COMMONWEALTH OF AUSTRALIA

Patents Act 1952

APPLICATION FOR A STANDARD PATENT OR A STANDARD PATENT OF ADDITION

I/we... KINGSWOOD HOMES PTY. LIMITED

of 563 Ford Road, ROCHEDEALE 4127

Insert title (54) hereby apply for the grant of a ☑ standard patent for an invention entitled

MODULAR ROOF TRUSSES

which is described in the accompanying complete specification.

The actual inventor(s) of the said invention is/are KINGSWOOD HOMES PTY. LIMITED

My/our address for service is 563 Ford Road, ROCHEDEALE 4127

My/our address for service of notices in Australia

THESE SECTIONS ARE ONLY TO BE COMPLETED WHERE APPLICABLE:

(ONLY TO BE USED IN THE CASE OF A CONVENTION APPLICATION)

Details of basic application(s) -

Number of basic application

Name of Convention country in which basic application was filed

Date of basic application

(ONLY TO BE USED IN THE CASE OF A FURTHER APPLICATION MADE BY VIRTUE OF SECTION 51)

Number of original application

Person by whom made

(ONLY TO BE USED IN THE CASE OF AN APPLICATION FOR A PATENT OF ADDITION)

I request that the patent may be granted as a patent of addition to the patent applied for on


In the name of

I request that the term of the patent of addition be the same as that for the main invention or so much of the term of the patent for the main invention as is unexpired.

Dated this fifth day of August 1989

TO

THE COMMISSIONER OF PATENTS

This form must be accompanied by either a provisional specification (Form 9 and true copy) or by a complete specification (Form 10 and true copy).
COMMONWEALTH OF AUSTRALIA
PATENTS ACT 1952

APPLICATION FOR A STANDARD PATENT

I/We, KINGSWOOD HOMES PTY. LIMITED a Company incorporated under the Laws of the Australian Capital Territory having its registered office at C/- Gallens Solicitors, Marcus Clark Building, Canberra, 2601, Commonwealth of Australia, hereby apply for the grant of a standard patent for an invention entitled:

MODULAR ROOF TRUSSES

which is described in the accompanying provisional specification.

The address for service is:-
G.R.- Cullen & Co.,
79 Eagle Street,
Brisbane, Queensland, 4000,
Australia.

DATED this 19th day of August, 1988

KINGSWOOD HOMES PTY. LIMITED

By:

Registered Patent Attorney

TO: THE COMMISSIONER OF PATENTS
AUSTRALIA.
DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT

In support of the Application made by KINGSWOOD HOMES PTY. LIMITED

for a patent for an invention entitled MODULAR ROOF TRUSSES

I, RODNEY BRYCE GROCOTT

of 563 Ford Road, ROCHDALE 4127

do solemnly and sincerely declare as follows:-

1. I am the applicant for the patent.

   (or, in the case of an application by a body corporate)

   1. I am authorized by KINGSWOOD HOMES PTY. LIMITED

      the applicant for the patent to make this declaration on its behalf.

2. I am the actual inventor of the invention.

   (or, where a person other than the inventor is the applicant)

   2. of is the actual inventor of the invention and the

      facts upon which I am entitled to make the application are as follows:-

      Board of Director decision to lodge patent

      .

Declared at Brisbane this eighth day of August 1989.

(Signature of Declarant)

TO:

THE COMMISSIONER OF PATENTS.

(IMPORTANT - Cross out inapplicable words in the above Form.)
INVENTION FOR A PATENT

FOR A PATENT

P/00/007

MTON

FOR A PATENT

PTY. LIMITED

on its behalf.

inventor of the invention and the

application are as follows:

August

1989

(Signature of Declarant)
1. a method of fabricating metal roof trusses for use in building construction comprising:

(a) the combination of a bottom chord, two top chords and a plurality of webs said top and bottom chords being in the form of elongate rectangular profile members each having a lengthwise extending opening defined by opposite vertical walls and having a plurality of slots formed along the length thereof, said webs each being in the form of an elongate channel profile member having tongue elements on each end, the construction and arrangement being such that one end of each web extends into the opening in the top chord and the other end of each web extends into the opening in the bottom chord so that the combination of webs and chords forms a conventional triangulated roof truss configuration, said web being retained in position by virtue of the tongues on each end thereof extending through said slots in said chords,

(b) the opening in the chords will have a cross-sectional dimension, that is, a width extending transversely of the longitudinally extending direction of the chord,
which is sufficient to accommodate the floor of the web channel section when inserted therein in a substantially frictional fit,

(c) the opening in each chord is preferably in the form of a longitudinal aperture which extends from one end of the chord to the other end, said aperture will generally be located mid-way between the opposite edges of the chord so as to provide a symmetrical opening, said opening being defined by upstanding walls, said upstanding walls also provide side support for the web, said walls preferably include lips so as to provide additional rigidity to the chord structure and thereby give greater support for the web,

(d) the slots in the chord are preferably positioned at pre-set separations along the section of the chord which is opposite the longitudinal aperture, said slots are dimensioned so as to comfortably accommodate the tongues formed on the ends of the web, said slots will be of substantially the same width as the thickness of the material from which the web is fabricated;

2. A method of assembly on site of a metal roof truss comprising the steps of:

(a) placing the bottom chord on an appropriate support,

(b) inserting the webs into the bottom chord and passing the tongue elements through the slots in the base section of the bottom chord,

(c) if necessary, fixing the tongue elements to the bottom chord,

(d) placing the two top chords over the free ends of the webs and passing the tongue elements on said free ends through the slots in the base sections of the top
chords,

(e) if necessary, fixing the tongue elements on said free ends to the top chord,

5. A method of securing a metal roof purlin to top chord of metal trusses by way of:

(a) a purlin member consisting of a longitudinal channel section having longitudinal side flanges extending outwards from ends of the channel flanges, said side flanges parallel to web of the channel, said side flanges having tabs formed in the faces of both side flanges comprising portions which have been cut out of the side flanges and bent away from the plane of the said side flanges,

(b) attaching a purlin member to top chord of a metal truss by inserting tabs through matching slots in the base of the truss top chord, said tabs bent to engage the inside face of the truss top chord base to ensure a tight rigid joint.
Complete Specification for the Invention entitled: MODULAR ROOF TRUSSES

The following statement is a full description of this invention, including the best method of performing it known to me:

* Note: The description is to be typed in double spacing, pica type face, in an area not exceeding 250 mm in depth and 180 mm in width, on tough white paper of good quality and it is to be inserted inside this form.
This invention is described in the following statement:
THIS INVENTION relates to building elements and is particularly concerned with modular roof trusses.

Trusses are roof structures framed together in single units to carry the loads. They comprise a number of interrelating triangles formed in a single plane. Because of their flat configuration, they are generally put together on a flat surface prior to erection. They are particularly adapted to off-site fabrication and numerous specialist building suppliers produce roof trusses in bulk for the housing industry.

The main problem with such bulk produced trusses however, is the problem of transportation from the point of manufacture to the building site. Because roof spans can be quite large, with correspondingly wide trusses being required, large transportation vehicles are required. There is also the problem of off-loading on site and manipulating the truss in position.

In an attempt to overcome this problem, various knock-down roof trusses have been developed. These generally comprised a package of webs and chords with a whole host of fixtures for assembling the trusses on site. Thus, for instance, and range of different sized bolts and nuts, gang nail plates, brackets and so forth were required. The disadvantage of these trusses was the large number of fixtures which could easily be overlooked or lost. As a consequence, building delays could be expected.

It is therefore an objective of the present invention
to provide a modular roof truss which obviates or at least minimises the aforementioned disadvantages.

According to the present invention there is provided a modular roof truss comprising the combination of a bottom chord, two top chords and a plurality of webs, said top and bottom chords being in the form of elongate rectangular profile members each having a lengthwise extending opening defined by opposed vertical walls and having a plurality of slots formed along the length thereof; said webs each being in the form of an elongate channel profile member having tongue elements on each end; the construction and arrangement being such that one end of each web extends into the opening in the top chord and the other end of each web extends into the opening of the bottom chord so that the combination of webs and chords forms a conventional triangulated roof truss configuration, said web being retained in position by virtue of the tongues on each end thereof extending through said slots in said chords.

The components of the roof truss are preferably fabricated from roll formed sheet metal such as structural grade sheet steel. The sheet steel is pressed to form the appropriately shaped section for the chord and web thereby providing an economical manner of production. The chords and webs may thus be manufactured on a substantially continuous basis without the need for additional componentry.

The top and bottom chords are preferably the same profile for obvious reasons of economy, however it is not
absolutely necessary that this be so provided that they have the structural characteristics referred to above. The opening in the chords will have a cross-sectional dimension, that is, a width extending transversely of the longitudinally extending direction of the chord, which is sufficient to snugly accommodate the floor of the web channel section when inserted therein. By "snugly" is meant that the web is accommodated in a substantially frictional fit.

The opening in each chord is preferably in the form of a longitudinal aperture which extends from one end of the chord to the other end. The aperture will generally be located mid-way between the opposite edges of the chord so as to provide a symmetrical opening. Upstanding walls define the opening and also provide side support for the web.

The walls preferably include lips so as to provide additional rigidity to the chord structure and thereby give greater support for the web.

The slots in the chord are preferably positioned at pre-set separations along the base section of the chord. By "base section" is meant that section of the chord which is opposite the longitudinal aperture. The slots are dimensioned so as to comfortably accommodate the tongues formed on the ends of the web. To this end, the slots will generally be of substantially the same width as the thickness of the material from which the web is fabricated. However, this will naturally depend on the exact shape and configur-
ation of the tongues. Thus for tongues which include rectangular single hinge sided press-out flaps, the slots will be of correspondingly greater width than the thickness of the web material.

The number and arrangement of slots for any one web may vary from one upwards. If there is one slot per web, it will generally be arranged to extend across the base section of the chord. If there are two, they will generally be arranged to extend parallel to the longitudinally extending direction of the chord. For three slots, the arrangement will generally be a combination of the former two arrangements.

This later arrangement is by far the most preferred as it enables a particularly rigid inter-locking system to be produced.

The web will preferably have a rectangular profile channel section with the flanges of the web being of a sufficient width to provide flexural rigidity to the web. The tongues on each end of the web may simply comprise extended sections of the web base and/or the web flanges. In this case, the tongues will usually be rectangular in shape and of substantially the same width as the base or flanges of the web.

Since the tongue is an important feature in determining the locking together of the structural componentry, it may assume different shapes and configurations in different types and sizes of trusses. One particularly useful alterna-
tive comprises a rectangular extension with a metal flap which temporarily deforms as the tongue is inserted through the receiving slot in the chord, and once through, the slot springs back to its original configuration, thereby preventing removal from the slot and additionally acting to retain the web tightly against the chord.

In practice, truss chords and webs are manufactured in continuous lengths and stored off-site. When an order is placed for a truss of a particular size, the chords and webs are cut to the desired lengths and tongue elements are formed in the ends of the webs. The chords and webs are then bundled up and taken to the site in a compact package. At the site, the truss is assembled either on a flat surface or in-situ. The steps of assembly comprise:

1. Placing the bottom chord on an appropriate support;
2. Inserting the webs into the bottom chord and passing the tongue elements through the slots in the base section of the bottom chord;
3. If necessary, fixing the tongue elements to the bottom chord;
4. Placing the two top chords over the free ends of the webs and passing the tongue elements on said free ends through the slots in the base sections of the top chords; and
5. If necessary, fixing the said tongue elements on said free ends to the said top chord.

Preferred embodiments of the invention will now be
described with reference to the accompanying drawings, in which:

Figure 1 is a partial isometric view of a section of a roof truss according to the present invention;

Figure 2 is a partial isometric view of an end of a web;

Figure 3 is a partial isometric view of an end of another web;

Figure 4 is a partial isometric view of a section of roof truss according to the present invention with a purlin fixed thereto; and

Referring to Figure 1, there is illustrated all the essential components of the roof truss, viz a top chord 10, a bottom chord 11 and a web 12.

The top and bottom chords have identical profiles comprising a rectangular portion 13, 14 with an opening 15, 16 defined by vertical walls 17a, 17b, 18a, 18b. Lips 19a, 19b and 20a, 20b are formed along the vertical walls for the purpose of providing additional rigidity and strength to the chords. A plurality of slots 21, 22 are formed in the base section of the chords at pre-determined separations. The chords are manufactured from roll formed structural grade sheet steel which has been press-formed into the shape depicted.

The web 12 is a rectangular channel section with opposite ends 23, 24 angled to conform with the desired degree of slope of the top chord 11. The degree of slope of the
top chord is, in turn, dependant upon the span that the roof truss is to bridge. The ends of the web are further characterised by rectangular shaped tongues, only one of which, viz 25, is depicted. Each tongue comprises an extended portion of the web base and is formed by cutting it away from the side flanges at the end of the web. As is shown in the drawing, the tongues extend through a slot in the top and bottom chords, and are bent against the outer surface of the chords to retain the web in a locked configuration with respect to the chords.

The web 12 has a cross-sectional dimension which enables it to snugly fit within the vertical walls 17a, 17b, 18a, 18b of the top and bottom chords and thereby resist sideways flexing. The chord is manufactured from structural grade steel section.

It will be readily appreciated that a roof truss can be easily assembled on site by merely laying the chords out and connecting them with webs, all of which have been pre-cut to the required lengths; the step of connecting merely involving bending the tongues of the webs against the outer surfaces of the chords.

Referring to Figures 2 and 3, there is depicted two alternative tongue arrangements on the end of the web. In Figure 2, the tongue arrangement comprises three rectangular elements 30, 31, 32 extending in the same plane as the flanges and base portions of the web. The arrangement naturally requires a complementary set of slots in each of the
top and bottom chords. The advantage of this arrangement is that it provides greater rigidity to the joint and prevents the flanges of the web from flexing.

In Figure 3, the tongue arrangement comprises a rectangular hinged press-out flap 40 in a conventional tongue extension 41 of the type previously described. The hinge line 42 is sufficiently flexible to enable the press-out flap 40 to bend inwardly towards its opening 43 as the tongue is inserted through the slot in the chord. When the press-out flap 40 has passed through the slot, it will then spring back open to the original orientation depicted in the drawing and thereby prevent removal of the web from the chord. In addition, the edge 44 of the flap will tend to bear against the outer surface of the chord to give a tight and secure interlocking arrangement.

Figure 4 shows how a purlin 50 may be fitted to the top chord 51 of a roof truss constructed in accordance with the present invention. In this instance, the top chord has the same features as described above in connection with Figure 1. The purlin 50 consists of a channel section member having side flanges 52, 53. Tabs 54 are formed at 900mm centres in the flanges. These tabs comprise portions which have been cut out of the flanges and bent away from the plane of the flanges. They are dimensioned similarly to the slots 55 in the chord and are adapted to fit therein for the purpose of securing the purlin in place. The tabs may be further bent against the inner surface of the chord.
when in situ to ensure a tight, rigid joint.

A completed roof truss is assembled using the steps as described. The truss comprises two top chords a bottom chord and support webs. The various elements are connected together in the manner described in relation to Figure 1.

The ends of the truss are additionally secured by metal clamps when necessary to comply with various wind loadings.

It can be seen from the foregoing that an uncomplicated roof truss system is provided which has the advantages of being able to be assembled on site and being able to be packaged for easy transportation.

Whilst the above has been given by way of illustrative example of the invention, many modifications and variations may be made thereto by persons skilled in the art without departing from the broad scope and ambit of the invention as herein set forth.
The claims defining this invention are as follows:

1. A method of fabricating metal roof trusses for use in building construction comprising:

   (a) the combination of a bottom chord, two top chords and a plurality of webs said top and bottom chords being in the form of elongate rectangular profile members each having a lengthwise extending opening defined by opposite vertical walls and having a plurality of slots formed along the length thereof, said webs each being in the form of an elongate channel profile member having tongue elements on each end, the construction and arrangement being such that one end of each web extends into the opening in the top chord and the other end of each web extends into the opening in the bottom chord so that the combination of webs and chords forms a conventional triangulated roof truss configuration, said web being retained in position by virtue of the tongues on each end thereof extending through said slots in said chords.

   (b) the opening in the chords will have a cross-sectional dimension, that is, a width extending transversely of the longitudinally extending direction of the chord, which is sufficient to accommodate the floor of the web channel section when inserted therein in a substantially frictional fit.

   (c) the opening in each chord is preferably in the form of a longitudinal aperture which extends from one end of the chord to the other end, said aperture will
generally be located mid-way between the opposite edges of the chord so as to provide a symmetrical opening, said opening being defined by upstanding walls, said upstanding walls also provide side support for the web, said walls preferably include lips so as to provide additional rigidity to the chord structure and thereby give greater support for the web,

(d) the slots in the chord are preferably positioned at pre-set separations along the section of the chord which is opposite the longitudinal aperture, said slots are dimensioned so as to comfortably accommodate the tongues formed on the ends of the web, said slots will be of substantially the same width as the thickness of the material from which the web is fabricated;

2. A method of assembly on site of a metal roof truss comprising the steps of:

(a) placing the bottom chord on an appropriate support,

(b) inserting the webs into the bottom chord and passing the tongue elements through the slots in the base section of the bottom chord,

(c) if necessary, fixing the tongue elements to the bottom chord,

(d) placing the two top chords over the free ends of the webs and passing the tongue elements on said free ends through the slots in the base sections of the top chords,

(e) if necessary, fixing the tongue elements on said
free ends to the top chord,

3. A method as claimed in claims 1 and 2 in which said web members are attached to said chord members by way of;

(a) a tongue arrangement extending from both ends of said web members, said tongue arrangement comprises three rectangular elements extending in the same plane as the flanges and base portions of the web, said arrangement matching a complementary set of slots in each of the top and bottom chords,

(b) said tongue elements inserted through matching slots in base of top and bottom chord members, said tongue elements bent to engage the external face of top and bottom chord bases.

4. A method as claimed in claims 1 and 2 in which said web members and attached to said chord members by way of;

(a) a tongue arrangement comprising a rectangular hinged press out flap in a conventional tongue extension said hinge line is sufficiently flexible to enable the press out flap to bend inwardly towards its opening as the tongue is inserted through the matching slot in the base of the top and bottom chord members, said press out flap will then spring back open to the original orientation when the press-out flap has passed through the matching slot in the base of the top and bottom chords, so as to prevent removal of the web from the chord,

(b) the edge of the flap is arranged to bear against the outer surface of the chord members in its inserted
position so as to give a tight and secure interlocking arrangement.

5. A method of securing a metal roof purlin to top chord of metal trusses by way of;

   (a) a purlin member consisting of a longitudinal channel section having longitudinal side flanges extending outwards from ends of the channel flanges, said side flanges parallel to web of the channel, said side flanges having tabs formed in the faces of both side flanges comprising portions which have been cut out of the side flanges and bent away from the plane of the said side flanges,

   (b) attaching a purlin member to top chord of a metal truss by inserting tabs through matching slots in the base of the truss top chord, said tabs bent to engage the inside face of the truss top chord base to ensure a tight rigid joint.

6. A method as claimed in claims 1 to 5 in which tabs are used to secure the various components together.

7. A method as claimed in claims 1 to 5 substantially as herein described with reference to the accompanying drawings.

8. Channel members for use in constructing on-site a metal roof truss substantially as illustrated in the accompanying drawings and substantially as hereinbefore described by reference thereto.

9. A roof truss for use in constructing a house or other building substantially as illustrated in the accompanying
drawings and substantially as hereinbefore described by reference thereto.

Signed the eighth day of August, 1989

KINGSWOOD HOMES PTY. LIMITED

RODNEY BRYCE GROCOTT
DIRECTOR