is secured to the associated panel, such clamping of the tie rod head by the bracket will afford the necessary spreading action for the form sides regardless of whether or not a spreader cone is employed on the tie rod.

The provision of a waler bracket of the character briefly outlined above and possessing the stated advantages constitutes the principal object of the present invention. A further object of the invention is to provide a waler bracket wherein the hoodlike reaction strap, as well as the wedge latch, exerts a camming action on the enlarged tie rod head during movement of the wedge latch toward its home position so that there will be no lost motion between the bracket as a whole and the tie rod, and the form has been tightened on the latter.

It is desirable that in a waler bracket of the type under consideration, the pivoted wedge latch shall not be too freely rotatable about its pivotal point or axis. Otherwise, the wedge latch is difficult to manipulate during connection to the enlarged head on the adjacent end of the associated tie rod. In many concrete wall forms, the waler brackets are successively aligned with their respective tie rods and the timbers in place before individual wedge latch tightening operations are performed. After a given number of tie rods have been put in position with respect to the associated timbers and waler brackets, the final operation consists in successively driving the various wedge latches to their home positions to lock the tie rods, so to speak, to the brackets. Before the wedge latch driving operation is resorted to, the wedge latches must be swung to a raised position where the helical slots of the wedge latches are in immediate register with the enlarged heads on the ends of the tie rods but are not in actual contact therewith.

In prior waler brackets designed for the same purpose, friction in the pivot parts of the wedge latch and baseplate assembly believed upon so that the wedge latch will remain in whatever position it is initially placed. To attain the necessary degree of friction, where the pivotal connection consists of a threaded bolt, a carefully threaded adjustment of the parts must be made so that the wedge latch will not be so loose that it will fall by gravity toward its latching position, or so tight as to make it difficult to manipulate by hand pressure to attain a proper initial setting. Where a riveted connection is made, a proper adjustment for friction is even more difficult to attain. In either event, subsequent repeated use will lessen the frictional adjustment in time, while the presence of foreign matter such as particles of concrete which find their way into the pivotal connection may cause the wedge latch to bind. According to the present invention, novel means are provided whereby uniform frictional resistance is maintained between the pivot and wedge latch is provided, such means being less subject to binding than has heretofore been possible, and such means also maintaining the desired coefficient of friction indefinitely.

Numerous other objects and advantages of the invention, not at this time enumerated, will readily suggest themselves as the following description ensues.

The invention consists in the several novel features which are hereinafter described and are more particularly defined by the claims at the conclusion hereof.

In the accompanying two sheets of drawings forming a part of this specification, one illustrative embodiment of the invention is shown.

In these drawings:

FIG. 1 is a fragmentary perspective view of an external area of a concrete wall form showing a waler bracket embodying the invention operatively installed thereon and illustrating the wedge latch in its retracted position preparatory to being driven to its home or operative position of tie rod engagement;

FIG. 2 is a frontal elevational view of the structure of FIG. 1 but showing the wedge latch in the position in which it assumes at the moment when the adjacent, head-equipped end of the associated tie rod enters the wedge slot in the wedge latch;

FIG. 3 is a front elevational view similar to FIG. 2 but showing the wedge latch driven to its home position;

FIG. 4 is a bottom edge view of the applied waler bracket looking in the direction of the arrows 4—4 of FIG. 2;

FIG. 5 is a horizontal sectional view taken on the line 5—5 of FIG. 2;

FIG. 6 is a side edge view of the waler bracket looking in the direction of the arrows 6—6 of FIG. 3.

FIG. 7 is a top edge view of the bracket looking in the direction of the arrows 7—7 of FIG. 3;

FIG. 8 is a side elevational view, partly in section, of the detached wedge latch in its free state and illustrating schematically the manner in which it is applied to the baseplate in order to attain frictional retardation against undesired wedge latch movement.

Referring now to the drawings in detail and in particular to FIG. 1, as exemplified in this view, it is common and widespread practice in the industry to fabricate a concrete wall form from opposed, upright, plywood panels 10 which are traversed and held in a desired spaced-apart relationship by horizontal, transversely extending tie rods 12 which project through holes 14 (see FIG. 4) in the panels 10, and extend exteriorly of the form in supporting engagement with waler-clamping brackets which are similar in many respects to the waler bracket 16 of the present invention and coact with horizontal walers 18 in an arrangement (not shown) involving pivoted wedge latches and which are similar to the present wedge latch 20 and function against enlarged buttons or heads 22 on the projecting end portions of the tie rod 12 in order to apply the influence of the latter, in reaction, against the walers, thereby establishing the desired spacing of the sides of the concrete wall form according to the predetermined dictates of the tie rods. Such known waler-clamping brackets are further characterized by wedge latches which present generally helical slots similar to the illustrated slot 24 and all present relatively steep ram portions 26 (see FIG. 3) that terminate in generally flat shelf or landing portions 28.
prevent the latches from returning to their retracted position of tie rod release under severe vibrational forces.

The waler-clamping bracket 16 of the present invention embodies the known features briefly outlined above and, additionally, it makes provision whereby, after a predetermined degree of wedging action has taken place tending to force the associated waler 18 inwardly of the concrete wall form, a secondary reaction member presents itself to the adjacent outer end of the tie rod, i.e., the adjacent enlarged head 22 on the associated tie rod 12, and prevents further inward movement of the associated waler 18 and panel 10 without destroying the function of the first reaction force which becomes effective during tightening of the wedge latch 20.

Applying the principle of the novel waler-clamping bracket 10 in greater detail, this bracket is comprised of two principal parts, namely, a flat rectangular baseplate 30 which, in the illustrated concrete wall form, is permanently secured to the waler 18 by nails 32 or other suitable fastening devices, and the previously mentioned wedge latch 20 which is pivoted to the baseplate 30 by a shouldered rivet 34, the swinging movement of the wedge latch being frictionally retarded in a manner that will be described presently. The wedge latch 20 is in the form of a rigid heavy gauge sheet metal stamping having a raised hollow cuneate boss 36 in which the helical slot 34, the ramp portion 26 and the shelf or land portion 28 are formed. Due to the raised nature of the boss 36, the arcuate slot 24 therein is roughly of helical configuration. The baseplate 30 is provided with a circular hole 38 which registers with a tie rod opening 39 in the waler 18. The curvature of the slot 24, insofar as its arcuateness is concerned, is such that all portions of the slot may progressively be brought into register with the hole 38 during movement of the wedge latch from the retracted position in which it is shown in FIG. 1, to the fully advanced or home position in which it is shown in FIG. 3. Except for the cuneate boss 36, the wedge latch 20 is generally flat and a relatively large surface area thereof is adapted to slide on the opposed surface of the baseplate 30 in face-to-face relationship. A limited peripheral portion 40 of the wedge latch is turned at an angle of approximately 45° out of the general plane of the wedge latch and the leading edge of the slot 24 is widened so as to provide a throat 42 which extends into this out-turned peripheral portion 30 to allow the enlarged head 22 of the adjacent projecting end portion of the tie rod 12 to enter the slot 24 during movement of the wedge latch 20 toward its advanced position as clearly shown in FIG. 2. By such an arrangement, an apertured bridge portion or yoke 44 is established and connects the leading side edges of the slot 28 in reinforcing it. The raised portion 40 also serves as a manipulating handle by means of which the wedge plate 20 as a whole may be shifted bodily between its two extreme positions as well as into intermediate positions.

A second limited peripheral portion of the wedge latch 20 is similarly turned at an angle of approximately 45° out of the general plane of the wedge latch and constitutes an out-turned extension or striker 46 which may also be used as a manipulating handle or as an impact lug or striker when the wedge is being driven to its home position.

From the above description, it will be apparent that with the adjacent end portion of the tie rod 12 projecting through the registering holes 14, 39 and 38 in the panel 10, the waler 18 and the baseplate 30, respectively, as shown in FIG. 1, downward swinging movement of the wedge latch 20 in a counterclockwise direction will bring the throat 42 into register with these three holes 14, 39 and 38 as shown in FIG. 2, and continued swinging movement of the wedge latch will cause the extremities of the tie rod 12 to enter the slot 26 while the enlarged head 22 on the tie rod is bypassed by the yoke 44 and overlies the side edges of the slot so that it will ride outwardly on the steep ramp portion 26, thus applying tension to the tie rod 12 and causing the waler bracket 16 as a whole, together with the waler 18 to which it is affixed, to be crowded inwardly of the form and against the panel 10. From the ramp portion 26, the enlarged tie rod head 22 moves onto the shelf or land portion 28 where further swinging movement of the wedge latch 20 is terminated by engagement of the tie rod portion immediately inwards of the head 22 with functioning in the manner of a detent in order frictionally to hold the wedge latch in its home position as shown in FIG. 3.

The general arrangement of parts thus far described is conventional and according to the present invention, certain improvements have been effected. Principal among these improvements is the provision of a substantially rigid hoodlike strap 50 in the form of a short length of heavy gauge sheet metal stock, one end of which is turned laterally inwards to provide a right-angle flange 52, the distal edge of which is welded as at 54 to a peripheral region of the wedge latch 20 in the vicinity of the striker 46. The strap 50 extends laterally over the slot 24 in the rear region of the latter as best seen in FIG. 2 and substantially conceals the adjacent end 48 of the slot and consequently the tie rod head 22 when the wedge latch is in its home position as shown in FIG. 3. The distal end region of the strap 50 is secured in position on an underlying portion 56 of the wedge latch 20 by the same rivet 34 which maintains the wedge latch 20 against the baseplate 30 in swinging relationship with respect thereto.

Whereas, with conventional wedge latches similar to the present wedge latch 20, the pivotal connection between the latch and the baseplate is a loose one so that the latch is capable of falling under the influence of gravity toward its home position, the latch of the present invention is frictionally retarded against such gravitational movement by reason of the assembly process which is resorted to in constructing the wedge latch 20 and its associated strap 50, as well as in assembling the unitary latch and strap upon the baseplate 30. This assembly process is schematically shown in FIGS. 5 and 8. After the wedge latch has been stamped from heavy gauge sheet metal, the laterally turned flange 52 is welded in position on the wedge latch 20 as previously described and on an angular bias so that the crown portion of the strap is disposed generally at a slight angle to the general plane of the latch as shown in FIG. 8. Thereafter, when the latch and the baseplate are brought into position for registry of the two rivet holes 58 and 60 (see FIG. 8) in these members, the distal end region of the strap 50 is forced downwardly as indicated by the arrow in FIG. 8 so that the rivet hole 62 in the strap also moves into register with the holes 58 and 60. The rivet 34 is then applied as shown in FIG. 5. In order that the swaged end of the rivet 34 shall not interfere with proper seating of the wedge latch 20 upon the baseplate 30, the latter is formed with a raised boss 64 and 66 for such purposes.

The portion of the wedge latch 20 which directly opposes or overlies the boss is formed with a corresponding or complementary boss which receives or accommodates the boss 64, and thus, permits the flat portions of the wedge latch to fit flatly against the baseplate 30. After the riveting operation has been completed and the clamping pressure on the strap 50 relieved, the annular rivet head shoulder 66 and the annular shoulder that is formed by the swaged portion of the rivet establishes friction surfaces which, respectively, bear against the upper face of the strap 50 and the underneath surface of the boss 64 respectively and thus inhibit free rotational movement of the wedge latch with respect to the baseplate 30, it being understood, of course, that the release of clamping pressure on the strap 50 places the latter under yielding friction and attains the desired frictional effect.

As best illustrated in FIGS. 1, 7 and 8, the leading edge region of the strap 50 is formed with an arched generally frustoconical portion 70 which tapers to nothingness in the trailing direction of the strap, thus giving the strap a whole, when considered in connection with the undercut portion of the wedge latch 20, the appearance of a hood. During the terminal movement of the wedge latch 20 and as it swings over the enlarged head 22 on the adjacent end portion of the tie rod 12, the shallow part of the arched portion 70 engages the extreme outer end of the head 22 and, by a camming action, forces the head
hard against the shelf or land portion 28 of the cuneate boss 36, thus, in effect, locking the waler bracket 16 as a whole securely to the tie rod 12 with the two form sides assuming their vertical positions with the predetermined spacing which is dictated by the linear extent of the tie rod. Outward spreading movement of the form sides is prevented by the intershoulder engagement between the captured tie rod head 22 and the strap 50, while inward collapse of the adjacent form side is prevented by the intershoulder engagement between the head 22 and the wedge latch 20.

In order to prevent overwinding of the wedge latch 20 when the bracket 16 is in its free state, as well as to protect the end 48 of the slot from becoming damaged by repeated contact with succeeding tie rods with which the bracket may be associated, a limit stop 72 (see FIGS. 1, 2 and 3) is formed on the baseplate 30 and is designed for engagement with a recessed edge area 74 on the periphery of the wedge latch 20 at or near the time when the end 48 of the slot engages that portion of the tie rod 12 that is immediately inwards of the adjacent enlarged head 22.

From the above description, it is believed that the mode of operation of the present waler-clamping bracket 16 will be fully understood, as well as many of the advantages thereof over conventional and similar waler brackets designed for the same purpose. Among the advantages not yet set forth is the fact that the hood which is afforded by the strap 50, being open at both ends, affords adequate open space for the escape of loosened and hardened bits of concrete which may collect in the vicinity of the slot 24, as well as affording access to the tie rod head 22 at all times for inspection purposes.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawings or described in this specification as various changes in the details of construction may be resorted to without departing from the spirit or scope of the invention. Neither is the waler bracket of the invention to be limited to the specific environment which, for exemplary purposes, has been selected. For example, while the bracket 16 is shown as being operatively installed in a concrete wall form installation by application directly to a waler such as the waler 18, where a gang form installation is made, the bracket 16 may be secured to a vertical stud which bridges a number of the waler, the hole 38 in the baseplate 30 of the bracket lying in register with aligned tie rod holes in both the associated stud and waler, as well as in the panel. Therefore, only insofar as the invention is particularly pointed out in the accompanying claims is the same to be limited.

I claim:

1. In a concrete wall form, the combination with a wall form panel, a timber disposed in backing relationship with respect to the panel, there being aligned openings in said timber and panel, and a headed tie rod portion projecting through said openings and having its head disposed a slight distance outwardly of the timber, of a clamping bracket designed for coaction with said head and timber and comprising a baseplate fixedly secured to the timber and having a hole therein in register with said aligned openings and through which the tie rod portion projects, a wedge latch disposed adjacent to the outer side of the baseplate and arranged in pivoted relation with respect to said baseplate for swinging movement in sliding relation with respect to the baseplate from a retracted position remote from the baseplate hole to an advanced position overlying said hole, said wedge latch being formed with a raised hollow cuneate boss having a helical slot therein which, in all overlying positions of the wedge latch, registers with said baseplate hole and through which the tie rod portion projects during traverse of the baseplate hole by the wedge latch, the side edges of said slot engaging said head during such traverse and by a camming action urging the baseplate inwardly against the timber, and an elongated sheet metal hoodlike strap on the outer side of said wedge latch having one end welded to said wedge latch on one side of the helical slot and arching outwardly and transversely over the terminal end region of the slot, the underneath side of the crown portion of said arched hoodlike strap being engageable with the had when the wedge latch is in its fully advanced position, and a fastening stud projecting outwardly from the baseplate on the other side of the helical slot, the other end of the strap being formed with a circular hole therethrough, the wedge latch also being formed with a similar circular hole therethrough in register with the circular hole in said other end of the strap, said fastening stud projecting loosely through said registering holes in the strap and wedge latch, forming the pivotal connection between the baseplate and the wedge latch, and having an enlarged head overlying the rim of the circular hole in the strap, said strap being so welded to the wedge latch that it exists under outward flexion to the end that the enlarged head of the fastening stud and said rim region of the circular hole in the strap are yieldingly urged into frictional contact with each other with the result that the swinging movement of the wedge latch about the axis of the fastening stud is frictionally restrained.

2. In a concrete wall form the combination set forth in claim 1 and wherein said baseplate is provided with an opening therethrough in register with the circular holes in the wedge latch and strap and said fastening stud is in the form of a shoulder rivet having a reduced inner end projecting through the opening in the baseplate and riveted in the latter.

3. In a concrete wall form, the combination set forth in claim 2 and wherein said baseplate is formed with a raised circular boss which establishes a recess in which the riveted end of the rivet is nested.

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