

(No Model.)

A. McDOUGALL.

CONSTRUCTION OF ROOFS, FLOORS, PAVEMENTS, &c.

No. 582,395.

Patented May 11, 1897.

Fig. 0

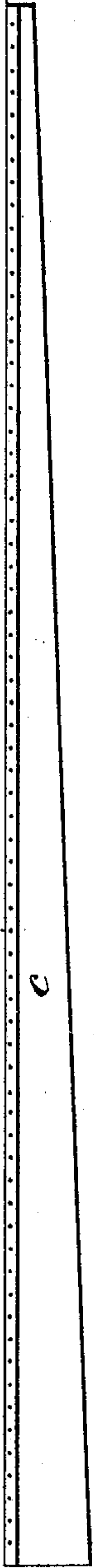


Fig. 1



Fig. 2

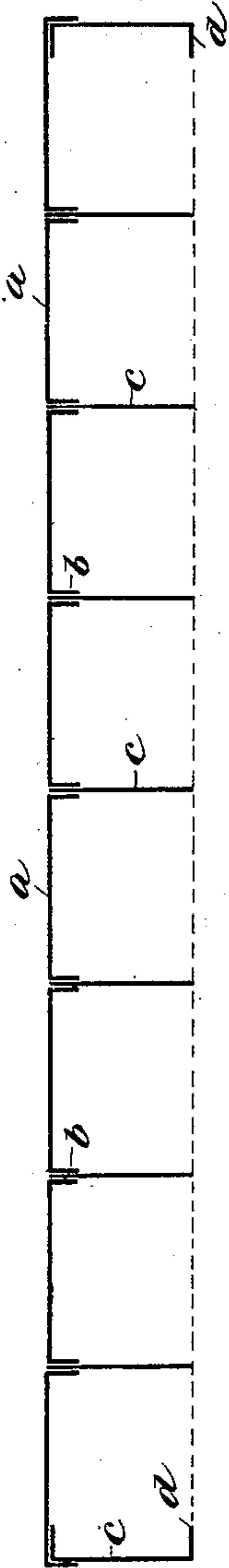


Fig. 3

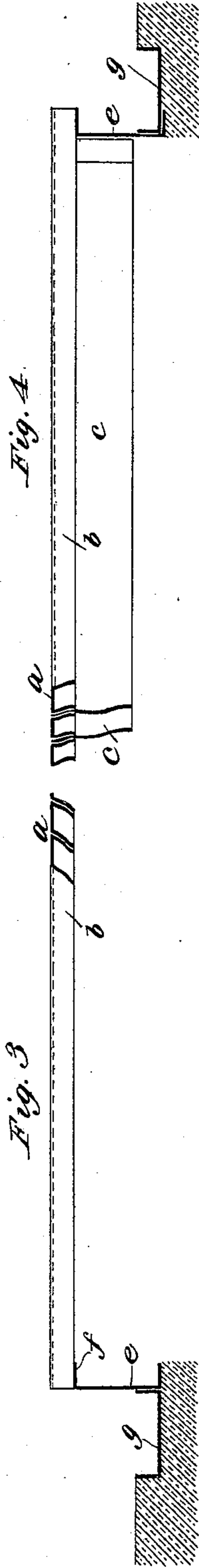


Fig. 4

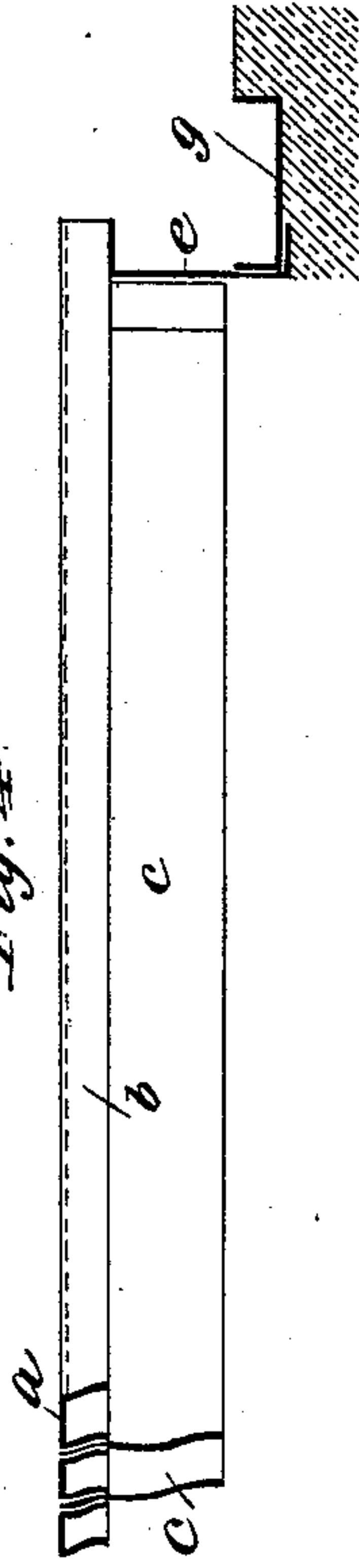


Fig. 5

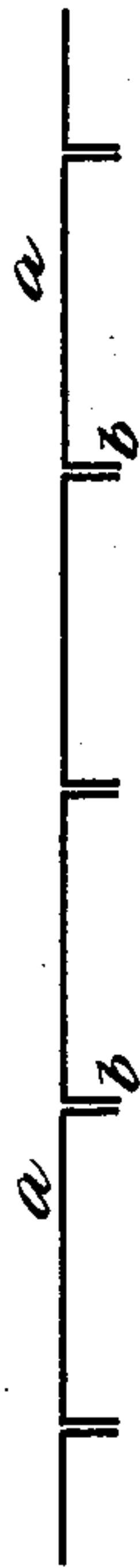


Fig. 6

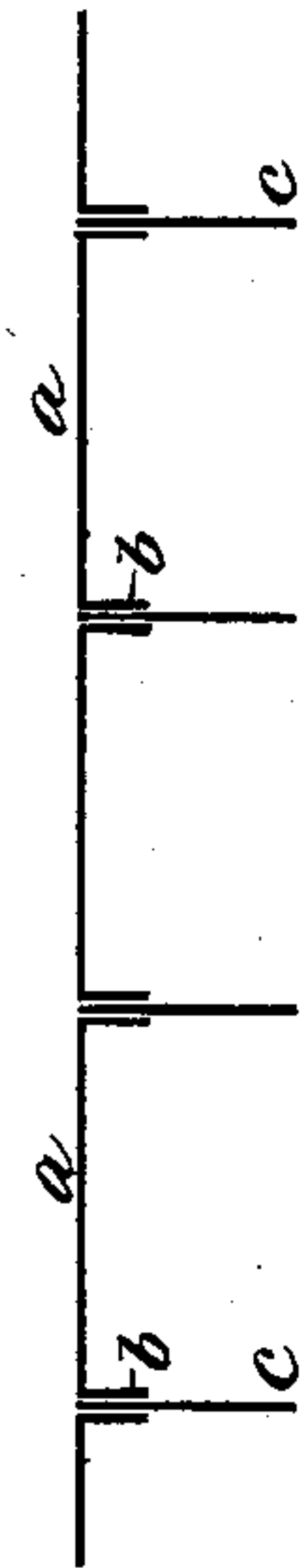


Fig. 7

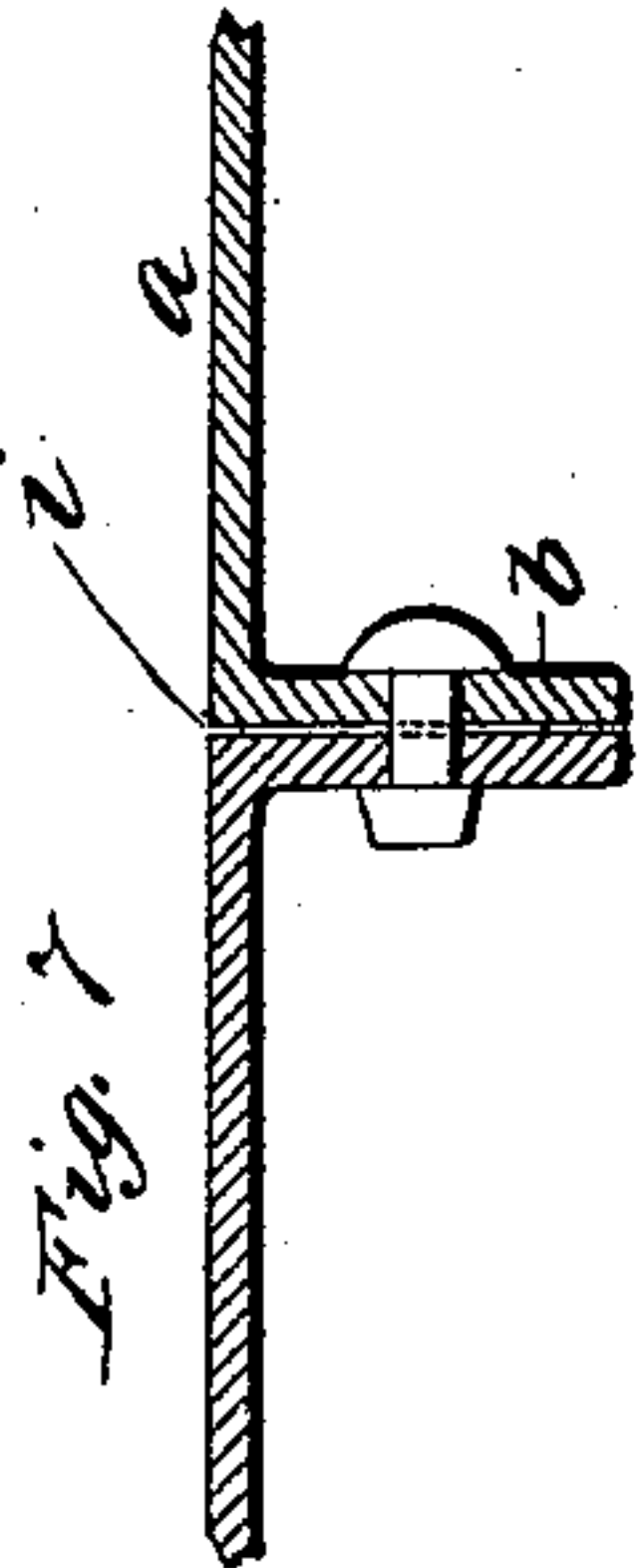


Fig. 9

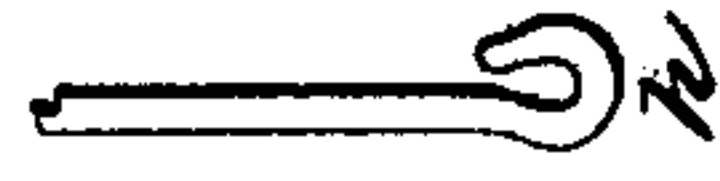
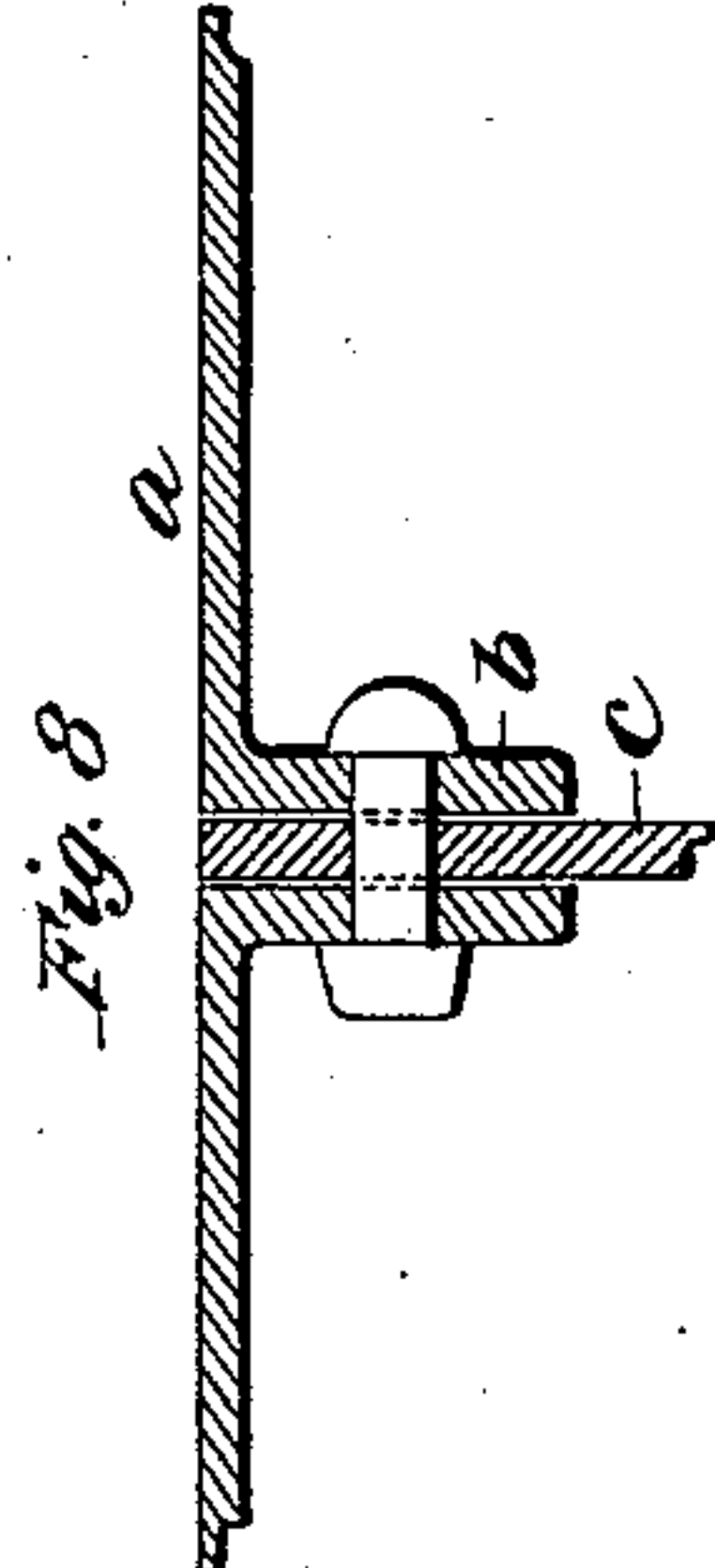


Fig. 8



Witnesses.

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ALEXANDER McDOUGALL, OF DULUTH, MINNESOTA.

CONSTRUCTION OF ROOFS, FLOORS, PAVEMENTS, &c.

SPECIFICATION forming part of Letters Patent No. 582,395, dated May 11, 1897.

Application filed June 29, 1895. Serial No. 554,470. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER McDOUGALL, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in the Construction of Roofs, Floors, &c.; and I do hereby declare the following to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the construction of roofs, floors, car-tops, streets, pavements, and other flat or approximately flat surfaces, either horizontal, inclined, or vertical, whereby a cheap, rigid, and durable structure will be obtained.

The methods by which iron and steel are now produced are such that the cost of those commodities has been so reduced as to enable structures which are now built of cheaper materials, such as wood and stone, to be built of the more durable metals mentioned. As the processes for making iron and steel are being improved upon all the time, the day does not appear to be far distant when iron and steel will entirely supplant the less durable materials now used in the construction of many forms of structures.

By means of my present invention I propose to construct roofs, floors, and other flat surfaces of iron and steel in such a way that the structures so built will be possessed of great rigidity and durability, and such structures can be built at a comparatively low cost.

In carrying out my invention in the construction of these structures the iron and steel made use of may be produced and erected mostly by machinery, whereby such structures can be economically built, and when the durability and rigidity and other advantages are taken into consideration will be as cheap, if not cheaper, than when such structures are constructed of wood and other less durable materials.

For the better comprehension of my invention attention is directed to the accompanying drawings, forming a part of this specification, and in which—

Figure 0 is a side elevation of a portion of a roof constructed in accordance with my invention; Fig. 1, a similar view of a car-top or

floor embodying the same; Fig. 2, an enlarged cross-sectional view of Figs. 0 and 1; Fig. 3, a side elevation, partly in section, of a street or sidewalk embodying my invention; Fig. 4, a similar view of a sidewalk or street, showing the use of web-plates; Fig. 5, a cross-sectional view of Fig. 3; Fig. 6, a cross-sectional view of Fig. 4; Fig. 7, an enlarged section of the joint between the channel-irons of Fig. 5; Fig. 8, a similar view of the joint between the channel-irons of Fig. 6, and Fig. 9 a similar view of the preferred construction of web-plates.

In all of the above views corresponding parts are designated by the same letters of reference.

The main feature underlying my invention is to construct a flat surface for any purpose whatever of a series of channel-irons placed side by side with the flanges of said channel-irons riveted, welded, or otherwise secured together, whereby a perfectly flat surface will be obtained and the flanges of the channel-irons will serve as ribs for offering longitudinal support to the structure. In order to further augment the longitudinal strength of the structure, web-plates may be placed between each of the abutting flanges and secured in place, or said web-plates may be secured between alternating flanges or be arranged in any other way. In all of the views above referred to this general principle is carried out, only modified more or less to suit the respective conditions to which the invention is to be applied.

Referring to Fig. 2, *a a a* represent a number of channel-irons made of iron or steel and which may be conveniently produced in any suitable form of rolling-machine. These channel-irons are provided at each side with a depending flange *b*, extending preferably the entire length of the channel-iron and are of any suitable depth.

From an inspection of the drawings it will be seen that the channel-irons which I make use of are comparatively shallow. The depth of the flanges *b* is comparatively slight, and the width of the channel-irons is comparatively large.

In order to support the structure longitudinally, I make use of web-plates *c c c*, which are placed between the abutting flanges *b* of

adjacent channel-irons, and the parts of the structure are then riveted, bolted, welded, or otherwise secured together. In this way a very durable, light, and cheap structure will be produced for any purpose whatever.

At the ends of the structure the web-plates are provided with horizontal flanges *d* at their lower ends, which flanges may be used to secure the completed structure in position. When the channel-irons *a a* and web-plates *c* are thus set up, they can be used, as shown in Fig. 0, for the construction of roofs, in which case the web-plates *C* can be inclined along the bottom edge, so as to allow for the slope or incline of the roof, or the said web-plates can be of the same depth throughout, as shown in Fig. 1, and secured on inclined stringers or stanchions. Such a structure can also be used in the construction of car tops and floors, as shown in Fig. 1, and will possess many advantages.

By making a top for cars for carrying gravel, dirt, coal, or other bulk cargoes a perfectly flat surface will be produced, from which the load can be removed by an automatic unloading apparatus.

Such a structure as I have above described is also well adapted for use in construction of streets and sidewalks, as shown in Figs. 3, 4, 5, and 6.

In Fig. 3 I show a sidewalk or street composed of a series of channel-irons *a*, the flanges *b* whereof are riveted immediately together without using the web-plates *c*, as above explained, the structure being supported at the side by a continuous stringer *e*, having the flange *f* at the top, to which the flanges *b* of the channel-irons *a* may be riveted, said stringer *e* being riveted to and supported by a horizontal channel-iron *g*, which also serves as an effective gutter for carrying off water which may flow upon the tops of the channel-irons *a*. In Fig. 4 substantially the same construction is shown as just explained, except that web-plates *c*, such as I have illustrated in Figs. 0, 1, and 2, are made use of, such webs being cut away at the ends to allow for the use of the longitudinal stringer *e*.

In Fig. 9 I have illustrated the preferred construction of web-plates *c*, which is composed, essentially, of a continuous plate having an enlarged bead or head *h* at its lower end, said bead or head being preferably formed by rolling the plate at the lower end or in any other way. By making a web-plate of this construction the enlarged bead or head serves materially to augment the strength thereof.

While the channel-irons *a a* are generally of a common construction, yet they differ in one point from most of the channel-irons which are now upon the market in that the outer edges *i* thereof are formed with a perfect angle, whereby when the channel-irons

are abutted together a perfectly flat surface will be obtained. In most of the channel-irons with which I am familiar this edge is more or less rounded, so that when the channel-irons are placed together longitudinal ridges or grooves will be formed. Such longitudinal ridges or grooves are not objectionable, and I may make use of the same without departing from the spirit of my invention, and, in fact, in some instances the provision of such grooves or channels may be of advantage.

Instead of supporting a flat-surface structure in accordance with my invention on stringers *e*, as explained, when the same is to be used in the construction of streets or pavements, it is obvious that the flanges of the said channel-irons or the said web-plates when used may be held upon or be embedded in the earth or be supported on a wooden, stone, cement, or other foundation. Channel-irons, as I have explained and as is well known, can be very cheaply formed by machinery, and the riveting of said channel-irons together may be effected by the use of a hydraulic or other power riveter, whereby the setting up of the structure will be very gradually facilitated.

Instead of riveting the flanges *b* of the channel-irons together as stated, it is obvious that said channel-irons may be welded together through the whole or parts of their lengths, an electric welder being preferably used for this purpose.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In the construction of streets or pavements, the combination of a series of channel-irons *a* having depending flanges *b*, said channel-irons being arranged side by side with the flanges *b* rigidly secured together, a longitudinal stringer *e* at the ends of said structure and to which the flanges *b* are riveted and the horizontal channel-iron *g* at the lower end of said stringer *e*, said channel-iron *g* constituting a gutter for the purpose mentioned, substantially as set forth.

2. In the construction of streets and pavements, the combination of a series of channel-irons *a*, having depending flanges *b*, web-plates *c* secured in place between the flanges of adjacent channel-irons, and the stringer *e* at the end of the structure for supporting the same, said web-plates *c* being cut away at their ends to accommodate said stringers, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ALEXANDER McDOUGALL.

Witnesses:

CHAS. W. LELAND,
G. A. LELAND.