July 4, 1939. D. M. MUIRHEAD 2,165,192

INSECT INSULATION FOR FOUNDATION STRUCTURES

Filed Aug. 12, 1938 4 Sheets-Sheet 1

Fig. 1.

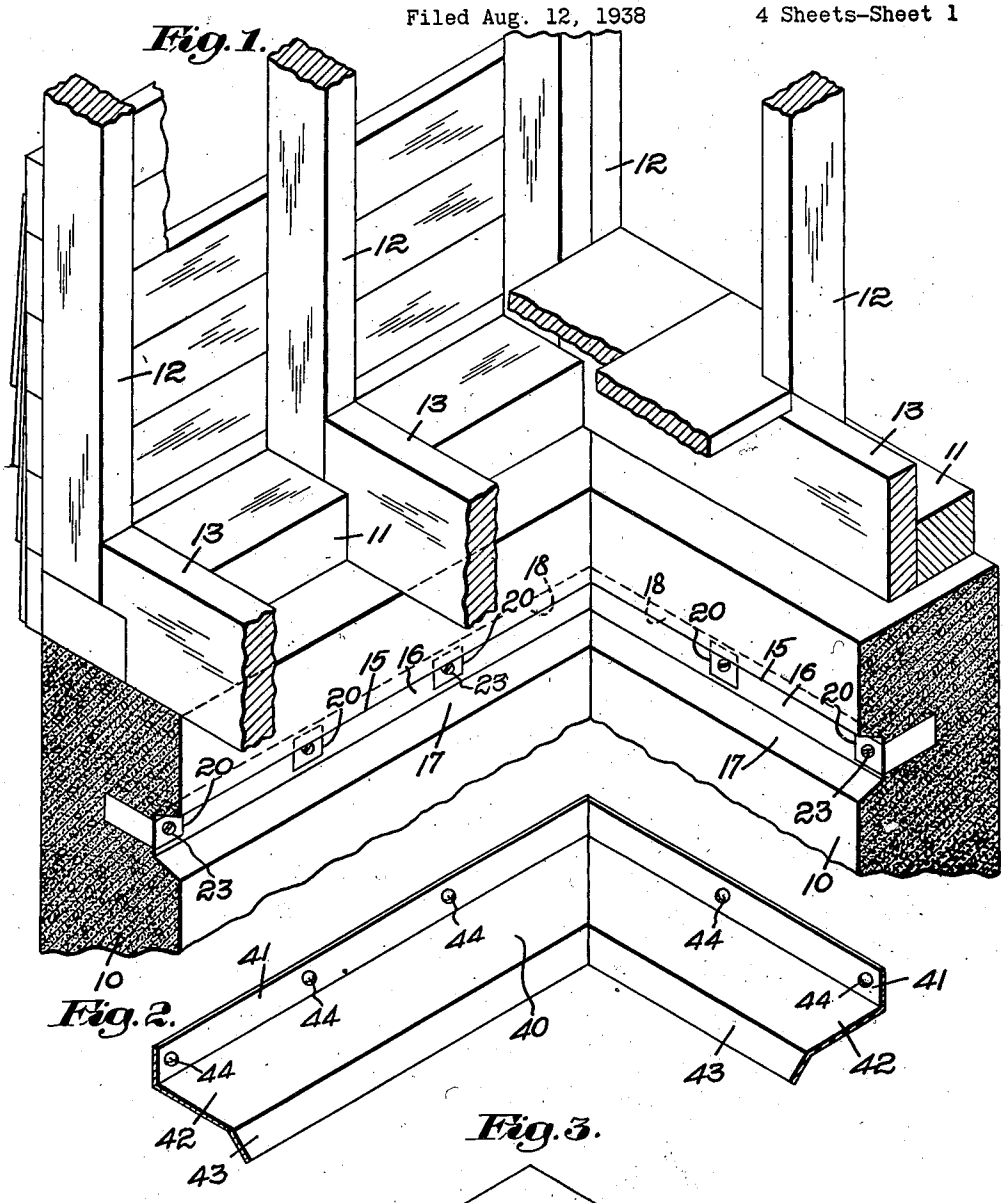
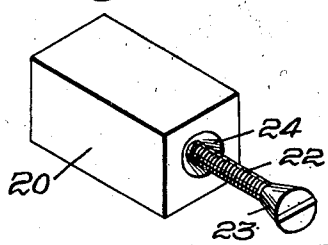


Fig. 2.

Fig. 3.



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Fig. 4.

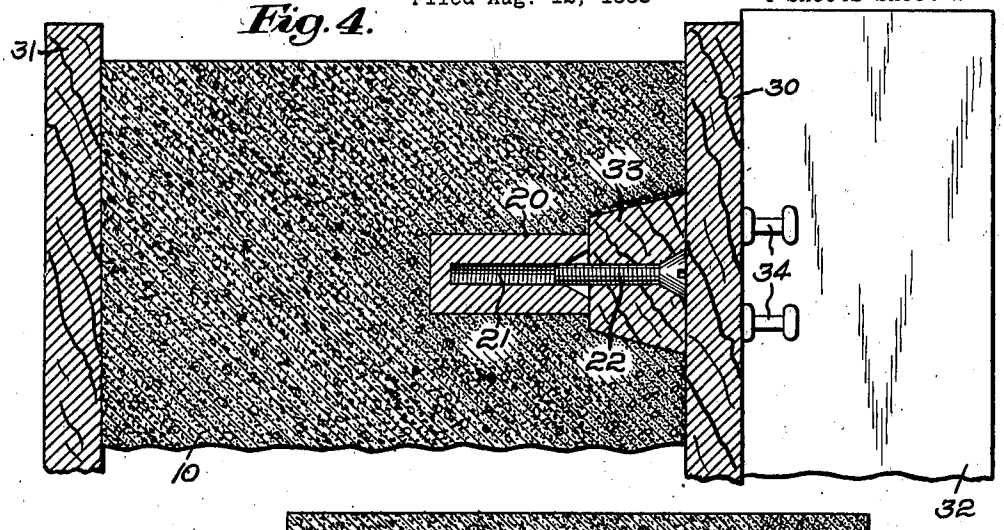


Fig. 5.

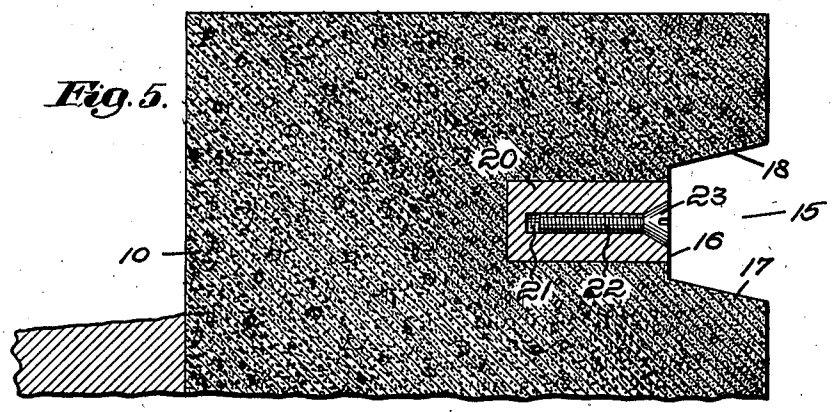
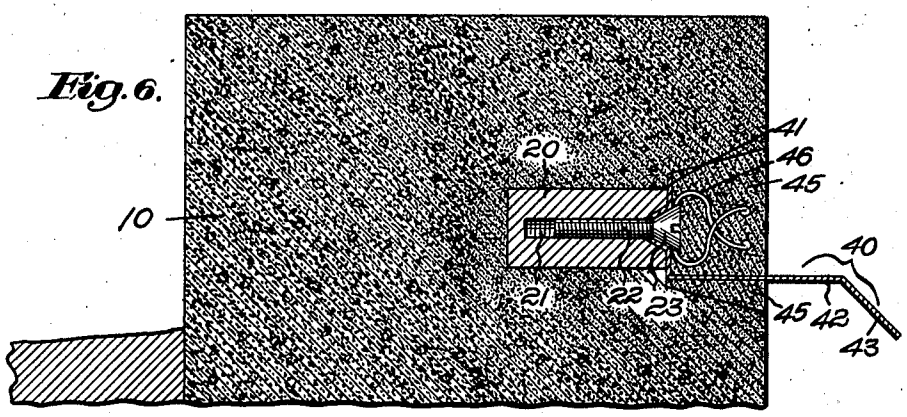


Fig. 6.



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INSECT INSULATION FOR FOUNDATION STRUCTURES

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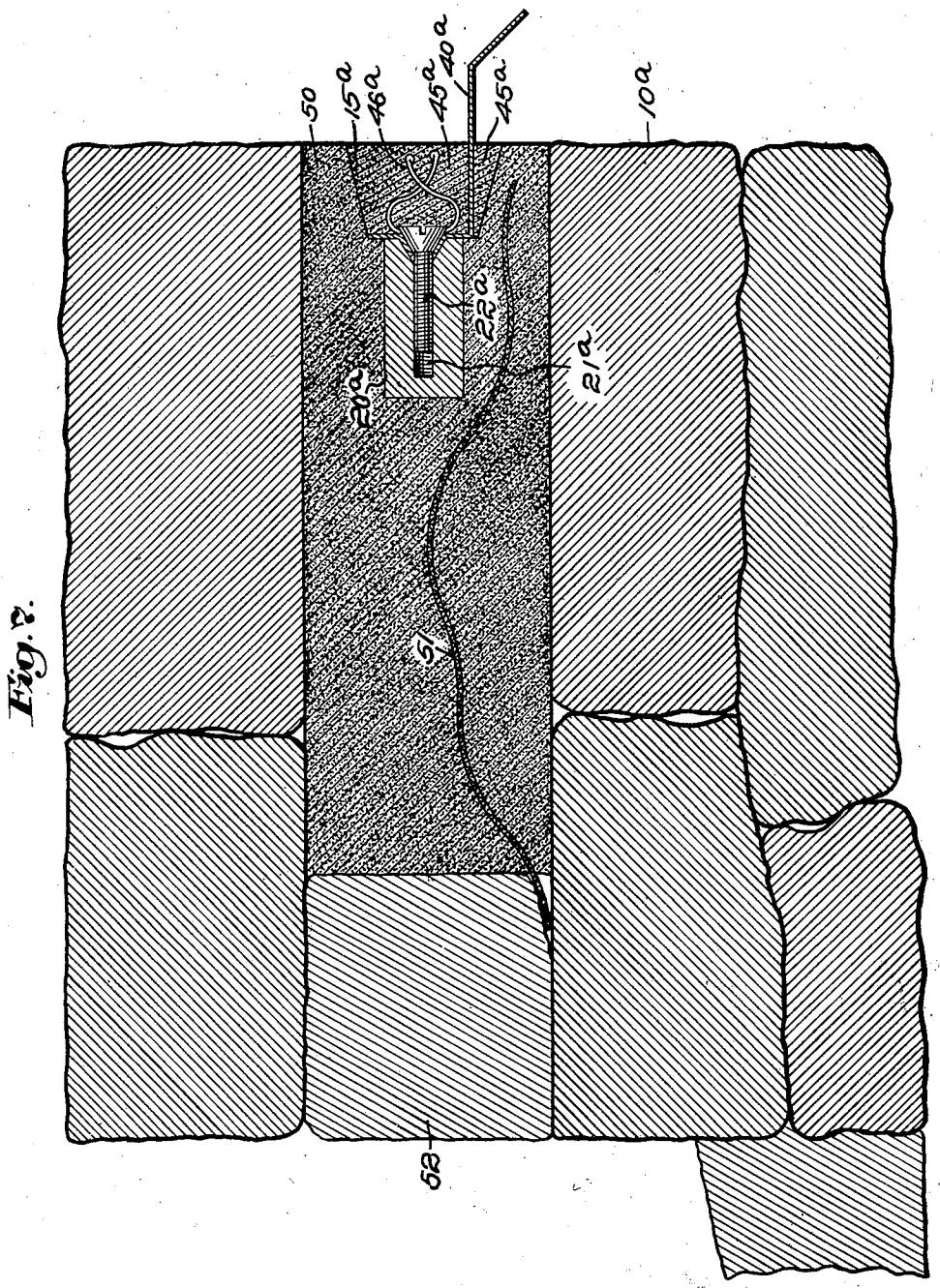


Fig. 2.

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INSECT INSULATION FOR FOUNDATION STRUCTURES

Filed Aug. 12, 1938 4 Sheets-Sheet 4

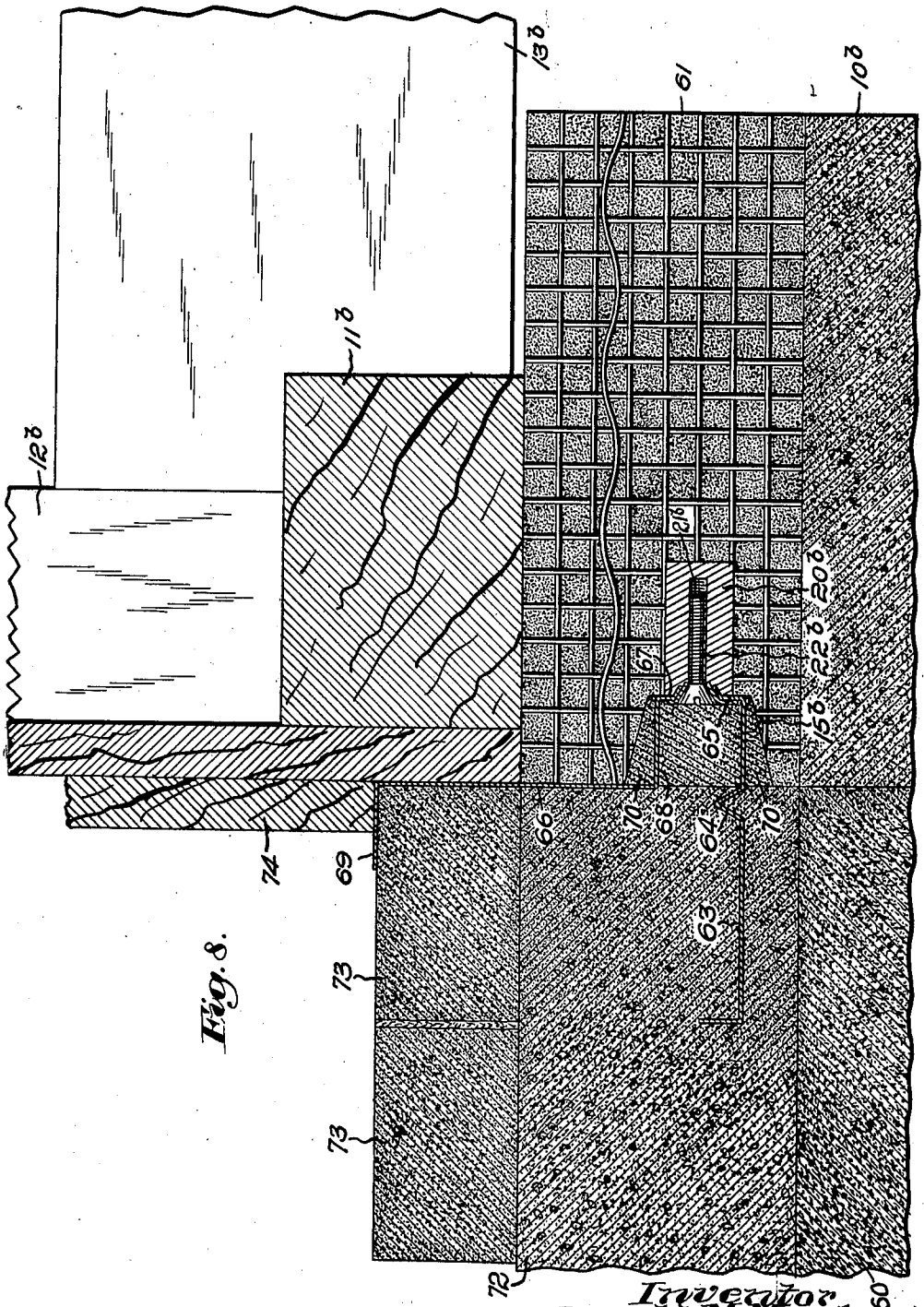


Fig. 8.

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UNITED STATES PATENT OFFICE

2,165,192

INSECT INSULATION FOR FOUNDATION STRUCTURES

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Application August 12, 1938, Serial No. 224,475

7 Claims. (Cl. 72—77)

My present invention relates to foundation and building construction. More particularly, it aims to provide improved protection for the wooden portions of buildings against invasion by termites or other crawling and boring insects which gain access from below.

Termites have always been prevalent in various parts of the United States, doing extensive damage. The amount of such damage appears to be increasing, and is becoming better recognized. In recent years the insects have been appearing further north, attacking buildings even in the more northerly localities, probably in part because the cellars and other parts of the buildings are kept warmer than formerly. Hence purchasers of and lenders on real estate are to an increasing extent requiring that the buildings be protected against termites and such insects. In certain States, for example, the HOLC and the FHA specify termite insulation in new construction.

The manner of protection as generally employed heretofore for new building has been to lay a sheet of metal completely across the foundation, allowing it to project out over any wall surface along which a termite tube is likely to be run. Such protection in a moderately priced house costing say from $8,000 to $10,000 involves a sheet metal contractor's job of approximately $150 and increases the costs of the general building contractor by say $50, totaling about $200. A similar house not originally equipped with termite insulation such as referred to would require the expenditure of roughly $750 to provide it with the same protection. Less satisfactory methods of protection might be resorted to, involving the use of chemicals, with somewhat less expense, but such form of protection is not sure and would not be lasting.

Throughout the United States, and especially in the more northerly latitudes, there is a large percentage of buildings not in fact attacked by termites, but it is not possible to tell with certainty which localities and which buildings may at some future time become infested. Hence if it were somehow possible originally to construct the building foundations inexpensively in such manner that adequate protection might later be incorporated, when invasion by termites is threatened or becomes an actuality, large economies would be effected.

Accordingly it is a main object of my present invention to provide that building foundations and associated basal parts of buidings may be initially prepared for later incorporation of adequate termite protection, at relatively small cost, and that similarly the protection or metallic shielding may originally be built in complete where such course seems advisable, either throughout the foundation or at those portions which afford the most likely points of entrance for termites or which are not readily accessible for the later installation of the protection, as for example the wall sections below porches, terraces and the like.

In the drawings illustrating by way of example various structural forms embodying the invention and by which the latter may be practiced,

Fig. 1 is a perspective view of a section of a foundation wall and immediately overlying wood parts of a building constructed in accordance with one form of the invention;

Fig. 2 is an enlarged detail view of a socket or receiver element and associated fastener member;

Fig. 3 shows in perspective a short length of the insect-impervious insulating strip or shield;

Figs. 4, 5 and 6 are sections of an upper portion of a foundation wall illustrating several stages in its construction, in accordance with one form of the invention, Fig. 4 representing an initial stage, Fig. 5 showing the wall with insulation receiving means installed and Fig. 6 illustrating the wall with incorporated insulation, whether applied as a final step of the initial construction or at some later time;

Fig. 7 is a view similar to Fig. 6 but illustrating an embodiment of the invention in connection with a masonry wall;

Fig. 8 shows further means, also illustrative of the invention, either for initial or for subsequent use, at wall sections adjoining a porch, terrace, approach steps or like locality at which the outside fill comes substantially to the top of the foundation wall.

Referring to the drawings in more particular, I have represented by way of example in Fig. 1 a foundation wall 10 embodying one form of the invention. The illustration shows a corner section of the wall, in this case of concrete. The wood members for the building are laid on the foundation in any preferred or usual manner, Fig. 1 showing for illustrative purposes portions of the sill 11, studding 12 and floor joists 13. The view is taken from within the building, looking at the inner face of the foundation.

In accordance with the invention I provide in the construction of the foundation, at the inner, the outer, or any face of the latter, sometimes at a plurality of faces, one or more substantially continuous channels or grooves 15 extending in a

direction across the likely path of travel of the insects. Such channel formation therefore generally runs in a horizontal direction, as represented. It extends into the wall for a depth adequate for the reception and retention of the insulating means to be described, such depth usually being approximately 1½ to 2½ inches. As shown the channel has an inner or substantially vertical wall **16**, an upwardly facing lower wall or shoulder **17** and an opposed downwardly facing or top wall **18**; see also Fig. 5.

The channel **15** is provided with means for readily fastening in place the metallic or other insect-impervious shield to be described. For this purpose there is distributed along the wall a series of fastener devices, spaced at suitable intervals, generally about 1 to 2 feet. These fastener means or devices includes separable male and female parts, one of which elements is fixed in the wall. While these elements may be subsequently installed, they preferably are built directly into the wall during its construction, being located with their outer ends flush with the vertical face **16** of the channel.

In the illustrated embodiment the individual fastening devices comprise receivers or blocks **20**, one of which is shown separately in Fig. 3. These blocks are formed with threaded sockets **21** adapted to receive the other principal part of the fastener device, in this case in the form of bolts **22** having beveled heads **23** substantially as indicated in Fig. 3. For cooperation with the bolts the socket members or receivers **20** have the mouths of their sockets correspondingly beveled, as at **24**, providing seats for the bolt heads and for crimping and sealing adjacent portions of the shield in a manner to be referred to in connection with the other figures. This construction for the fastening means as illustrated and described is found preferable to a reverse arrangement wherein the element set in the wall has a threaded male part adapted to receive a nut or like female part, but such reverse construction may be employed in some instances. The fastener elements desirably are metal, of a weather-resistant or non-corrosive character, so that they may stand in place unharmed by the weather or otherwise for long periods, perhaps years, in readiness for use whenever the need for completing the insect insulation arises.

One exemplary embodiment of a foundation or wall in accordance with my invention will now be described, with reference more particularly to Figs. 4 to 6 inclusive, as well as Figs. 1 to 3.

Forms for the reception of the wall material are provided in the usual manner, as represented at **30** and **31** in Fig. 4, these being held in position by uprights, one of which is seen at **32**. At the inner face of the form for the face or faces of the wall which are to have the shield-anchoring construction I provide a wood strip or sleeper joist **33**, of a cross sectional size and shape corresponding to that desired for the channel formation. In the illustrated example the top and bottom faces of this strip are inwardly beveled, to form a like-shaped channel from which the sleeper joist is subsequently easily removed. A strip having major cross dimensions of about 1 x 1¾ inches has been found satisfactory in actual practice, but these dimensions as well as the shape may be varied to suit the particular circumstances.

The sleeper joist or strip **33** is apertured at suitable intervals to receive the projecting threaded members or bolts **22** of the fastening means, the apertures in the strip being countersunk to receive the beveled bolt heads **23**. The bolts **22** are inserted in the strip prior to fixing the latter to the form and are of adequate length to project through and beyond the strip. For convenience in holding the screws in place during attachment of the strip to the form the socket elements **20** of the fastener means may first be applied to the projecting ends of the bolts, or this may be done after attachment of the strip if preferred.

The strip or strips **33** with the inserted bolts **22** are fastened to the forms in a readily removable manner, as by the double-headed form nails **34**. The socketed members **20** are then applied to the projecting ends of the bolts, if not so mounted before attaching the strip **33** to the form **30**.

The forms are then in readiness for the fabrication of the wall, by the pouring of the concrete in the case of a concrete wall such as illustrated in Figs. 1 to 6. The wall is continued upwardly so as to embed the fastener devices and the channel-forming strips in the wall material, and is finished off at the desired level above the fastening channel. When the concrete has set, or the wall has otherwise been completed, the strip holding nails **34** are withdrawn, and the forms knocked down. The bolts **22** are then backed out and the channel-forming strip is extracted, leaving the desired channeling formation, with the fastener elements or receivers **20** set fast in the wall, at the back of the channel. If the insulation proper is not to be installed at this initial or building stage, the bolts desirably are re-inserted and turned down into the sockets of the corresponding receivers **20**, protecting the latter and excluding dirt. It will be understood that the desired channel at any external face of the foundation or wall may be produced otherwise than in the manner described in connection with Figs. 1 to 6, the method there illustrated being but one convenient manner of effecting the channel formation.

Referring now to Figs. 2 and 5, the insulation proper includes a metal or other shield **40** composed of insect-impervious material such as a strip of sheet-metal of substantially the shape and arrangement illustrated and preferably of a non-corrosive material such as copper, Monel or other alloy. This metal shield element comprises an inner flange or anchoring portion **41** of a formation allowing it to be received flatwise against the back face **16** of the channel **15**. Extending from, generally angularly or perpendicularly to, this securing flange is a substantially horizontal portion **42** of a width sufficient to extend outwardly through the channel and beyond the wall for a distance of about an inch or more, that is, to any such extent and at such angle that termites will not tube past it. Along the outer edge portion of this projecting flange is an outer flange **43** turned at an angle of approximately 45° relative to the horizontal flange, downwardly in the illustrated example, and having a width of approximately 1 to 2 inches. The outer edge of this outer angular flange **43** presents a thin eave like projecting edge. This probably works better when flat and angular, even sharp edged. What is desired is an edge past which it is difficult or impossible for the termites to gain admission to the structure above through their shelter tubes, the construction of which is a feature of their operation.

As previously indicated, this shield may be in-

stalled at the outset, when the building is originally constructed. This is determined by the local conditions. At some points, such as beneath terraces, porches or steps, such initial installation is advisable in any case, and in certain sections of the country complete initial insulation of the building may be the best practice. But in a large percentage of the total building construction throughout the country as a whole the placing of the shield may be postponed until actual need arises. In any of these various examples the basic procedure in accordance with my invention is the same, and may be carried out as follows, to give one convenient example:

The shield strip **40**, which may be supplied in any convenient lengths, is provided with apertures **44** along its upright securing flange **41**, spaced to correspond to the positioning of the fastening means **20**, **22**. This aperturing may conveniently be done at the site of the particular job, as by puncturing or drilling, or standard apertured strips may be supplied. The anchoring portion of the shield strip **40** is inserted into the receiving channel **15** of the wall and there fixed by inserting and turning down the bolts **22**.

As will be noted particularly with reference to Fig. 6, in thus attaching the shield the metal or other material thereof immediately around the bolt apertures is crimped or forced inwardly into the beveled mouths or seats **24** in the receivers or blocks **20** as the bolts are turned home. This provides a tight homogeneous or metal-to-metal seal for the bolt apertures, proof against entrance of termites or the like at such point. This sealing action, due to the described beveled or tapered construction for the bolt heads and their seats in the fastener blocks also makes it unnecessary to match the apertures in the shield to the position of the fasteners with extreme accuracy, while still insuring a complete circumferential metal dam about the bolts.

The sealing and anchoring of the metal or other shield is then completed by at least partially filling the channel with cement, mortar, grouting or the like **45**. The complete installation is represented in Fig. 6. To assist in bonding this filling in place, so that it becomes essentially an integral part of the wall itself, I desirably employ reinforcing or tying means in the channel such as small rods, wires, mesh or the like. In the example illustrated in Fig. 6 one or more wires **46** are first placed in the channel, where they are looped under the heads of the bolts **22** and twisted, bent or otherwise manipulated to anchor them in position, substantially in the manner shown. The filling material forced and firmly packed into the channel is thus securely bonded by the described reinforcing. As clearly seen in the selected example of Fig. 6 this material, preferably concrete in the instance of a concrete wall, completely fills the channel **15** both above and below the shield and affords a further seal of concrete-to-concrete, within the wall itself and of substantial extent, desirably to a minimum of about 2 inches, in addition to the joint between the concrete and the shield strip.

It will be understood that the cementitious or other grouting or like material **45** need not occupy the entire available space in the channel, the thing desired being a substantially homogeneous or sealing bond along a longitudinal area of the wall material and at least partly in the channel, that is, within the confines of the wall or foundation itself, and so as to block insect passage between the inserted portion of the shielding strip and the adjacent material of the channel. By homogeneous, as applied to the formation referred to, I mean that the material or materials, whatever it or they may be, are alike to the extent that they will cohere in themselves or with each other without likelihood of leaving spaces or passages accessible for insects such as termites. And in this connection the terms concrete, cementitious, grouting or the like are intended as including any available material that will bond or cohere in the fashion just stated.

As previously explained the provisions for attachment of the shield, or the original complete installation of the latter, may and in most cases will be at the interior face of the wall, but in various instances to suit local requirements similar provisions may be made at the exterior face, or at both faces, the securing channel being correspondingly located at the inner, upper or outer face of the wall.

Referring now to Fig. 7, I have there illustrated the invention in connection with a masonry foundation, shown as of the stone type. Parts corresponding to those already described in connection with the previous figures are indicated by similar reference numerals with the exponent *a*. As in the case of a concrete wall, the insulating means may be incorporated at the interior face, as here shown, the exterior face, or both, the shield-receiving channel being disposed at any face portion of the wall so as to present the projecting barrier portion at the desired location.

As some distance below the sill level, generally about one foot, the masonry of the wall **10***a* is leveled off. At this leveled portion I then provide a special course **50** of grouting or the like of a solid character free of cracks and crevices. This may be formed by a cement of a fairly rich mixture. In preparation for laying this course forms are provided, having a channeling strip appropriately located at the inner face of the interior or exterior form as the case may be, this strip temporarily supporting the fastener elements **20***a*, **22***a* similarly as already described. The material of this solid course **50** desirably is reinforced by metal mesh, screening or the like such as represented at **51**. With this reinforcement and the shield fastening means in place this special course **50** is poured or otherwise emplaced, the forms and channeling strip subsequently being removed.

If the shield is not to be initially installed, the bolts **22***a* are replaced in the receivers **20***a*, leaving the channel **15***a* and the described fastener elements in readiness for reception of the shield at such later time as the need arises. In Fig. 7 I have represented the insulation as having been completed, whether at the time of erecting the wall or later. The shield **40***a*, which may be the same as in the previous figures, is anchored in place by the bolts **22***a*, with the same crimp sealing action as referred to. The reinforcing or tie means **46***a* is secured beneath the bolt heads and the channel **15***a* is pocked and filled with a concrete or the like, providing the concrete-to-concrete or concrete-to-cement seal within the structure of the wall itself similarly as in connection with the concrete structure of Figs. 1 to 6.

The special course **50** may be carried completely across the wall, and is so extended in cases where the shielding means is to be incorporated either additionally or alternatively at the exterior face of the wall. If the exterior does not require shielding and it is desired to leave the outer wall

face uniform, for the sake of appearance, the course 50 may be terminated somewhat short of the outside of the wall and completed at the outer face with the stone or other masonry material harmonizing with the wall as a whole, as indicated at 52. The wall is carried on above the special course 50 to bring it to the desired level for the reception of the sill or other wood members of the building.

Turning now to Fig. 8, I have there illustrated a further embodiment of the invention, with particular reference to the portion of a foundation adjoining a terrace, a brick or stone porch, or the like. Here again parts corresponding to those already described are indicated by the same numerals but having the exponent *b*.

The main foundation wall is seen at 10*b* and the outside porch or terrace foundation wall at 60. At the upper portion of said main wall 10*b* is a channeled course 61. This may be the integral top section of the wall as a whole, where the latter is of concrete or may be a finishing course of cement, grout or mortar on the main wall where the latter is of stone or other masonry work. The fastener receivers or socket elements 20*b* may be cast into this top course 61 in the manner already described by way of example or they may be otherwise installed.

In this rather special case the shielding is somewhat more extensive and is constructed and arranged to extend not only horizontally from but also above the anchoring channel 15*b*. The shield may be made up from a single strip shaped to the cross sectional form substantially as illustrated, or a plurality of separate strips may be employed, two being shown in this instance. These include a lower shield strip 63 having an expansion rib or like formation 64 and an attaching flange 65, and an upper strip indicated as a whole by the numeral 66. Said upper shield in the illustrated instance includes an attaching flange 67, and a horizontal portion 68 extending outwardly through the channel 15*b*. Its main portion extends vertically upward and terminates in a lateral flange 69. These shield elements are fastened in place by the anchor bolts 22*b*, the latter affording the similar crimping and sealing for the bolt apertures as previously described.

Following or attendant on attachment of the shield element as a whole the channel 15*b* is sealed adjacent the shield with cement or mortar 70 as in the previous instances.

The lower shield 63, which may have its outer edge portion turned substantially as represented in Fig. 8, is subsequently embedded in the concrete slab 72 which bears on the stone or concrete foundation 60. The wood members for the building are placed on the foundation in the usual manner, a sill 11*b*, stud 12*b* and floor joist 13*b* being represented in Fig. 8 by way of example. On the concrete slab 72 the brick, tiling or other material for the floor of the porch or terrace is applied, as indicated at 73. The terminal portion 69 of the upper shield 66 is bent down upon this flooring after the latter has been supplied, the clapboards or shingles 74 then being installed above it.

It will be noted that the described shielding means is so located that it effectively blocks the path of insects approaching from below, whether upwardly along the main wall 10*b*, or along or through the porch or terrace foundation wall 60, or at the level between the latter and the porch or terrace flooring 73. The shield is securely bonded and tied in place, and is insured again distortion or tearing in case of expansion or co traction between the concrete slab 72 and t course 61 of the main foundation wall, by mea of the V-shaped expansion rib.

From the foregoing it will be evident that m invention provides for the insertion and incorp ration of an insect-impervious shield in t foundation walls of buildings, whether the found dations be of concrete, stone, brick or oth masonry. In accordance with the invention suc incorporation is a planned and integral part c the foundation construction. The insulation i and of itself may be completed whenever desir able or necessary, either originally, when th foundation is built, or at some subsequent time The construction is such that the shield is i effect cast or built into and sealed in the wal itself substantially as an integral portion there of, whether at the time of or after erection of th foundation.

The term concrete as used in the specificatio or claims hereof is intended in its broad sens of a mass of united matter which is plastic a some stage, and this term is not employed merely in its more specific sense of an artificial ston composed of sand, stone and cement. Similarly also the term cement herein has its broad connotation of any composition or material which in one condition such as temperature or degree of moisture is plastic and in another is tenacious; hence the term cement does not have merely its more spicific meaning of the materials commonly known as Portland cement and natural rock cement.

A primary feature of the invention, as above explained, is the novel formation of an outwardly open elongated recess or channel in and along a foundation surface to be shielded, the channel being so constructed and arranged, when the wall is built or subsequently, as to adapt it for the anchoring reception of a like-extensive shield. Other novel features include the separable fasteners adapted to be cast or otherwise set in or adjacent a face of the channel or which are qualified mechanically to seal their receiving apertures in a shield, and the reinforced or plain concrete or like filling of the channeled zone.

The insulation incorporated as herein disclosed requires no external or other asphaltic or similar seal subject to deterioration from weather effects, since there is no possibility of cracks occurring in the metal-to-metal and concrete-to-concrete or other homogeneous sealing means of my invention. Nor does it necessitate the use of chemicals or posionous or toxic preparations intended to repel or destroy the insects. The numerous other advantages flowing from my invention, including particularly the low cost of installation, whether contemporaneous with or subsequent to the original erection of the foundation, will readily be apparent.

It will be understood that my invention, either as to means or method is not limited to the exemplary embodiments or steps herein illustrated or described, and I set forth its scope in my following claims.

I claim:

1. In building construction, in combination, a foundation wall having at a location to be shielded at least an external horizontal portion formed of concrete, an outwardly open horizontal channel formed continuously in an external face of said concrete portion, a strip element of mate-

l impervious to termites, said strip element be- ; coextensive with said channel and including inner anchoring section and an outer barrier :tion, said channel and the anchoring section the strip element being mutually proportioned d arranged for the supporting reception of said :tion within the channel in such manner as leave a horizontally continuous area of a con- ete face of the channel paralleling the flange the anchoring section uncovered by the ma- rial of the strip element, fastening means se- ring the anchoring section to the wall within e channel, sealing means composed of cemen- ious material applied uninterruptedly along the nchoring section of the strip element, directly on said horizontally continuous concrete area ithin the channel and homogeneously bonding ith said area to provide a positive termite bar- er between said anchoring section and the ad- cent concrete of the channel, and said outer arrier section of the strip being disposed to roject freely out from the channel and beyond ie face of the wall to such extent and at such ngle thereto that termites will not tube past it.

2. In building construction, in combination, foundation having at a face thereof which is be shielded against upward passage of insects t least a course portion formed of concrete, aid concrete portion having formed continuous- y along an external face an outwardly open sub- tantially horizontal channel, a metallic shield- ng strip having one longitudinal side portion nserted into and anchored in said channel in uch manner as to leave accessible a longitudinal rea of concrete within the channel and imme- liately along said inserted strip portion, con- crete-forming means applied to the concrete of aid area within the channel and providing a concrete-to-concrete bond sealing the inserted trip portion against passage by insects between it and the concrete of the channel, and said shielding strip having its other longitudinal side portion projecting outwardly from the channel and standing clear beyond the face of the foun- dation adequately to block upward passage of insects across it externally of the channel.

3. A termite-proof foundation structure com- prising, in combination, a foundation at least a course portion of which is formed of concrete, a horizontally extensive channel in said con- crete portion, a longitudinally extensive metal strip having along one longitudinal portion an attaching formation of a width less than the combined widths of the top and back faces of the channel, said attaching formation being in- serted in the channel, fastening means for se- curing said formation to the foundation within the channel, said strip including also a longitu- dinally coextensive outer section projecting lat- erally outwardly from and substantially beyond the channel and foundation so as to stand clear of the latter, and means applied directly to and bonding with the concrete of a face of the chan- nel continuously along the inserted portion of the strip to form a lasting homogeneous struc- tural seal therefor within the confines of the foundation itself.

4. A termite-proof foundation structure com- prising, in combination, a foundation at least a course portion of which at the region to be pro- tected is formed of concrete, a horizontal chan- nel in an external face of said concrete portion, a barrier strip of a width substantially greater than the depth of the channel, said strip hav- ing one longitudinal section inserted and an- chored in the channel and its opposite longitu- dinal section projecting out from the channel and freely beyond the foundation, and cooper- ating barring means disposed along said inserted strip section within the confines of the channel, said means composed of a material forming a homogeneous bond with a concrete surface por- tion of the channel.

5. In building construction, in combination, a concrete foundation, a horizontally extensive channel at a face of the foundation to be blocked against traversing by insects, fastening means carried in the concrete of the foundation at in- tervals along the channel and extending in- wardly from it, said means comprising a plu- rality of pairs of separable male and female elements, one element having an annular recess, and the other a like-formed part adapted to enter the recess, and a longitudinally extensive metal strip having an attaching portion received in the channel and having apertures receiving the male elements of said fastening means, said strip having its material peripherally of said ap- ertures forced into said annular recesses of the recessed elements by the application thereto of the other elements so as to form a metallic seal for the apertures in the shield.

6. In building construction, in combination, a foundation, a horizontally extensive channel at a face of the foundation to be blocked against traversing by insects, a multiplicity of separable fastening devices distributed along the channel, each device comprising a base element set into the material of the foundation and a cooperat- ing detachable element, one element having a male part and the other a corresponding female part, a longitudinally extensive metal strip hav- ing an attaching flange inserted in the channel, said flange having apertures through which the male parts of said fastening devices extend, said flange being received between the base elements and the detachable elements of said devices and having its apertures metallically sealed thereby, and filling means in the channel further anchor- ing the metal strip and sealing the channeled zone.

7. Means for damming foundations against the passage of insects along surfaces thereof, said means comprising an elongated strip of sheet metal including an erect attaching flange, an intermediate portion and an angularly ex- tending edge remote from the attaching flange, spaced apertures distributed along said attach- ing flange, and attaching devices for said strip, each comprising a base element to be fixed in a wall and a cooperating detachable element, one element having a portion receivable through the apertures of said attaching flange and the other being receivable by said portion at the opposite face of the flange, and other cooperating forma- tions on said elements of the attaching devices adapted to upset and seal the metal of the strip peripherally of said apertures.

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