

(12)

**EUROPEAN PATENT APPLICATION**

(21) Application number: 86309200.3

(51) Int. Cl.<sup>4</sup>: **E 04 G 25/02**

(22) Date of filing: 25.11.86

(30) Priority: 24.12.85 GB 8531751

(43) Date of publication of application:  
01.07.87 Bulletin 87/27

(84) Designated Contracting States:  
BE FR GB IT LU NL

(71) Applicant: **Mabey Hire Company Limited**  
**Floral Mile Twyford**  
**Reading, RG10 9SQ(GB)**

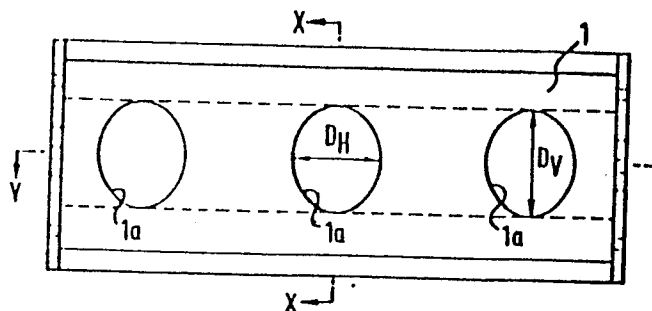
(72) Inventor: **Collins, John**  
**14 Mayflower Road Park Street**  
**St. Albans Herts, AL2 2QR(GB)**

(74) Representative: **Lee, Philip Graham et al,**  
**MARKS & CLERK 57/60 Lincoln's Inn Fields**  
**London WC2A 3LS(GB)**

**(54) Improved steel soldier.**

(57) A steel soldier for supporting concrete formwork comprises a pair of elongated steel elements connected back to back and parallel with one another by tie plates (3) at their ends and, if necessary, by diaphragms intermediate their ends. Each channel has a web (1) which, in order to increase its strength, is formed at longitudinally spaced intervals with

flanged openings (1a). These openings characteristically according to the invention have peripheral flanges (1c) which are of channel-shaped radial profile, thereby increasing the shear carrying capacity and reducing the risk of cracking of the soldier under load.



**FIG. 1.**

"IMPROVED STEEL SOLDIER"

This invention relates to an improved steel soldier for supporting concrete formwork and represents an improvement or modification of the steel soldiers which have been disclosed in British Patent Specifications  
5 1551154 and 2145145.

Those soldiers are of a kind which comprise a pair of elongated steel elements, which may be of channel section, connected back to back and parallel with one another. Each element has a web which, in order to  
10 minimise weight, has openings spaced at regular intervals along its length. To increase the stability of these webs the openings have peripheral lips otherwise known, and hereinafter referred to, as flanges. Further the flanges of the respective web may  
15 be flared as appropriate in opposite directions.

The present invention has been devised with the general object of providing a soldier which has an increased shear and bearing load carrying capacity, above that of a flange which is turned through 90°.

20 In accordance with the invention therefore a soldier of the kind referred to above is characterised in that the flanges which are formed peripherally around the openings in the webs are of channel-shaped radial

profile. Further and preferably the flanges of the respective webs face in opposite directions preferably with the channels facing one other.

These modifications have the effect of  
5 redistributing the more highly strained fibres of the flange to an area which is less harmful under the normal loading condition.

The invention is hereafter described in more detail by reference to the accompanying drawings in which:-

10 Fig. 1 is a side elevation of the improved soldier;

Fig. 2 is a cross-section on line X-X of Fig. 1;

Fig. 3 is a cross-section on line Y-Y of Fig. 1;

Fig. 4 is an end elevation of the soldier shown in Figs. 1 to 3;

15 Fig. 5(a) and (b) are enlarged scale detail views of new and old peripheral flange profiles; and

Fig. 6 is a diagram to illustrate the effect of the newly proposed flange profile.

Referring firstly to Figs. 1 to 4 the soldier  
20 therein shown comprises a pair of beam elements each comprising a folded steel plate having a flat web 1 formed with elliptical openings  $1a$  along its length. Three such openings are shown although there may be more depending upon the overall length of the soldier. In  
25 each instance however dimension  $D_h$  may be less than dimension  $D_v$  (as illustrated) or greater than or equal

thereto. The web 1 is laterally extended so as to enter and give support to a pair of hollow profile chord plates 2 of somewhat channel-shaped configuration which are attached to the web by welding at locations a and b along the web edge and one web face. The complete soldier is comprised of two beam elements as above described mounted in parallel opposite facing spaced relation and connected at their ends by rectangular tie plates 3. Also depending upon their length they may be connected intermediate their ends by one or more diaphragms (not shown).

Hitherto, as shown in Fig. 5b the openings 1a in the webs have been formed at their peripheries with lips or flanges 1b which have a simple arcuate profile but in accordance with the invention the peripheral portions of the openings are formed with lips or flanges 1c of U-shaped profile as shown in Figs. 3 and 5(a).

In each of Figs. 5(a) and 5(b) the dashed lines indicate the mode of elastic settlement of the newly devised flanges 1c and the previous flanges 1b under the same applied load  $P_2$ . In Fig. 5(a)  $e_1$  represents the lateral distance between the planes of the points of application of the load  $P_2$  whilst in Fig. 5(b)  $e_2$  represents the equivalent distance for the previously used arcuate flange configuration.

From Figs. 5a and 5b it should readily be understandable that under resilient settlement the value

of  $e_2$  increases to a greater extent than that of  $e_1$  with the same loading. This causes lack of dispersal of load around the flange opening resulting in an increase in the rate of settlement with respect to load.

5 Otherwise expressed, because fibre stresses are proportional to  $e_1$  and  $e_2$  it is therefore desirable to utilise a configuration which results in  $e_1$  having a minimum value.

10 Fig. 6 diagrammatically represents the distribution of loads in the region of a web opening  $1a$  of the improved soldier when a bearing tube is supported therein and sheds a load in the direction indicated by arrows P. Due to the lesser value of  $e_1$  compared to  $e_2$  the channel shaped flange profile acts more as a  
15 hoop. This enables components  $R_c$  of reaction R, R, to be carried within the circumference of the flange section, thus reducing the stress intensity.

It is to be understood that whilst there has been described a soldier having web openings of elliptical  
20 shape, these openings may be of circular, substantially rectangular or any other appropriate shape as may be desired provided that the peripheral flanges have the required channel-section profile.

## WE CLAIM:

1. A steel soldier of the kind referred to, characterised in that flanges (1c) which are formed peripherally around openings (1a) in the webs (1) are of channel-shaped radial profile.
- 5 2. A steel soldier as claimed in Claim 1 in which the flanges (1c) of the respective webs (1) face in opposite directions.
3. A steel soldier as claimed in Claim 2 in which the channels formed by the flanges (1c) face towards each  
10 other.

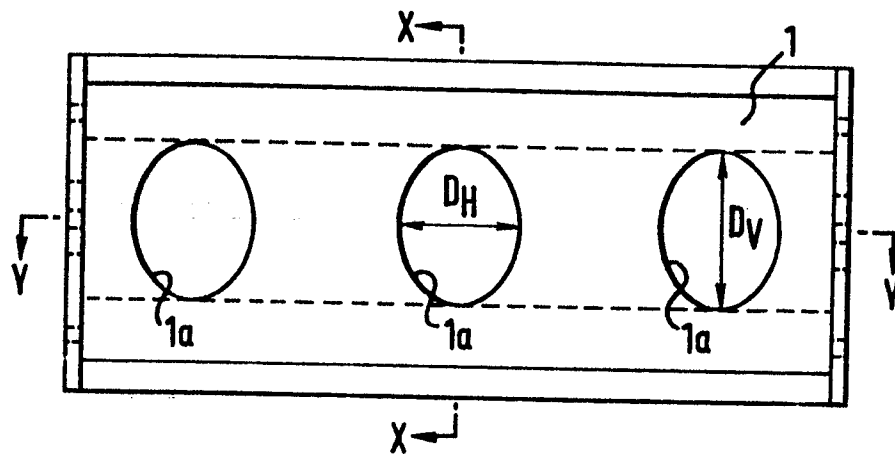


FIG. 1.

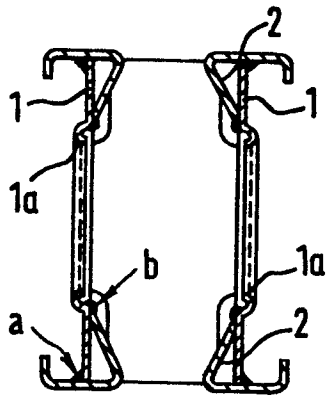


FIG. 2.

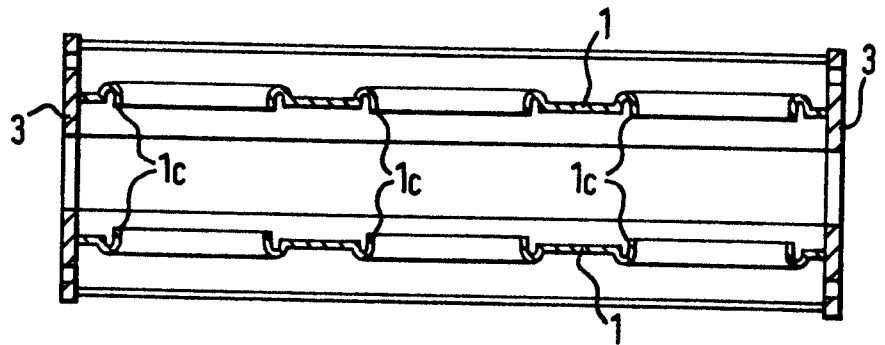


FIG. 3.

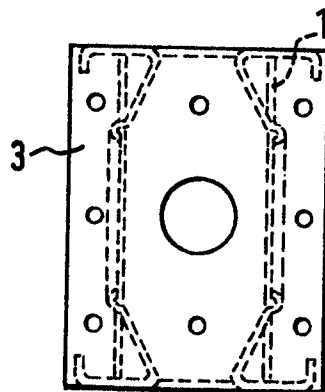


FIG. 4.



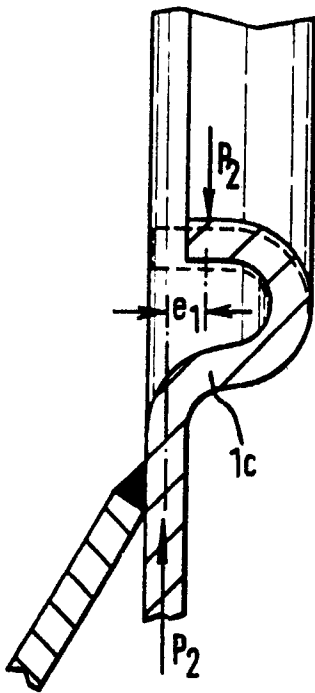


FIG. 5a.

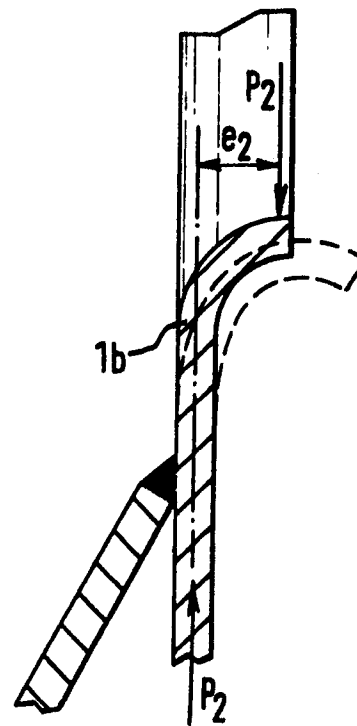


FIG. 5b.

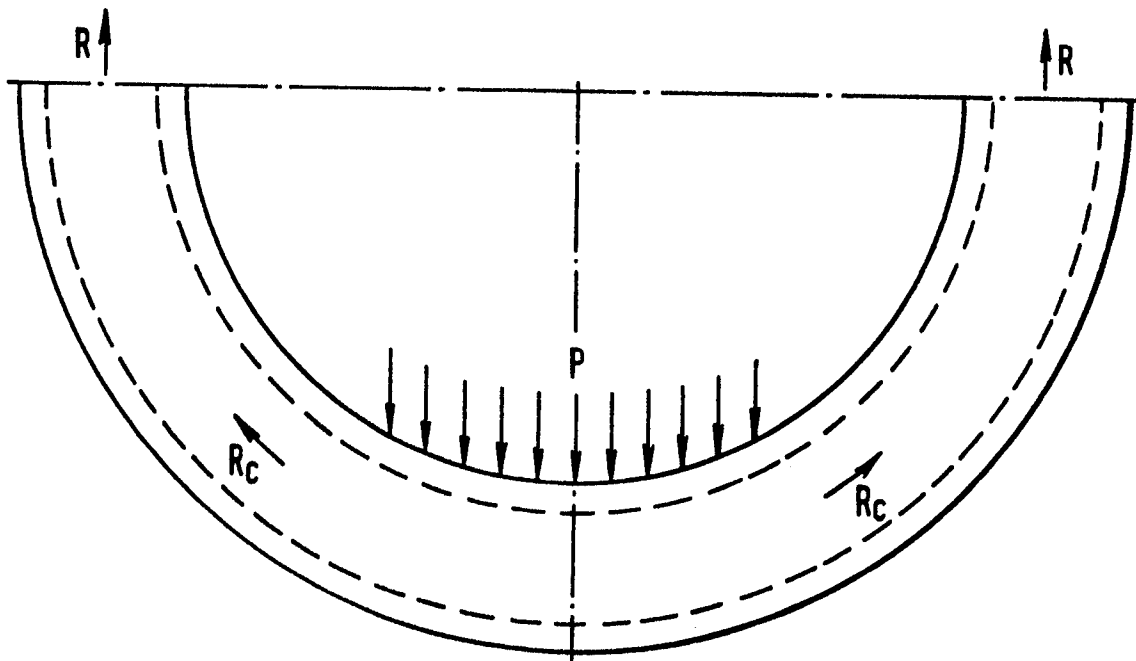


FIG. 6.