PUBLISHED

MAY 4, 1943.

BY A. P. C.

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DEVICE FOR DOWELLING TRANSVERSE JOINTS OF CONCRETE ROAD PAVEMENTS

Filed March 25, 1941

Serial No. 385,177

2 Sheets-Sheet 1

Fig. 1.

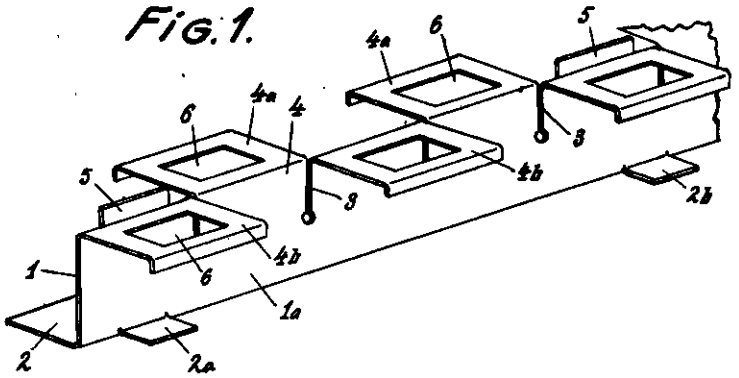

Fig. 2.

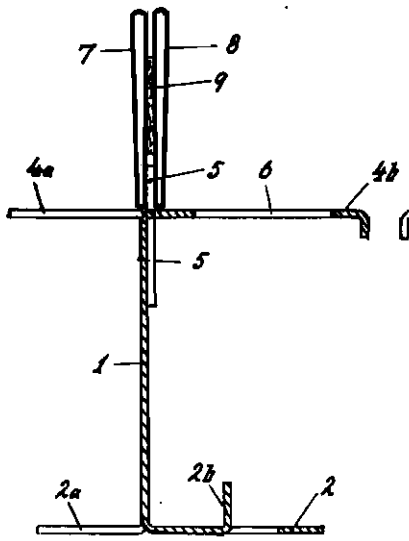

Fig. 3.

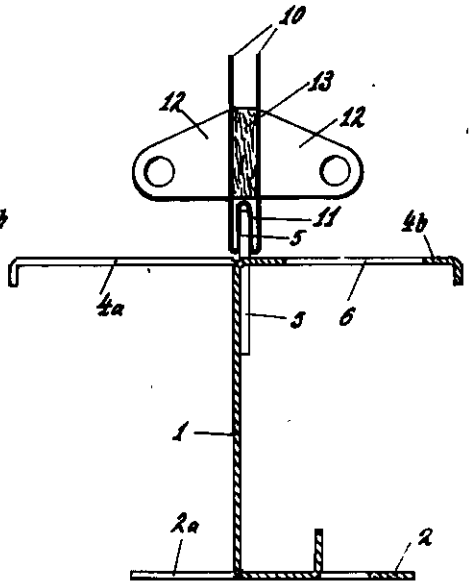

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Fig. 4.

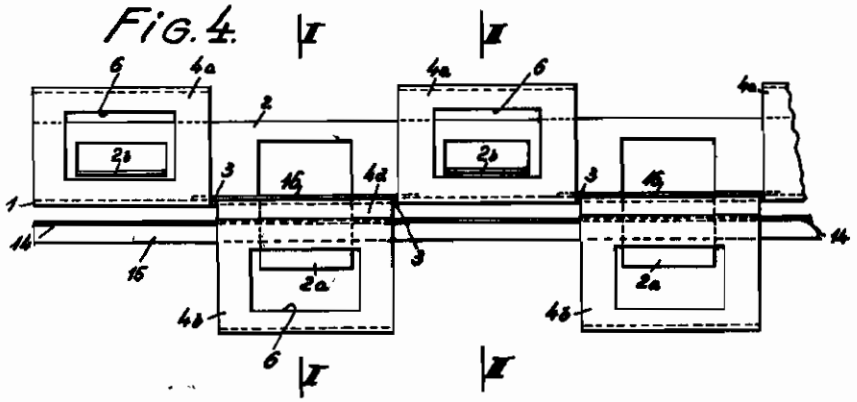


Fig. 5.

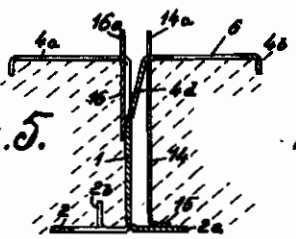


Fig. 6.

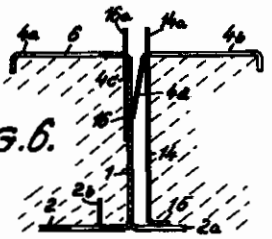


Fig. 7.

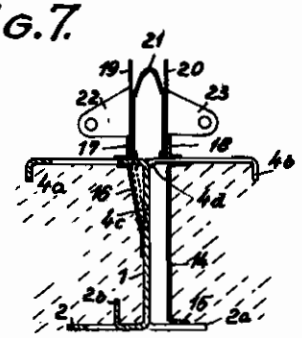
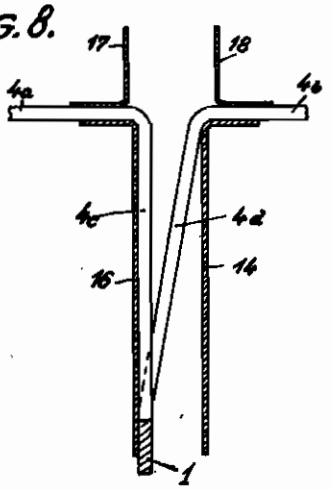


Fig. 8.



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Published May 4, 1943 Serial No. 385,177

ALIEN PROPERTY CUSTODIAN

DEVICE FOR DOWELLING TRANSVERSE JOINTS OF CONCRETE ROAD PAVEMENTS

Alexander Musall, Berlin, Germany; vested in the Alien Property Custodian

Application filed March 25, 1941

The invention relates to a device for dowelling transverse joints of concrete road pavements with the aid of a metal plate resting perpendicularly on the formation level. In concrete road pavements it is usual to arrange between each pair of spaced joints two apparent or pressing joints, which require dowelling the same as the spaced joints, so that the vertical transverse forces between any two adjoining plates of a concrete pavement may be taken by the dowels, where the dowels in the apparent or pressing joints as well as in the spaced joints must be able to yield to the contractions and expansions or to the subsequent expansions of the plates of concrete pavements.

The object of the invention is to construct a dowelling device which, apart from dowelling the plates of the pavement, is adapted to form a permanent joint, requiring a small quantity of material and being simple to install, and in which the same principal elements may be used for the apparent and pressing joints as well as for the spaced joints. Accordingly, the invention principally consists in a dowelling device composed of a metal plate, which is placed vertically upon the formation level, and which, in its top portion, is provided with flaps formed by vertical incisions, these flaps being bent at the top alternately to the left and to the right so as to form horizontal anchoring plates. In this shape, the device is adapted to form apparent and pressing joints, the vertical transverse forces between two adjacent concrete plates being taken by the lower portion of the vertically standing metal plate, whereas the upper flaps of this plate will yield, owing to the incisions and the anchoring in the concrete, to any contractions and subsequent expansions of the concrete plates.

The same device may also be used for forming spaced joints, in which case, however, there is provided, parallel to the vertical metal plate, according to the width of the spaced joint, a thinner metal plate serving as a casing and extending from the bottom up to the horizontal portions of the flaps, and being attached at its upper edge to the bent flap portions lying on one side. The lower flap portions, bent towards this side on the opposite side of the metal plate, are covered, in the vertical position of these lower flap portions, with slanting thinner metal plates, or, in an inclined position of these lower portions, with thinner metal plates disposed parallel to the dowelling plate.

Several constructional examples of the subject of the invention are illustrated in the accompanying drawing, in which—

Fig. 1 is a partial perspective view of a dowelling device for apparent and pressing joints;

Fig. 2 is a cross section of the device according to Fig. 1 with a removable upper pulling iron;

Fig. 3 is the same cross section with a covering device remaining in the concrete;

Fig. 4 is a partial plan view view of a dowelling device for spaced joints;

Figs. 5 and 6 are two cross sections taken on the lines II—II and III—III of Fig. 4;

Fig. 7 is a somewhat modified cross section of the device according to Fig. 4 with an upper covering device for concrete pavements consisting of two layers; and

Fig. 8 is an enlarged partial cross section of the top portion of the dowelling device according to Fig. 6.

The dowelling device according to Figs. 1 to 3 consists of a metal plate 1 extending over the whole width of the concrete pavement plates and being provided with legs 2 placed upon the formation level. Out of the legs 2, which are produced by bending off the metal plate 1, there may be stamped additional flaps 2*a*, bent up and serving as a better means of anchoring. The top portion of the metal plate 1 is provided with stampings or incisions 3 perpendicular to the formation level, so as to form flaps 4 above the uninterrupted bottom portion 1*a*. These flaps 4 are bent in a part of their height alternately to the left and to the right in horizontal direction, and these bent off flap portions 4*a* and 4*b* are embedded in the concrete and serve as anchoring flaps. In order to prevent these anchoring flaps 4*a* and 4*b* from being drawn out in case of contractions of the concrete pavement plates, their edges are bent downwardly. Furthermore, the horizontal flap portions are provided with stamped out openings 6 so as to let the concrete, when being deposited, fall through these openings and also fill the spaces below the flaps 4*a* and 4*b*.

The device described above will readily serve to produce apparent joints. In this case, it only remains to make incisions in the concrete layer of the pavement above the flaps 4*a* and 4*b* in the direction of the metal plate 1 so that, in case of contractions, the concrete will only tear in the line above the metal plate 1.

When using the device for pressing joints, where the pavement plates meeting at the joint are completely separated, sheet metal strips 5 are welded on to the metal plate 1 opposite the flaps 4*b*, or strips are stamped out of the lower flap por-

tion and bent upwardly so as to extend beyond the flaps 4a and 4b. These strips 5 serve as supports for a pulling iron (Fig. 2) which is slipped on, or for a covering body (Fig. 3) which remains in the concrete. The pulling iron consists of, for example, two conical hollow metal sheets 7 and 8, connected by an intermediate piece 9. This pulling iron is slipped on to the strips 5, and after the setting of the concrete, it is pulled out again. The remaining hollow space is then filled up with any known type of filling material. In the construction according to Fig. 3, there is provided a covering body which remains in the concrete. This covering body consists of a folded metal sheet 10 which is folded in such a manner that it may be slipped over the strips 5. The parallel walls of this metal sheet 10 are provided on the outside with small anchoring flaps 12. In the space between the parallel walls there is placed an elastic insertion 13, for example, corrugated cardboard or the like. The space above this insertion may then be filled with a grouting substance. Upon contraction of the concrete plates, the parallel walls of the covering body will yield to the surfaces of the adjoining concrete pavement plates. The vertical transverse forces are transferred between two adjacent concrete pavement plates via the flaps 4 upon the lower uninterrupted portion 1a of the metal plate 1 and are taken up by the latter.

In order that the dowelling plate 1, whose lower uninterrupted portion takes the vertical transverse forces between the concrete plates, may also be used for spaced transverse joints, the lower portions 4d of the flaps, whose upper portions 4b are on the right, according to Figs. 4 to 6, are placed at an angle to the lower portion 4c, whose upper portions 4a are on the left, the width of the aperture of the angle being equal to the required width of the spaced joint. In the corner of the angle of the horizontal flap portions 4b there is attached a thin metal sheet 14 which, for example, may be welded on. This metal sheet 14, which serves as a casing, has its lower edge spot-welded at 15 to the flap 2a of the leg 2 in such a manner that the attachment at 15 will resist the pressure during the ramming of the pavement plates, but will tear when the concrete plates expand in consequence of heat influences. The thin metal sheet 14 lies parallel to the dowelling plate 1 and to the flap portions 4c and has a distance from the dowelling plate 1 equal to the width of the joint.

The metal sheet 14 forms one of the walls of the transverse spaced joint, the other wall of the joint being formed by the dowelling plate 1, the flaps 4c and thin metal sheets 16. These metal sheets 16 cover the openings, which are produced in bending off the flap portions 4d, in the plane of the dowelling plate 1, the metal sheets 16 being attached, for example welded on, to the dowelling plate 1 opposite the metal sheet 14. Instead of individual metal sheets 16, there may be used one single thin metal sheet extending over the entire length of the dowelling plate 1.

As shown in Fig. 7, the lower flap portions 4c and 4d may also be in the same plane as the dowelling plate 1. In this case, the metal sheets 16 must be attached at an angle in such a manner that the flap portions 4d may move into the space between the metal sheets 16 and the plane of the dowelling plate 1 according to the expansions of the concrete plates and according to the width of the joint, as indicated by dotted lines. For this purpose, it is best to use one single metal sheet 16 extending over the entire length of the dowelling plate.

In order to save iron and to reduce the weight, the metal sheet 14 may be omitted, in which case an elastic yielding substance of the width of the joint is connected with the dowelling plate 1. For this purpose, there may be used, for example, a somewhat compressed fibre material, layers of corrugated cardboard, or the like. These materials are merely required to resist or but slightly yield to the ramming pressure when the concrete plates are being formed, whereas they must be compressible by the pressure arising at the adjacent ends of the concrete plates caused by expansions of the latter, to an extent required by such expansions. If desired, the metal sheets 16 may be replaced by cardboard, corrugated cardboard, or the like. The elastic materials or the cardboard, etc., used instead of the metal sheets 14 and 16, may be attached, for example, by gluing, or by means of wire loops, or in any other suitable manner.

If it is the question of ramming the pavement in two layers of concrete plates, it is advantageous to shape the metal sheets 14 and 16 so that they have extensions 14a and 16a passing upwardly between each pair of flap portions 4a and 4b (Figs. 5 and 6), or to place weak angle irons 17 and 18 on the horizontal flap portions 4a and 4b, as shown in Figs. 7 and 8. When ramming the bottom layer, there is inserted between these angle irons or said extensions a cover, which is removed after the lower concrete layer has set. When the lower concrete layer is ready, these flaps 14a, 16a and 17, 18 serve as supports for a pulling iron, which is placed between the flaps and whose height is equal to the thickness of the upper concrete layer. The pulling iron is removed after the concrete has set, and the remaining hollow space is filled with a grouting material. In order to save grouting material and to prevent foreign bodies from entering the actual dowelling, there may be used, instead of the pulling iron, a sheet metal device according to Fig. 7 at the top, forming a permanent part of the joint and consisting of a metal plate folded three times so as to form four parallel walls, the two inner uninterrupted walls having a distance from each other corresponding to the width of the joint and having a roof-like connection 21, whereas the two outer walls 19 and 20, leaning against the inner walls, form the joints and are provided with stamped out anchoring flaps 22 which are bent off at right angles. This construction results in such an elastic connection that the walls of this device will yield to the expansions and the contractions of the concrete plates without great forces being required to act on said device.

ALEXANDER MUSALL.