United States Patent [19]

Fortine

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[54] **MUDSILL TIEDOWN**

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[73] Assignee: **Simpson Manufacturing Co., Inc.,** San Leandro, Calif.

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[21] Appl. No.: **462,809**

[52] **U.S. Cl.** **52/715;** 52/714; 52/751

[51] **Int. Cl.²** **E04B 1/41**

[58] **Field of Search** 52/751, 713, 712, 295, 52/714, 300, 715, 369, 702, 370

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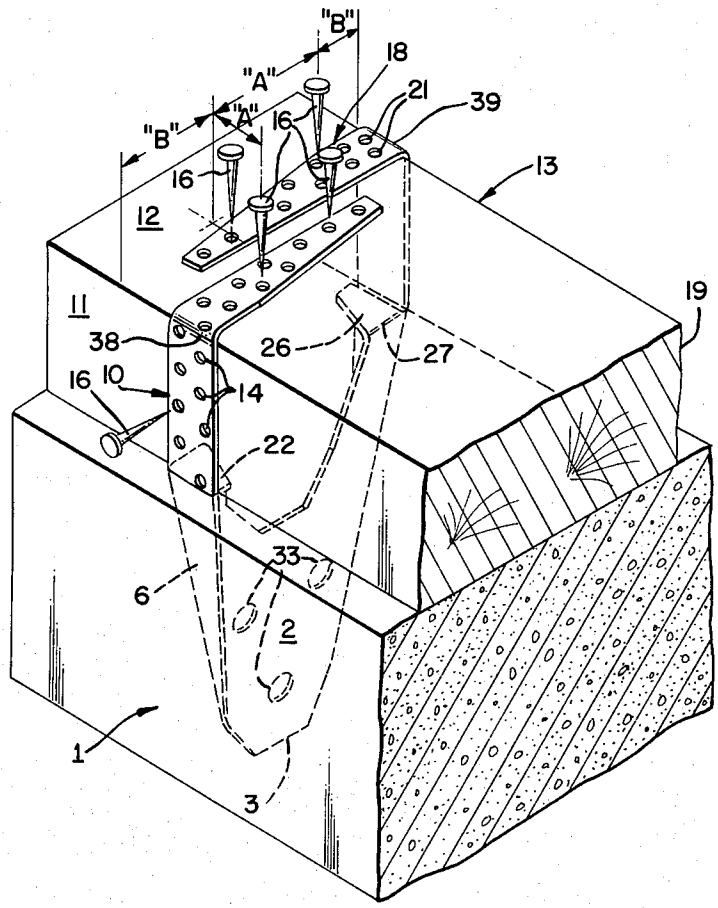
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Assistant Examiner—Leslie A. Braun
Attorney, Agent, or Firm—James R. Cypher

[57] **ABSTRACT**

An anchor used in building construction to tie the mudsill to a concrete foundation. The device being constructed from an elongated sheet metal strip; cut and formed on a progressive die. The tiedown consists of an "arrowhead" shaped web, angularly related sides preventing withdrawal and depending tie members which are dimensioned to overlap or overlie the wood mudsill. The tie members are formed with apertures so that nails or other fasteners can be easily inserted therethrough for securing the tie members to the mudsill.

8 Claims, 11 Drawing Figures



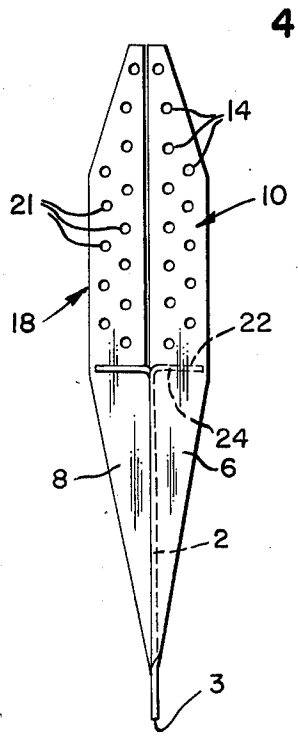


FIG. 4

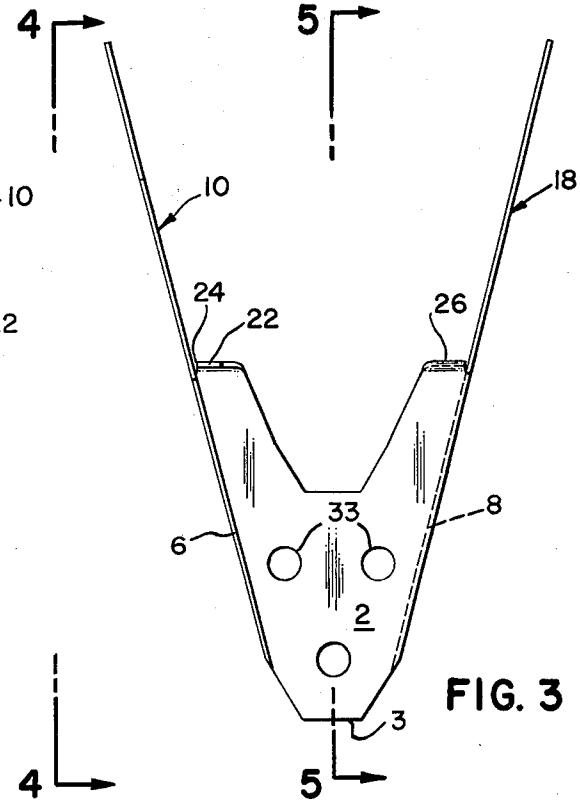


FIG. 3

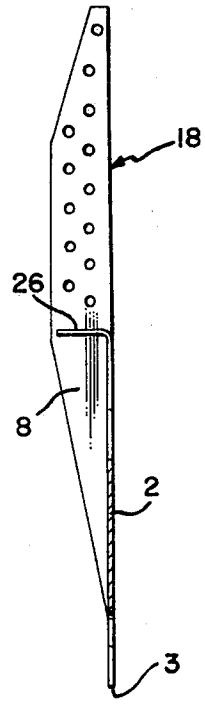


FIG. 5

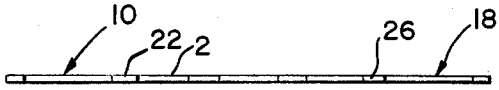


FIG. 2

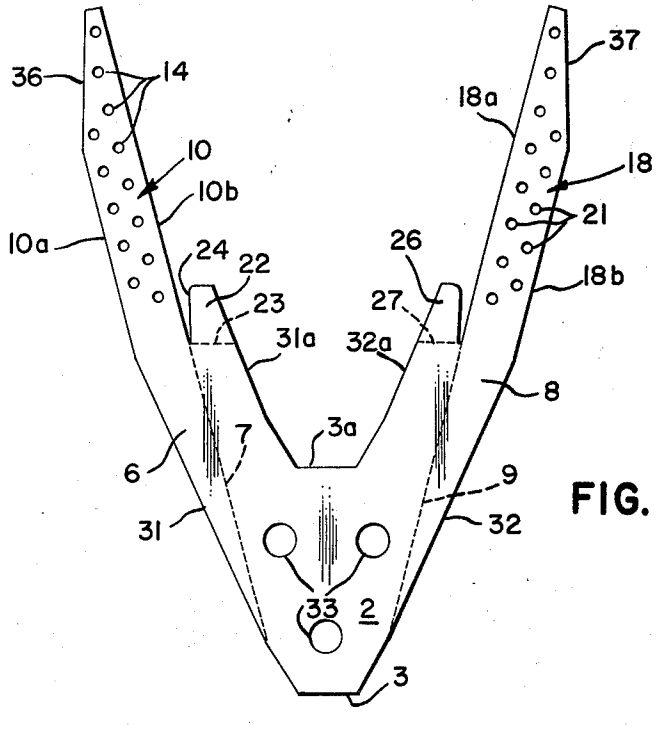


FIG. 1

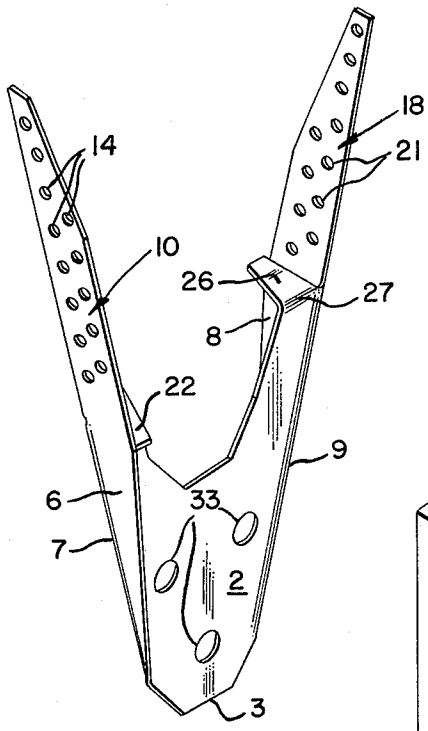


FIG. 6

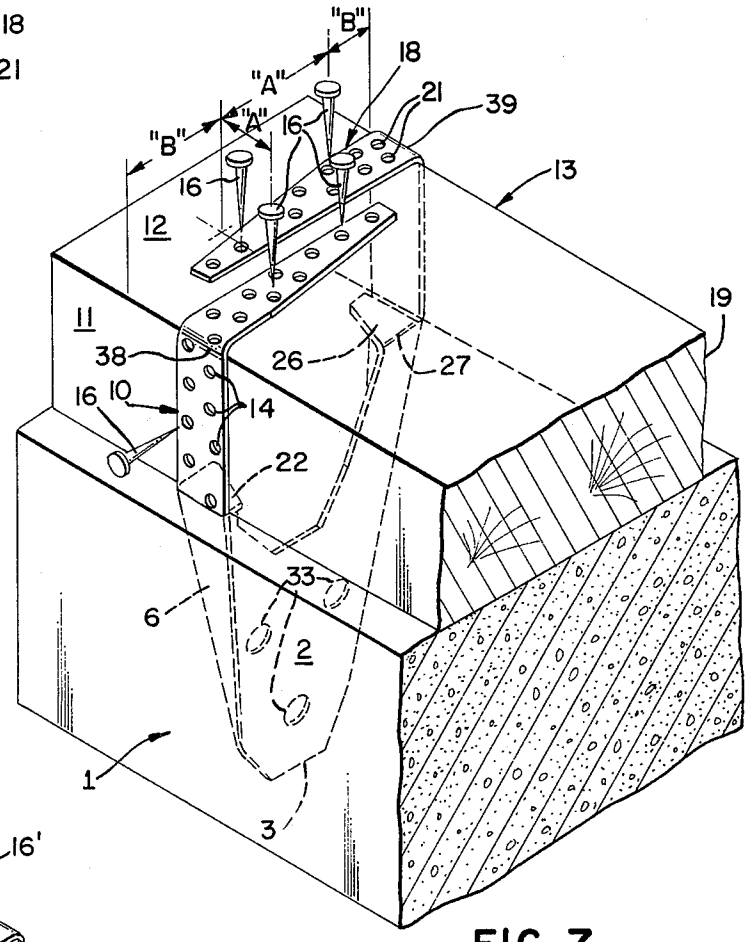


FIG. 7

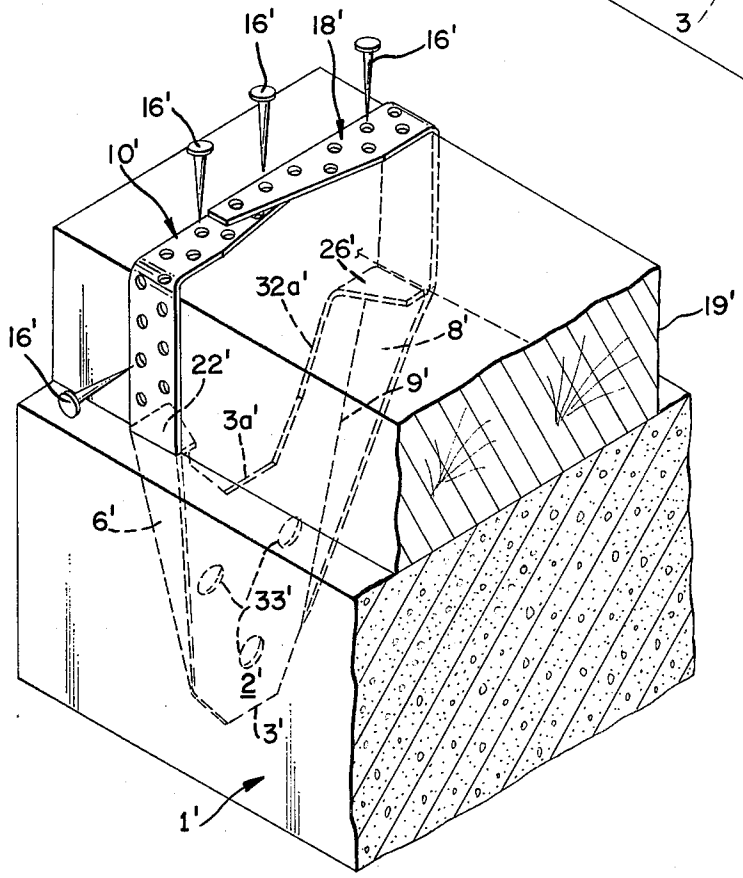


FIG. 11

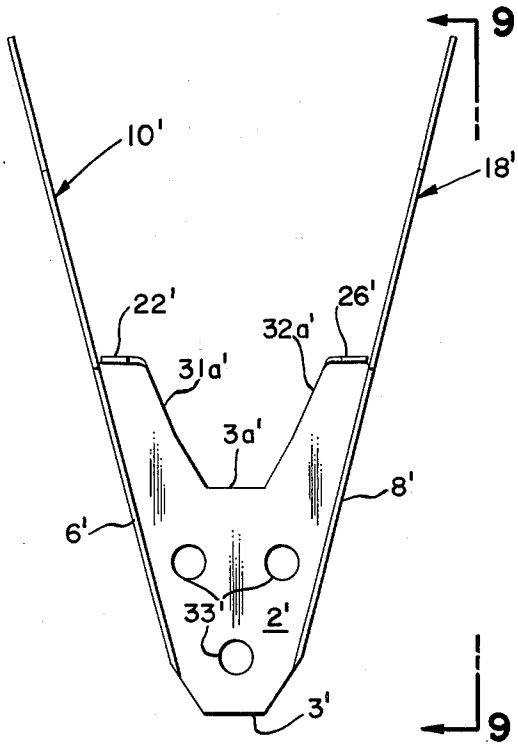


FIG. 8

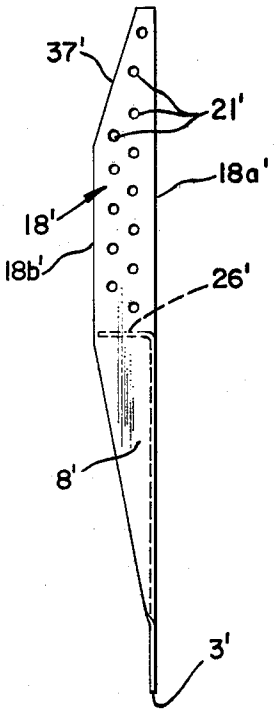


FIG. 9

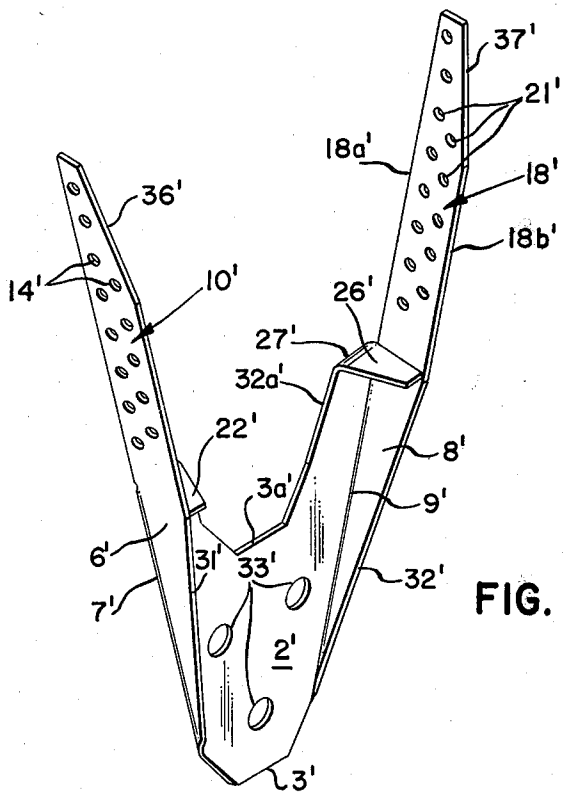


FIG. 10

MUDSILL TIEDOWN

BACKGROUND OF THE INVENTION

Building codes and good construction practice dictate the use of connectors to tie the wall structure to the foundation in geographical areas subject to earthquakes, hurricanes or high wind loads. One solution to this problem (and still in wide use today) is the setting of threaded bolts in the concrete foundation and inserting the free ends of the upright bolts through holes drilled in the wood mudsill. Threaded nuts bearing against washers hold the mudsill to the foundation.

Prefabrications of sheet metal products have patented alternate solutions (see e.g. U.S. Pat. Nos. 3,750,360; 3,422,585; 2,920,477; and 1,622,697). In general, these solutions must be attached to the mudsill prior to pouring of the concrete or inserted while the concrete is still very flowable to prevent bending of the long narrow anchor strips.

At least one known U.S. Pat. No. **2,182,579,** has used the "arrowhead" approach, but it too has failed to provide a device which is sufficiently rigid to penetrate relatively dry mixed concrete pours.

SUMMARY OF THE INVENTION

The gist of the present invention is the use of a specially designed mudsill tiedown member, cut and folded from an elongated sheet of metal on a progressive die which can be placed in wet or relatively dry mixed concrete without bending.

Another object is to provide a tiedown which automatically stops at a predetermined embedded distance into the concrete.

A further object is to provide a tiedown which has sufficient rigidity to hold the tie members in a preselected position prior to bending around the mudsill.

Still another object is to provide a mudsill tiedown as described which is lightweight, inexpensive and easy to install.

A still further object is to provide a device which can meet the mudsill nailing requirements of various jurisdictions having different building code specifications.

Another object is to provide a device which can support a reinforcing bar when necessary.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front view of a sheet metal blank of the present invention prior to bending.

FIG. **2** is a top edge view of the blank shown in FIG. **1.**

FIG. **3** is a front elevation view of the device shown in FIG. **1** after bending as set forth in the description.

FIG. **4** is a side view of the described invention taken along lines **4—4** of FIG. **3.**

FIG. **5** is a cross sectional view of the device of FIG. **3** taken generally along line **5-5** of FIG. **3.**

FIG. **6** is a perspective view of the device shown in FIGS. **1** through **5.**

FIG. **7** is a perspective view of the device of FIG. **6** as used in practice.

FIG. **8** is a front elevation view of the device shown in FIG. **1,** but bent in an alternate manner.

FIG. **9** is a side view of the device shown in FIG. **8** taken generally along the line **9—9** of FIG. **8.**

FIG. **10** is a perspective view of the device shown in FIGS. **8** and **9.**

FIG. **11** is a perspective view of the device shown in FIGS. **8** through **10.**

DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

The mudsill tiedown for anchorage in a concrete foundation **1** of the present invention consists briefly of a web member **2** tapering to a blunt pointed leading edge **3** for embedment in the concrete foundation;

a first embedded side **6** integrally and angularly connected to a first edge **7** of said web and having a width tapering in dimension toward the pointed edge of the web;

a second embedded side **8** integrally and angularly connected to a second edge **9** of the web and having a width tapering in dimension toward the pointed edge of the web;

a first tie member **10** extending from the first side a distance adapted for engaging the side **11** and a substantial portion of the top face **12** of a mudsill **13** and being formed with a plurality of spaced apertures **14** adapted to receiving nails **16** or other fasteners therethrough, the tie member being constructed from a malleable material to permit bending of said tie around the side and top face of the mudsill; and a second tie member **18** extending from the second side a distance adapted for engaging the other side **19** and a substantial portion of the top face of the mudsill and being formed with a plurality of spaced apertures **21** adapted for receiving nails or other fasteners therethrough, said tie member being constructed from a malleable material to permit bending of the tie around the other side and top face of the mudsill.

Preferably each tie member extends across more than one half the width of the mudsill so that the mudsill is in effect encircled by the members.

It should be noted that even the sides **6** and **8** are tapered so that the device may be easily inserted into the wet concrete and without causing air voids in the concrete as it is inserted.

The mudsill tiedown as described may be formed with a depth tab **22** connected to the upper part **23** of the web at a preselected distance from the pointed web edge and bent at a right angle to the web.

As a further feature the mudsill tiedown may be formed so that the depth tab **22** has an edge **24** in close relation to the first side **6** providing support to side **6** to maintain the preselected angular relationship between side **6** and web **2** and assist in the prevention of twisting of the first tie member **10.** Thus the tie member will fit flat against the sides and top of the mudsill.

Preferably the tiedown is formed with a second depth tab **26** spaced from the first named depth tab **22** and connected to the upper part **27** of the web **2** at a preselected distance from the pointed web edge **3,** bent at a right angle to the web and having an edge **28** in close relation to the second side **8** providing support to the second side.

The upper portion of the web of the mudsill tiedown is formed with a void defined by leading edge **3***a* and sides **31***a* and **32***a* having a shape identical to the shape of the blunt pointed leading edge **3** of the web and a portion of the sides which correspond to edges **31** and **32** permitting progressive die cutting of the tiedown with a minimum of waste material, thereby reducing the weight of the tiedown. Furthermore, the void presents an increased upper web edge **3a, 31a** and **32a** thus

providing increased interlock with the concrete foundation for resisting upward forces.

Preferably the mudsill tiedown described has a web member formed with voids **33** permitting additional concrete interlock between the tiedown and the foundation.

Instead of holes, the web may be formed with bend-out tabs which provide additional concrete interlock.

The first and second tie members **10** and **18** are formed with tapering edges **36** and **37** along their outer sides for minimizing metal waste in forming the tiedown from an elongated rectangular strip of sheet metal by means of a progressive die and for diminishing the total weight of the tiedown.

Referring to FIGS. **3, 4, 5,** and **7** the first and second sides **6** and **8** are bent along bend lines **7** and **9** so as to lie on opposite sides of the web member **2** and the first and second sides are bent to approximately the same angle in relation to the web so that the tie members **10** and **18** will fold upon the mudsill at bend lines **38** and **39** and lie in side by side spaced relation to one another as shown in FIG. **7.**

The unique spacing of the tie members makes it possible to amply meet building codes which require a 1½ inch center line to center line spacing "A" and a three-fourths inch edge distance "B" for 10 penny nails and a 1¼ inch spacing "A" for 8 penny nails with a similar edge distance "B" of three-fourths inch.

The mudsill tiedowns of the present invention are cut from a sheet of metal forming a blank as shown in FIG. **1.**

There is a minimum of waste metal since the head portion of one device lies within the tail portion of the next device. Thus edge **3** of a first device corresponds with edge **3***a* of a second device; side **31** lies along line **31***a*; line **32** along line **32***a*; line **10***a* along **10***b*; and line **18***b* along line **18***a*.

The blank is then folded by automatic machines in the shape shown in FIGS. **3, 4,** and **5.**

At the job site, the workmen may place the tiedown in one of two ways. First, they may bend the tie members as shown in FIG. **7** and attach them to the mudsill **19** with nails **16.** The mudsill may then either be suspended in the foundation forms prior to pouring of the concrete, or the foundation may be poured and then the mudsill, with several tiedowns attached, pressed into the wet concrete. A second way is to pour the concrete, then press the tiedowns into the wet concrete and after the concrete has set up, the mudsill can be placed on the foundation and the tie members of the tiedown bent around the mudsill and attached with nails.

Once the tiedowns are in place and the concrete has set, it is impossible to withdraw the tiedown from the concrete foundation. The slanting sides **6** and **8** give an "arrowhead" effect or reverse wedge effect to prevent withdrawal. Moreover, edges **3***a*, **31***a* and **32***a* are interlocked in the concrete. In addition, concrete flows through openings **33** in the web and forms a bridge effect preventing withdrawal of the device.

Depth tabs **22** and **26** prevent the device from being inserted too far into the concrete and not allowing a sufficient length of tie members **10** and **18** to protrude. When the device is attached to the mudsill **19,** the bottom face of the wood member rests on the top faces of the tabs **22** and **26,** thus automatically setting the depth that the blunt point **3** will be embedded in the foundation. On the other hand, where the device is placed in the concrete before attachment to the mudsill, the workman merely pushes the device down into the concrete until the tab rests on the top face of the foundation.

The web **2** serves to distribute any uplift load to both embedded sides **6** and **8.** In this way there is less chance of the device working loose from the concrete and failing. The web also distributes lateral loads that may be imposed as by earthquakes or side wind loads, or rotational or overturning loads. The web uniquely provides a surface for distributing longitudinal loads imposed upon the mudsill to the foundation.

The bending of the sides **8** and **6** at right angles to the web causes the member to become very rigid which in turn permits the device to be inserted into concrete without bending even when the mix is relatively dry. More importantly, the rigidity of the sides holds the tie members **10** and **18** at a preset angle so that the workmen do not have to spend time re-shaping the device before installing it. Providing a device which will maintain its shape is particularly important when several mudsill tiedowns are attached to a single mudsill and then pressed into the wet concrete. If the webs of all the devices are not parallel to one another, or if one or more devices bend while being inserted, installation of the mudsill can be very difficult.

Another form of the invention is shown in FIGS. **8 – 11.** The alternate form is identical in all respects to the previously described mudsill tiedown except that the sides and tabs are bent in the same direction. Instead of repeating the description, like parts have given like numbers with the addition of a (′) prime designation.

FIG. **11** shows the manner in which the device of FIGS. **8 – 10** encircle the mudsill. Instead of the tie members being in side by side relation, they overlie one another so that a single nail can be placed through the apertures in both tie members **10′** and **18′**. The placement and operation of the device in FIG. **11** is similar to the previously described device.

I claim:

1. A mudsill tiedown for anchorage in a concrete foundation comprising:

a. an integral web member having a face presented at right angles to the longitudinal axis of the mud sill tapering to a blunt pointed leading edge for embedment in said concrete foundation and presenting outer first and second diverging edges;

b. a first embedded side for embedment in said concrete foundation and integrally and angularly connected to said first edge of said web extending from adjacent said leading edge along substantially said entire diverging first web edge and having a width tapering in dimension toward said pointed edge of said web;

c. a second embedded side for embedment in said concrete foundation and integrally and angularly connected to said second edge of said web extending from adjacent said leading edge along substantially said entire diverging second web edge and having a width tapering in dimension toward said pointed edge of said web;

d. said first and second sides being in spaced diverging relation to one another:

e. a first tie member disposed at right angles to said web member and extending from said first side a distance adapted for engaging the side and a sub-

stantial portion of the top face of said mudsill in a flat face to face relationship and being formed with a plurality of spaced apertures adapted for receiving nails or other fasteners therethrough, said tie member being constructed from a malleable material to permit bending of said tie around said side edges of said mudsill;

f. a second tie member disposed at right angles to said web member and extending from said second side a distance adapted for engaging the other side and a substantial portion of the top face of said mudsill in a flat face to face relationship and being formed with a plurality of spaced apertures adapted for receiving nails or other fasteners therethrough, said tie member being constructed from a malleable material to permit bending of said tie around said other side edges of said mudsill; and

g. said web member having a width at its upper end subtantially greater than the widths of said tie members and a length equal to a substantial portion of the length of said device which is embedded in said foundation for joining said two embedded sides for a substantial portion of their respective lengths.

2. A mudsill tiedown as described in claim **1** comprising:

a. a depth tab connected to the upper part of said web at a preselected distance from said pointed web edge and bent at a right angle to said web.

3. A mudsill tiedown as described in claim **2** comprising:

a. said depth tab having an edge in close relation to said first side providing support to said side to maintain the preselected angular relationship between said side and said web and assisting in the prevention of twisting of said first tie member; and

b. a second depth tab spaced from said first named depth tab and connected to the upper part of said web at a preselected distance from said pointed web edge, bent at a right angle to said web and having an edge in close relation to said second side providing support to said second side.

4. A mudsill tiedown as described in claim **1** comprising:

a. the upper portion of said web being formed with a void spaced from said first and second diverging edges thereby providing substantial solid web area and having a shape identical to the shape of the blunt pointed leading edge of said web and a portion of said sides permitting progressive die cutting of said tiedown with a minimum of waste material, reducing the weight of said tiedown and said void providing an increased upper web edge providing increased interlock with said concrete foundation for resisting upward forces.

5. A mudsill tiedown as described in claim **4** comprising:

a. Said web member being formed with voids of substantial dimension permitting additional concrete interlock between said tiedown and said foundation.

6. A mudsill tiedown as described in claim **5** comprising:

a. said first and second tie members being formed with ends tapering along their outer distal sides to a blunt end edge for minimizing metal waste in forming said tiedown from an elongated rectangular strip of sheet metal, for diminishing the total weight of said tiedown, and for eliminating sharp protruding points.

7. A mudsill tiedown as described in claim **1** comprising:

a. said first and second sides being bent so as to lie on the same side of said web member, and said first and second sides being bent to approximately the same angle in relation to said web so that said tie members will fold upon each other in overlying relation permitting a single fastener to register with an aperture with each of said tie members.

8. A mudsill tiedown as described in claim **1** comprising:

a. said first and second sides being bent so as to be disposed at the same end of said web member but lie on opposite sides of the plane of said web member, and said first and second sides being bent to approximately the same angle in relation to said web so that said tie members will fold upon said mudsill and lie in side by side spaced relation to one another without overlying one another.

* * * * *