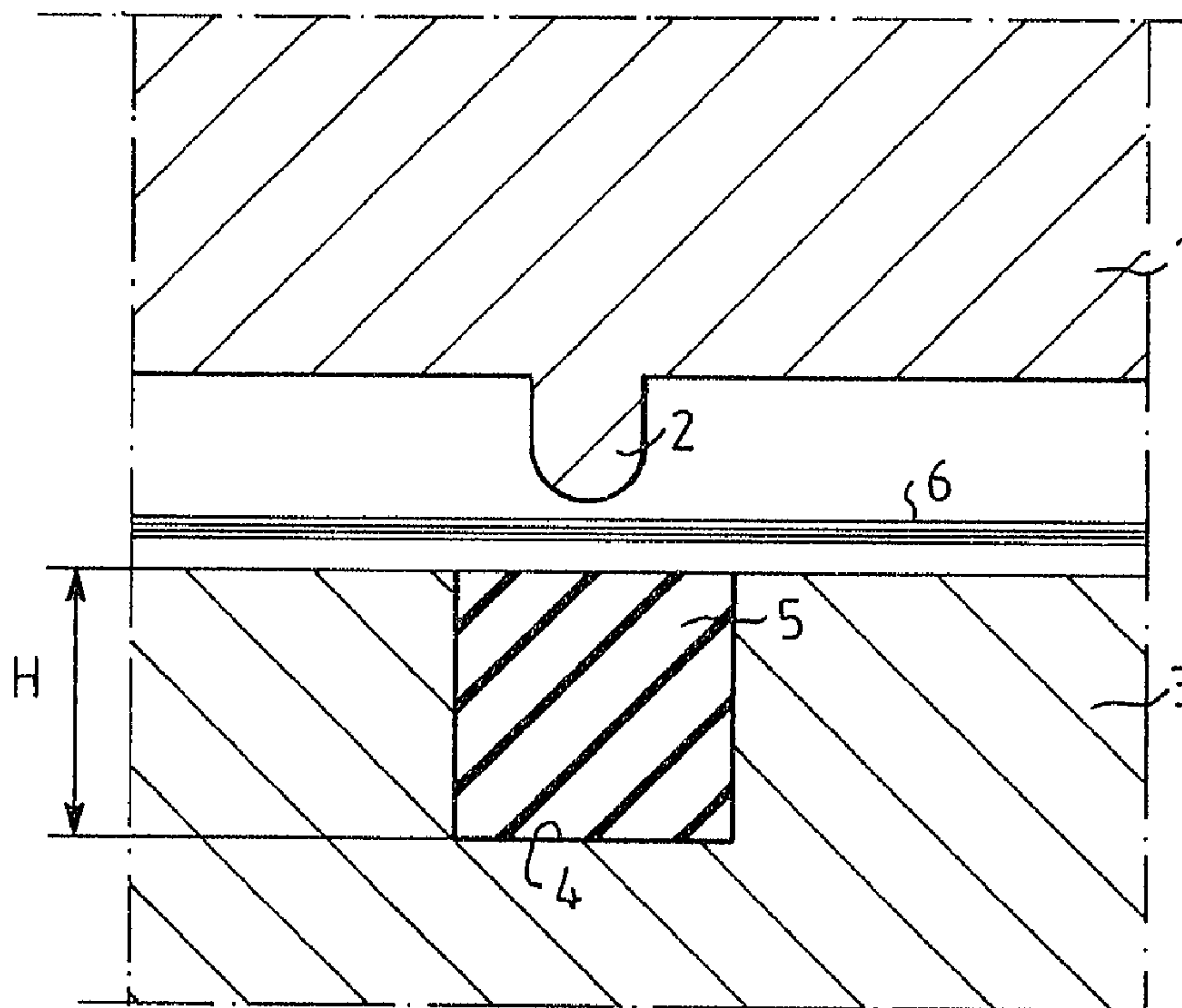




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 (54) Title: CREASING APPARATUS



(57) Abrégé/Abstract:

The present invention relates to a creasing apparatus with a male part (1) with bars (2) and a cooperating female part (3) with grooves (4). Profiles (5) of an elastic material are inlaid in the grooves (4) of the female part (3). The profiles (5) are pretensioned and locked in their grooves (4) by means of T-shaped end pieces (9).

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**ABSTRACT OF THE DISCLOSURE**

The present invention relates to a creasing apparatus with a male part (1) with bars (2) and a cooperating female part (3) with grooves (4). Profiles (5) of an elastic material are inlaid in the grooves (4) of the female part (3). The profiles (5) are pretensioned and locked in their grooves (4) by means of T-shaped end pieces (9).

## CREASING APPARATUS

This present invention relates to machines for folding and forming packaging containers such as boxes and cartons, and more particularly relates to an apparatus  
5 for forming creases in board or cardboard laminate packaging materials.

The invention particularly relates to a creasing apparatus consisting of a male part provided with bars and a female part corresponding to the male part and provided with grooves.  
10

Packaging materials for liquid packages consisting of board or cardboard laminated with thermoplastic and possibly aluminum foil are normally provided with fold lines, so-called crease lines which are made when the packaging material is in web form. These crease lines are made using creasing tools which normally consist  
15 of a male part with bars and a corresponding female part provided with grooves. In conventional creasing, these tools are made of metal, with or without a surface coating. The crease line is made in that the material passes between the male and female parts of the creasing tool and, when both of the tool parts are forced towards one another, the packaging material is broken between the parts so that crease lines  
20 occur.

Since the packaging material is forced between the two metal parts of the tool, the material is exposed to quite large stresses and, instead of forming a distinct crease line, the tool may bring about the creation of two folding or crease lines, and  
25 may also cause the packaging material in the process to be partly delaminated and thereby weakened. Trials have been carried out in which the entire female part of the tool has been provided with a rubber coating, but because of tensions in the rubber, it has not been possible in this manner to obtain perfect creases. Similarly, it is difficult in this case to obtain a pitch stroke which is constant throughout. The  
30 pitch stroke is the packaging length which must always be uniform in order to ensure that all packages have the same volume and size.

One object of the present invention is to devise a creasing apparatus which may execute distinct crease lines without weakening the material. In addition, the  
35 creasing apparatus must be relatively economical to manufacture.

A further object of the present invention is that the creasing apparatus be easy to install at various settings, and require few or no adjustments.

40 These and other objects have been attained according to the present invention in that the creasing apparatus of the type described by way of introduction has been given the characterizing feature that profiles of elastic material are inlaid in the grooves of the female part.

More specifically, in accordance with this invention such a creasing apparatus comprises a male part provided with one or more bars, and a female part corresponding to the male part, the female part having a surface and being provided with one or more grooves formed in the surface and adapted to receive the bars. One or more elastic material elements are inlaid in the grooves of the female part; the elastic material elements being compressible by the bars when packaging material is positioned between the bars and the elastic material elements and the bars are received in the grooves, such that the elastic material elements are held in contact with one side of the packaging material to reduce stress in the packaging material. In one embodiment, the elements have at least two T-shaped end pieces, which are inlaid in the grooves of the female part such that the elements are locked in the grooves. Preferably, the elements are pretensioned by 2 - 20% in a longitudinal direction of the grooves.

## **BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS**

One preferred embodiment of the present invention will now be described in greater detail hereinbelow, with particular reference to the accompanying Drawings in which:

- Fig. 1 is a section of a part of the creasing apparatus;
- Fig. 2 shows a basic element of the groove profiles; and
- Fig. 3 shows a crease pattern with inlaid groove profiles.

The Drawings show only those details which are essential to an understanding of the present invention.

## **DESCRIPTION OF PREFERRED EMBODIMENT**

The creasing apparatus as illustrated in Fig. 1 consists of a male part 1 with bars 2 upstanding from the surface, the bars being clearly rounded-off, and a female part 3 corresponding to the male part 1. Grooves 4 are milled in the female part 3 and profiles 5 of an elastic material are inlaid in these grooves. In the preferred embodiment, the elastic material is rubber, such as urethane rubber and of a hardness corresponding to 90° - 97° Shore. Tests have shown that a rubber hardness of approx. 93° Shore is often suitable. Softer rubber qualities, below 90° Shore, require a greater pressure between the tool parts in order to obtain an acceptable crease line. Harder rubber qualities, above 97° Shore, suffer from insufficient elasticity and have properties which begin to liken those of steel.

Both of the parts 1 and 3 of the creasing apparatus can be designed as plates which are forced towards one another with the packaging material 6 therebetween, but are normally designed as two rollers with the packaging material 6 passing between them.

The rubber profiles 5 may be of different appearances, but Fig. 2 shows a basic element 7 of a profile 5. The profile 5 has a square cross section which corresponds to the cross section of the groove 4. The dimensions of the profile 5 may vary, but for most practical applications it is sufficient with a profile which is 6 x 6 mm. The intention is to have as few rubber parts as possible without, to that end, risking that the tools become difficult to adjust in their settings.

Fig. 3 shows other types of elements 8 which may occur. Fig. 3 shows a crease pattern in which the groove profiles 5 are laid out. Of course, the larger elements 8 can be divided into smaller elements if this is considered suitable in order that as many parts as possible can readily be replaceable.

The basic element 7 according to Fig. 2 has an elongate configuration and, in both ends, T-shaped end pieces 9 which are also of square cross section. The T-shaped end pieces 9 are employed to lock the profile 5 fixedly in the groove 4 and this feature also makes it possible for the profiles 5 to be slightly pretensioned when they are applied into the grooves 4. A tensioning of between 2 and 20 % may be appropriate. Practical experiments demonstrate that a pretensioning of approx. 7 % is sufficient. Otherwise, the profiles 5 lie loose in the grooves 4 and move somewhat in the direction of rotation when the tools consist of two counter-operating rollers. As a result of the pretensioning, the rubber material constantly compensates for those stresses which occur in the crease making process and a correct mutual spacing between the crease lines in the packaging material 6 will be obtained.

By varying the height H of the profile 5, a different pressure on the crease line can be obtained. Alternatively, different heights of the bars 2 of the male part 1 may be employed. Hereby, it is possible to vary the pressure on the different creases in a crease pattern and by such means achieve an optimum creasing procedure.

Creasing with a tool according to the present invention is gentle on the packaging material 6 given that the packaging material is not pressed between two metal parts. Moreover, the tool proper will be subject to less wear since it is a metal part in the male tool 1 which is forced against an elastic material in the female part 3. This is particularly suitable on creasing of clay coated packaging materials 6, since otherwise the clay particles wear out the tool parts.

As a result of the creasing apparatus according to the present invention, the tool as a whole is much easier to adjust than conventional creasing tools, since the rubber profiles 5 inlaid in the grooves 4 of the female part 3 are wider than the bar 2 of the male part 1. Trials have also  
5 demonstrated that a preset tool needs no subsequent re-adjustment.

The creasing apparatus according to the present invention also makes it possible for the profiles 5 divided into elements to be easily replaced if a profile 5 were to become worn out or damaged. Since only one profile element 7 may perhaps need to be replaced on a female part 3,  
10 the service life of the tools will be prolonged.

As is apparent from the above description, the present invention realizes a creasing apparatus which gives distinct and exactly placed crease lines. The creasing apparatus contributes in the gentle treatment of the packaging material and also assists in ensuring that certain packaging  
15 materials do not wear out the parts of the creasing apparatus. Furthermore, the creasing apparatus is relatively economical to manufacture, easy to adjust at different settings and its various parts are readily replaceable.

The present invention should not be considered as restricted to that described above and shown on the Drawings, many modifications being  
20 conceivable without departing from the spirit and scope of the appended Claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A creasing apparatus consisting of a male part provided with bars, and a female part corresponding to the male part and provided with grooves, in which profiles of an elastic material are inlaid in the grooves of the female part.
2. The creasing apparatus as claimed in claim 1, in which the profiles have a cross-section which corresponds to the design of the grooves.
3. The creasing apparatus as claimed in claim 1 or 2, in which the profiles are pretensioned and are locked in the grooves by means of T-shaped end pieces.
4. The creasing apparatus as claimed in claim 1, 2 or 3, in which the profiles are pretensioned by 2 - 20% in the longitudinal direction of the grooves.
5. The creasing apparatus as claimed in any one of claims 1 to 4, in which the profiles consist of a rubber material having a hardness of between 90° and 97° Shore.
6. The creasing apparatus as claimed in any one of claims 1 to 5, in which the different profiles in a crease pattern are each of different heights.
7. A creasing apparatus comprising:
  - a male part provided with one or more bars;
  - a female part corresponding to the male part, the female part having a surface and being provided with one or more grooves formed in the surface and adapted to receive the bars; and

one or more elastic material elements inlaid in the grooves of the female part, the elastic material elements being compressible by the bars when packaging material is positioned between the bars and the elastic material elements and the bars are received in the grooves, such that the elastic material elements are held in contact with one side of the packaging material to reduce stress in the packaging material; wherein the elements have at least two T-shaped end pieces which are inlaid in the grooves of the female part, such that the elements are locked in the grooves.

8. The creasing apparatus as claimed in claim 7, wherein the T-shaped end pieces are inlaid in the grooves of the female part such that the element is pretensioned.
9. The creasing apparatus as claimed in claim 7 or 8, wherein the one or more elastic material elements have a sectional profile which corresponds to the shape of the grooves.
10. The creasing apparatus as claimed in claim 7, 8 or 9, wherein different elements are arranged in a crease pattern.
11. The creasing apparatus as claimed in any one of claims 7 to 10, wherein at least one of the male and female parts is a roller.
12. The creasing apparatus as claimed in any one of claims 7 to 11, wherein at least one of the male and female parts is a plate.
13. A creasing apparatus comprising:  
a male part provided with one or more bars;

a female part corresponding to the male part, the female part having a surface and being provided with one or more grooves formed in the surface and adapted to receive the bars; and

one or more elastic material elements inlaid in the grooves of the female part, the elastic material elements being compressible by the bars when packaging material is positioned between the bars and the elastic material elements and the bars are received in the grooves, such that the elastic material elements are held in contact with one side of the packaging material to reduce stress in the packaging material;

wherein the elements are pretensioned by 2 - 20% in a longitudinal direction of the grooves.

14. The creasing apparatus as claimed in claim 13, wherein different elements are arranged in a crease pattern.

15. The creasing apparatus as claimed in claim 13 or 14, wherein at least one of the male and female parts is a roller.

16. The creasing apparatus as claimed in claim 13 or 15, wherein at least one of the male and female parts is a plate.

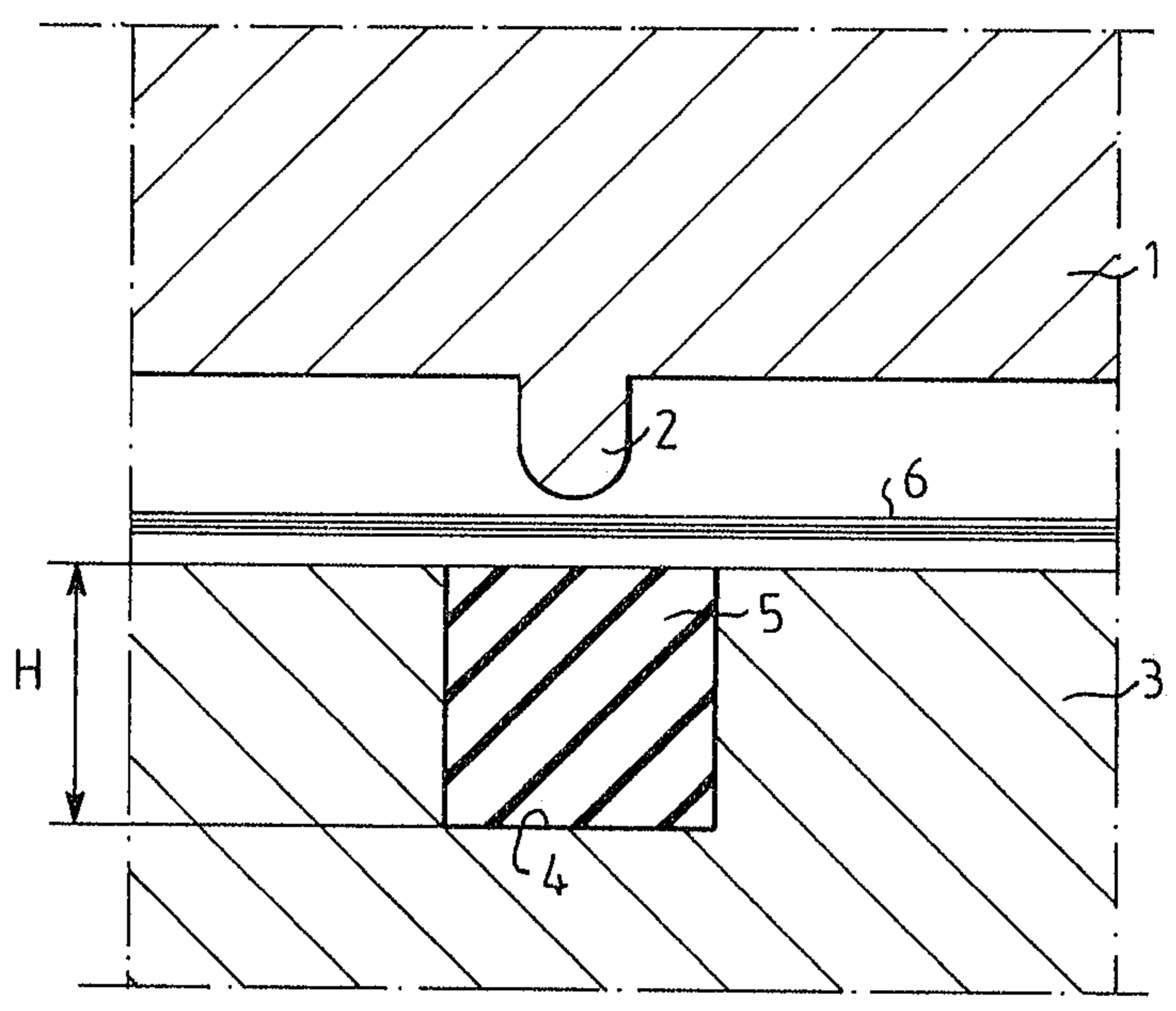


FIG.1

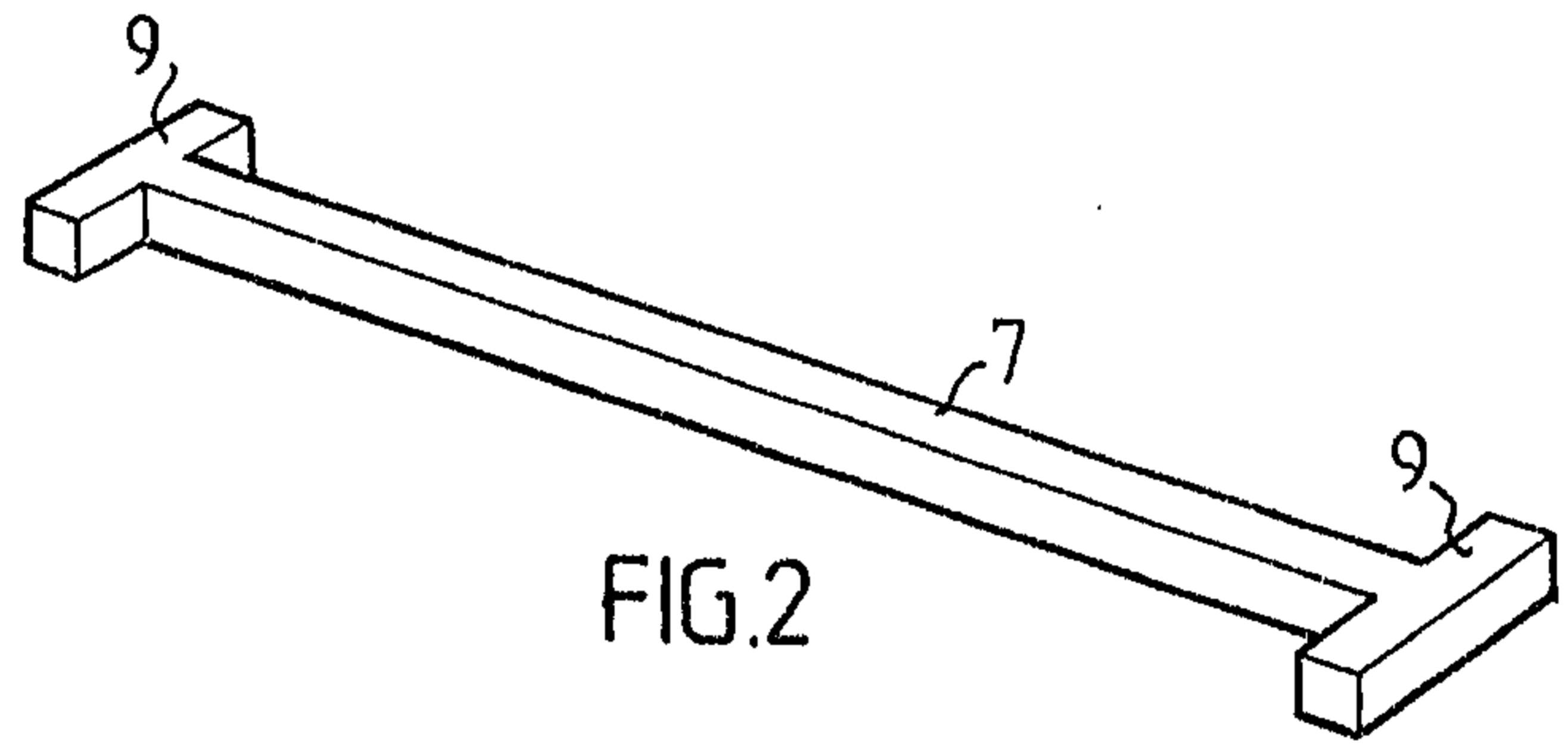


FIG.2

*Franklin & Clark*

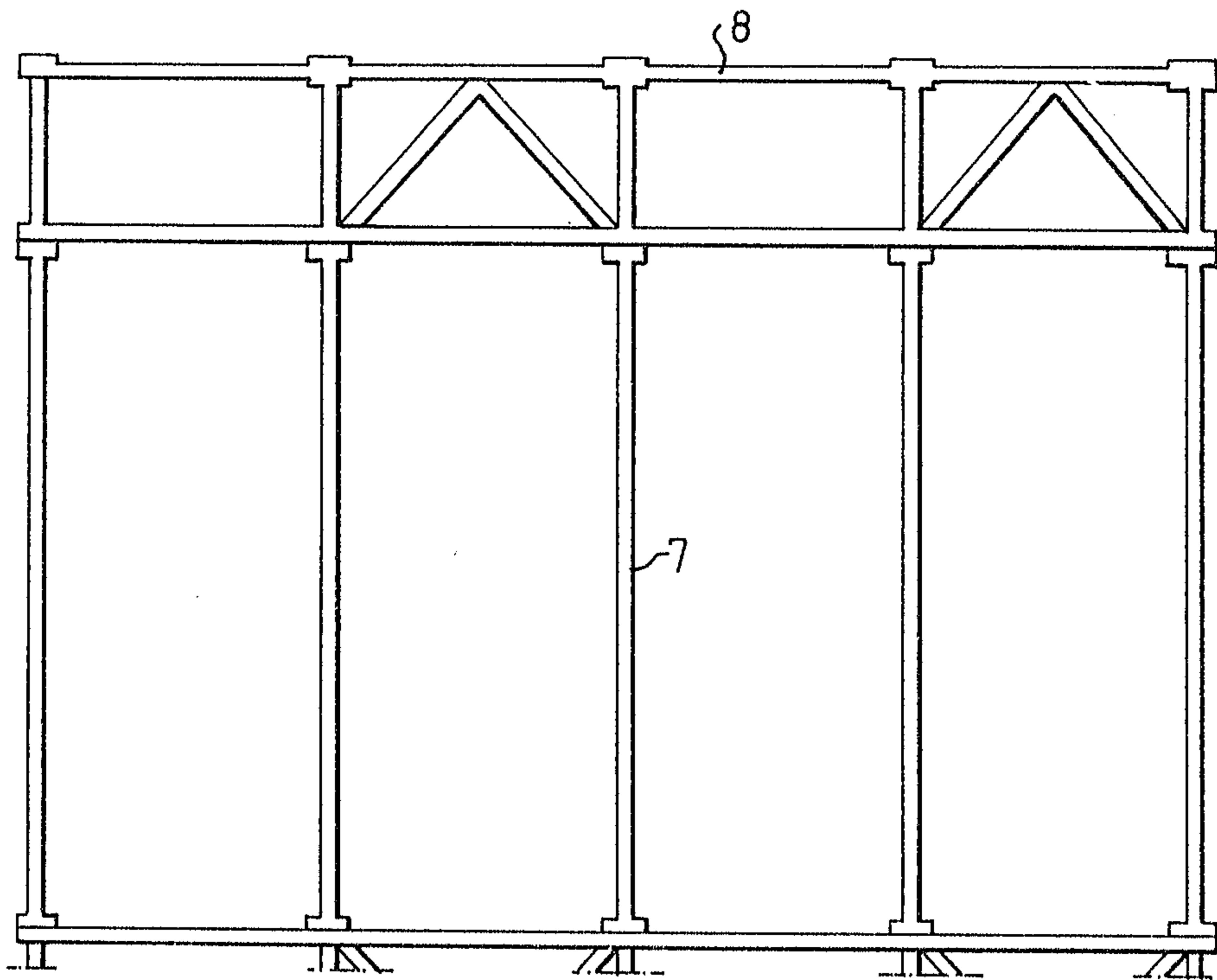


FIG. 3

*Wentworth & Clark*

