

A Lintel

Background and Field

5 The invention relates to a lintel.

A typical channel lintel comprises a horizontal base with upright side legs along both sides of the horizontal base. Masonry being supported sits within the channel i.e. between the side legs and on the horizontal base. However, such
10 an arrangement is structurally not efficient.

Thus, it is desirable to provide a lintel which addresses at least one of the disadvantages of the prior art and/or to provide the public with a useful choice.

15 Summary

In a first aspect, there is provided a lintel for spanning across an opening defined by support structures, the lintel comprising an elongate lintel body including an elongate base member; side legs extending from the elongate
20 base to define an elongate channel therebetween; a load bearing element projecting from at least one of the side legs for supporting masonry elements; end portions at ends of the lintel body for engaging with the support structures, and a plurality of protrusions disposed at least at the end portions .

25 The described embodiment is able to strengthen the lintel in view of the protrusions. Further, the load bearing element is able to support masonry elements and thus, no masonry is needed to fill up the channel leading to material savings.

30 Preferably, the protrusions may be spaced apart from each other and disposed along the lintel body's length. Some of the plurality of protrusions may be disposed on the base member and the others on the side legs.

Preferably, each of the protrusions may be elongate and may have a protrusion longitudinal axis which traverses a longitudinal axis of the lintel body. Advantageously, each of the protrusions may be arranged to face inwardly towards the channel.

5

Preferably, the load bearing element may include lip members projecting from respective edges of the side legs and along the longitudinal axis of the channel, with the lip members arranged to support the masonry elements.

- 10 The lintel may include a plurality of perforations and the plurality of perforations may be interleaved with respective ones of the plurality of protrusions. The perforations may be circular or other shapes.

- Other aspects may relate to a method of making the lintel of the first aspect (for
15 example, making the protrusions of the lintel by embossing) or constructing a masonry wall using the lintel of the first aspect.

It should be appreciated that features relevant to one aspect may also be relevant to the other aspects.

20

Brief Description of the Drawings

- 25 Exemplary embodiments will now be described with reference to the accompanying drawings, in which:

Figure 1 is a simplified view of a lintel spanning an opening according to a first embodiment;

- 30 Figure 2 is an closed up perspective view of part A of Figure 1 to show a section of the lintel more closely;

Figure 3 is perspective view of the section of the lintel of Figure 2 without showing the masonry;

Figure 4 is a cross-sectional view of the lintel of Figure 3 in a direction B-B, and

Figure 5 is a partial sectional view of the lintel of Figure 3 in a direction C.

5 Detailed Description of Preferred Embodiment

Figure 1 show a lintel 100 according to a preferred embodiment for spanning an opening 200. The lintel 100 has end portions 102,104 which are supported by support structures 202,204 defining the opening 200. As it can be appreciated,
10 the lintel 100 is arranged to bear load 206 above the opening 200 and in this embodiment, the load 206 and the support structures 202,204 are formed from masonry such as bricks, concrete units, building stones etc.

Figure 2 is a closed up view of part A of Figure 1 to show a section of the lintel
15 100 more closely and Figure 3 is a perspective view of the section of Figure 2 without showing the support structures. Figure 4 is a cross-sectional view of the lintel of Figure 3 in the direction B-B, whereas Figure 5 is a partial sectional view of the lintel 100 in the direction C of Figure 3.

20 The lintel 100 is normally prefabricated and preferably made of steel or other metal. The lintel 100 comprises an elongate lintel body 106 having a longitudinal axis 108 which spans the opening 200 and the lintel body 106 includes an elongate base member 110 which is generally flat. The lintel body 106 further includes side legs 112,114 projecting uprightly along respective
25 sides of the base member 110 to define a generally U-shaped channel 116 (see Figure 4).

The lintel 100 further includes a load bearing element for supporting masonry and the load bearing element is arranged to project from at least one of the side
30 legs 112,114. In this embodiment, the load bearing element includes lip members 118,120 projecting inwardly and toward each other at approximately right angles to the side legs 112,114. Each of the opposing lip members 118,120 has a width 'W' of about 10mm.

The lintel 100 further comprises a plurality of protrusions 122 arranged to strengthen or reinforce the structural strength of the lintel body 106. The protrusions 122 are formed on the lintel body 106 and regularly spaced along the longitudinal axis 108 of the lintel body 106 and centre-to-centre distance between adjacent protrusions is about 30mm. The protrusions 122 are formed on the base member 100 as well as the side legs 112,114 to form sets of protrusions with each set 122a having one protrusion 122 on each of the base member 100 and side legs 112,114 aligned along a common plane.

10

Each protrusion 122 is elongate, has a finite strip of length and a longitudinal protrusion axis 124 and in this embodiment, the protrusions 122 are arranged such that the longitudinal protrusion axis 124 traverses the length or longitudinal axis 108 of the lintel body 106. The protrusion 122 has a protrusion width 'Pw' of about 8mm (see Figure 5) with end radius of about 4mm to form the semi-circular ends. As shown in Figures 4 and 5, the protrusions 122 are formed inwardly facing the channel 116, preferably by embossing to create the concave indentation of about 1 or 2mm depth. Needless to say, other dimensions are possible.

20

The lintel body 106 further includes a series of perforations and in this embodiment, the perforations are circular apertures 126 arranged as rows and interleaved between the plurality of elongate perforations. Each row has two circular apertures 126 on each of the base member 110 and the side legs 112,114. These circular apertures 126 are arranged to receive mortar to allow greater bonding between the lintel 100 and sand-cement plaster finish applied to the lintel 100.

In use, the lintel 100 is arranged to span the opening 200 as shown in Figure 1. However, instead of masonry arranged within the channel 116, the masonry (or load) 206 rests on the lip members 118,120 and thus, the lip members 118,120 are arranged to support the weight of the load 206 on top of the lintel 100. The load 206 acting on the lip members 118,120 is progressively transferred to the

30

support structures 202,204 via the lintel body 106 (via the side legs 112,114 and the base member 110) and the ends 102,104 of the lintel body.

It has been found that the presence of protrusions 122 strengthens the base member 110 and the side legs 112,114 to reduce the possibility of the base member 110 warping and/or the side legs 112,114 bowing or bending due to the load at the base member 110 in contact with the support structures 202,204 and this results in a more efficient load transfer. The use of the protrusions 122 also obviates a need to increase the thickness of the lintel 100 or fabrication material stress grade in order to address these failure modes and thus, a more economical use of materials may be achieved.

Indeed, the protrusions 122 enable the lintel 100 to support more load, especially in situations with narrower openings 200 (and thus, the lintel 100 would be correspondingly shorter).

With the lintel 100 supporting the load 206 at the lip members 118,120 (and not within the channel 116), this offers further advantages:

- i) indirect savings in weight and use of (or less use of) masonry since no masonry needs to be used within the channel 116; and
- ii) plaster as thin as 3mm (eg. skim coat situations) may be used for the masonry units. This is not possible with conventional channel lintels because side legs of such lintels would be located outside of the masonry.

25

The lip members 118,120 may increase the load capacity of the lintel 100. For example, the stiffness of a 60mm by 60mm (i.e. width and height) lintel 100 with the 10mm lip members 118,120 is about 30% greater than a similarly sized lintel with no lip members.

30

As explained above, the protrusions 122 on the side legs 112,114 helps to increase the load capacity for shorter spans, and also help in plaster keying or bonding. The protrusions 122 may not be as superior as the perforations 126

(since the protrusions 122 are “blind holes” and not through holes) which allow more mortar to penetrate and bond better but the protrusions still helps in the bonding process since mortar can fill (outside of) the protrusions 122.

5 The described embodiment should not be construed as limitative. For example, in the described embodiment, the protrusions 122 are shaped as elongate finite strips but other shapes are envisaged. Further, the protrusions 122 are arranged with their longitudinal protrusion axis 124 running across the width of the base member 110 and up the side legs 112,114 to obtain maximum benefit,
10 but the protrusions 122 may be arranged in other orientations or directions, such as parallel to the length or longitudinal axis 108 of the lintel body 106, although this is not preferred.

In the described embodiment, the protrusions 122 are spaced from each other
15 and are disposed along the entire length of the lintel body 106 for ease of manufacturing. This is also beneficial since the amount of end portions 102,104 of the lintel 100 which bear or rest on the support structures 202,204 is usually determined on site, based on the length of the lintel and the opening 200 etc. However, it is envisaged that the protrusions 122 need only be formed at or
20 near the end portions 102,104 of lintel body 106 which rest on the support structures 202,204 to achieve the advantage of load transfer efficiency and thus, the protrusions 122 may not be formed throughout the entire length of the lintel body 106. Likewise, while it is preferred to form the protrusions 122 at both the side legs 112,114, this may not be necessary, and in certain applications,
25 the protrusions 122 may only be formed on just one of the side legs 122,144 or not on the side legs 122,144 and just at the base member 110.

In the described embodiment, the protrusions 122 are formed to face inwardly toward the channel 116 but it is envisaged that the protrusions 122 may face
30 outwardly i.e. away from the channel 116.

The lip member's 118,120 shape and dimensions may change. For example, while the described embodiment illustrates continuous lip members 118,120

extending along the length of the lintel body which makes manufacturing easier, it is envisaged that the lip members 118,120 may include a series of discrete members spaced from each other. The dimension of the lip members 118,120 may vary depending on size of the lintel 100 and application. There is no
5 specific limit on the lip member dimensions but if the lip members 118,120 are too small, the effect and benefit may be limited, whereas if the lip members 118,120 are too large, the load transfer may not be efficient. Indeed, it has been found that the width W of the lip members 118,120 may be varied as a function of the steel thickness and size of side legs 112,114 in order to achieve a
10 particular load transfer efficiency. For example, for 10mm wide lip members 118,120 may be useful for thickness of about 1mm of the lintel body 106 to achieve optimum load transfer efficiency.

The lip members 118,120 project towards each other in the described
15 embodiment, but it is envisaged that the lip members 118,120 may face outwards and away from each other.

The lintel 100 of the described embodiment includes the generally U-shaped channel 116 but the shape of the channel 116 may vary. Indeed, it is envisaged
20 that aspects of the described embodiment may also be used for a "box lintel" where the load bearing element may occlude the channel 116. For example, the load bearing element may project from one edge of one of the side legs 112,114 and extend across to the other side leg 112,114 to create a box-like lintel where load would still rest on the load bearing element.

25

Having now fully described the invention, it should be apparent to one of ordinary skill in the art that many modifications can be made hereto without departing from the scope as claimed.

CLAIMS

1. A lintel for spanning across an opening defined by support structures, the lintel comprising
 - 5 an elongate lintel body including
 - (i) an elongate base member;
 - (ii) side legs extending from the elongate base to define an elongate channel therebetween;
 - (iii) a load bearing element projecting from at least one of the side legs for supporting masonry elements;
 - 10 (iv) end portions at ends of the lintel body for engaging with the support structures, and
 - (v) a plurality of protrusions disposed at least at the end portions; wherein the load bearing element includes lip members projecting inwardly from respective edges of the side legs and along the longitudinal axis of the channel, the lip members being spaced apart from each other to define a lintel opening for the elongate channel and arranged to support the masonry elements; and
 - 15 wherein, in use, the masonry elements are placed on the lip members without structural infill material being used within the elongate channel.
2. A lintel according to claim 1, wherein the protrusions are spaced apart from each other and disposed along the lintel body's length.
- 25 3. A lintel according to claim 1 or 2, wherein some of the plurality of protrusions are disposed on the base member and the others on the side legs.
4. A lintel according to any preceding claim, wherein each of the protrusions is elongate and has a protrusion longitudinal axis which traverses a longitudinal axis of the lintel body.
- 30

5. A lintel according to any preceding claim, wherein each of the protrusions are arranged to face inwardly towards the channel.
6. A lintel according to any preceding claim further comprising a plurality of perforations.
7. A lintel according to claim 6, wherein the plurality of perforations are interleaved with respective ones of the plurality of protrusions.
8. A lintel according to claim 6 or 7, wherein the perforations are circular.