Oct. 29, 1935. E. E. HALL ET AL 2,019,131

EXPANSION JOINT

Filed May 19, 1933 2 Sheets-Sheet 1

Fig. 1.

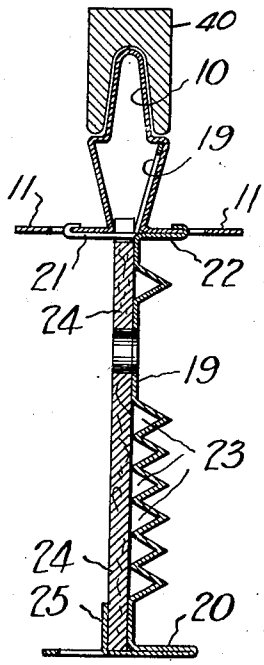


Fig. 2.

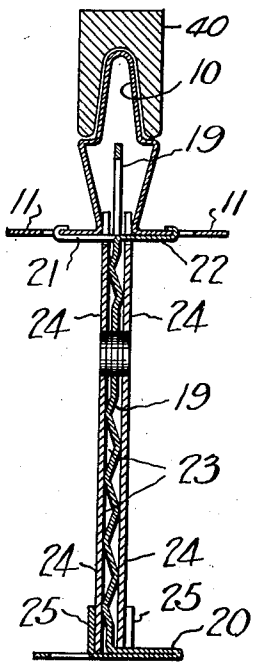


Fig. 3.

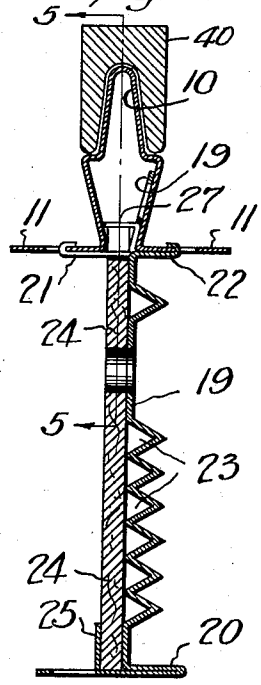


Fig. 4.

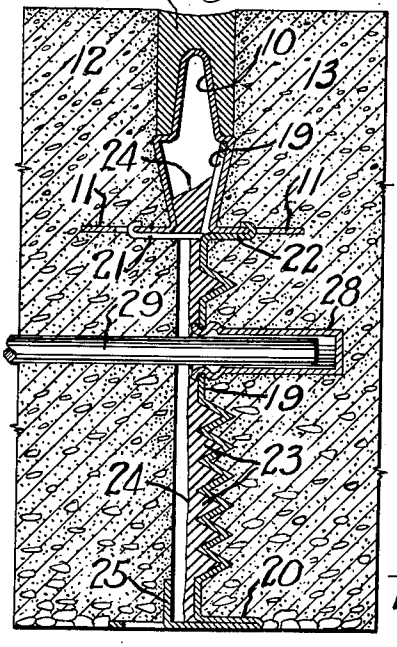
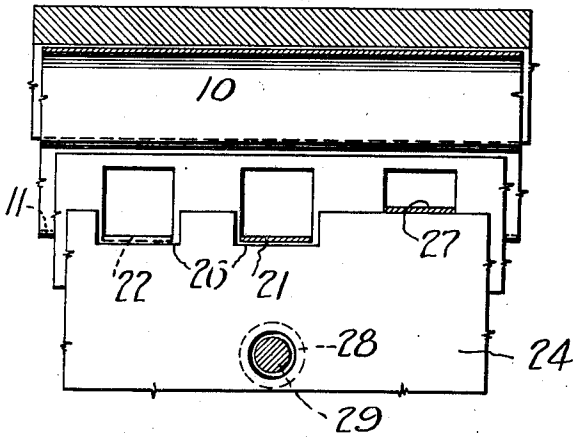


Fig. 5.



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Fig. 6.

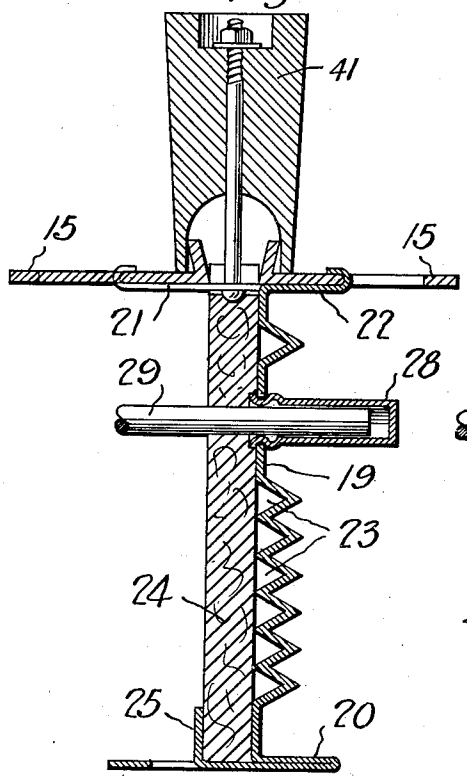


Fig. 7.

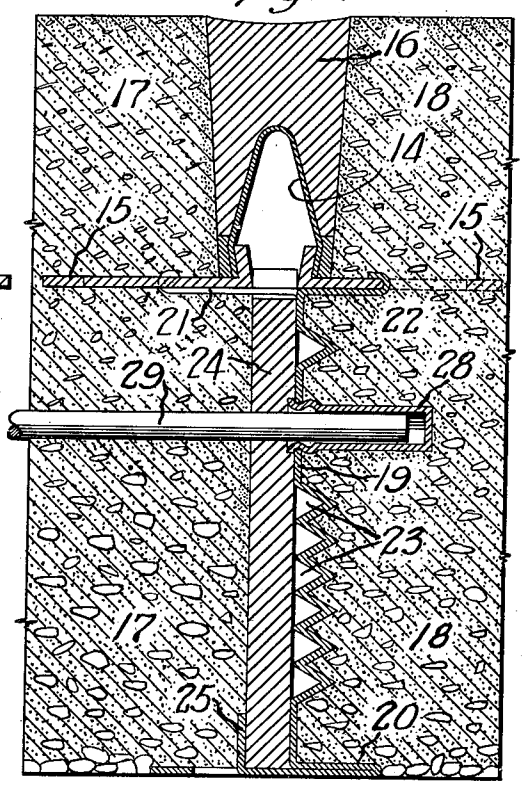
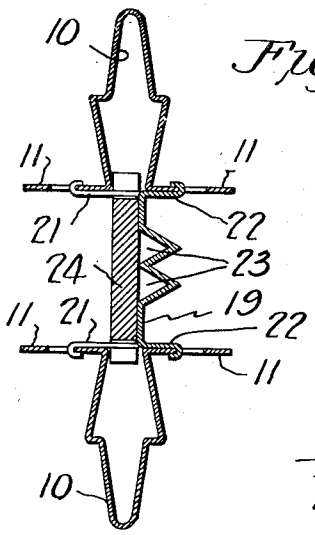


Fig. 8.



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Patented Oct. 29, 1935 2,019,131

UNITED STATES PATENT OFFICE

2,019,131

EXPANSION JOINT

Eric E. Hall, Chicago, and William H. Eichelman, Des Plaines, Ill.; said Hall assignor to said Eichelman

Application May 19, 1933, Serial No. 671,896

9 Claims. (Cl. 94—18)

Our present invention relates to improvements in expansion joints for monolithic concrete construction, pre-cast slabs and the like, such as shown and described in our copending applications relating to this subject, filed August 12, 1932, Serial No. 628,576, and which has matured into United States Letters Patent No. 1,958,391 issued May 8th, 1934; and United States Letters Patent No. 1,978,305 patented October 23, 1934 which was filed February 23, 1933, Serial No. 657,978; and May 8, 1933, Serial No. 669,814; and likewise has for its paramount object, the provision of an expansion joint, which when placed between adjacent slabs, will compensate for the relative lateral separating and converging movement of the adjoining slabs and still effectively join and allow of their independent or relative vertical movement, sealing the joining of the slabs against the possible entrance of foreign matter such as water, ice or dirt.

In the applications above referred to we have disclosed various means employing both integral and removable seals with metallic supports or stools for effecting an air space below the seal and between the ends of the adjacent concrete sections, wherein the lateral extensions or anchors of the seal engage the adjoining slabs; the seal itself extends up and between the adjacent faces of the slabs, flexing to accommodate the movement of the slabs, and is protected with a compressible filler.

It is now our object to provide a joint such as previously described, but wherein the metallic stool itself is likewise provided with a compressible filler which is a separate independent unit serving to create a definite spacing apart of the adjoining concrete walls during the pouring of the slabs, and which, as such, may be compressed and allow of their independent relative converging and separating movement.

A further object is to so position the compressible filler and the metallic stool, that a corelating action between the combination is set up, effecting the desired rigidity and necessary flexibility required in a joint of this type.

A still further object of our invention is to provide a replaceable cap or seal in combination with the quasi-rigid anchors, with such a stool or support which in itself is braced against collapse; and further to provide means for transmitting the load from one slab to the next adjacent slab and to limit their relative vertical movement at the joint; to effect a space between the adjacent ends of the slabs to permit of their uninterrupted linear movement; and to seal the intervening space tight against the entrance of foreign matter.

Having the foregoing objects in mind, and others as will be more specifically pointed out in the following specification and appended claims, we have illustrated a preferred embodiment of our invention in the accompanying drawings, in which:—

Fig. 1 is a transverse section thru the joint prior to its installation;

Fig. 2 is a like view of a modified form of joint;

Fig. 3 is similar to Fig. 1 showing reinforcing means providing against the collapse of the seal during pouring;

Fig. 4 is a like section thru the joint shown cast in place between ends of adjoining sections of concrete; the joint being intercepted by means of a dowel and dowel socket for limiting the relative vertical movement between the concrete sections;

Fig. 5 is a fragmentary vertical section of the joint taken on line 5—5 of Fig. 3;

Fig. 6 is a transverse section thru a modified form of joint, showing the adaptability of the present stool construction to a renewable or replaceable seal;

Fig. 7 is a like section, showing the joint cast in place between adjoining sections of concrete. The screed has here been removed and the metallic seal placed; and

Fig. 8 is a transverse section similar to Fig. 1 showing the application of the present stool where the hairpin fold or seal is employed at both the top and bottom or front and rear of the ends of adjoining concrete sections to effect a double seal.

Similar reference characters refer to similar parts thruout the respective views.

An expansion joint when placed between the ends of adjoining sections of concrete, monolithic or precast, must effectively compensate for their lateral or linear converging and separating movement. The joint to be successful must also provide for a limited, relatively vertical movement of the slabs. That is, an appreciable settling of one beyond that of the next adjoining should not destroy the joint or impair the seal to the extent of permitting the entrance of foreign matter. And where a known load is to be carried from one slab to the next, as is the case in road building, provision must also be made for load transmission from one to the other. Therefore, for purposes of description only, we elect to define our invention as applied to road building, because, as such, it will involve a large number of

principles, actions, or functions met with in construction work.

As before, the joint comprises two major elements—a seal, and a stool for supporting the seal prior to the pouring of the concrete. And as before, the seal may comprise a flexible hair pin fold 10, with integral anchors 11, engaging or imbedded in adjacent concrete sections 12, and 13. Or as an alternate, the seal may be of the replaceable type as shown at Fig. 7, wherein the seal 14, is removably affixed to the anchors 15, which in turn are imbedded in the concrete sections 17, and 18. In either case, the seal is protected by means of a bituminous filler 16, poured over and between the seal and the adjoining concrete sections.

The stool, or temporary support for the seal as above described preferably comprises a metallic side wall member 19, made either in sections or in a continuous strip running transversely of the road and the full length of the joint. The member 19, is rolled out at a right angle and back upon itself to form a base 20, at the bottom, and at the top has lateral fins 21, and 22, punched from the walls in alternate directions. The seal for the joint rests upon these fins or shoulders 21, and 22, prior to the pouring of the concrete, and is temporarily secured thereto, as the fins are bent back and crimped to the anchors of the seal thru apertures in the anchors as shown. The metal of the wall member 19, is preferably extruded or drawn into corrugations 23, at points between the seal and the base 20, which corrugations are shown running parallel with the base.

Placed adjacent the metallic wall 19, is a strip of compressible filler 24, preefrably constructed from a pre-moulded fibre matrix and bitumen. A tongue 25, is punched up from the base 20, of the metallic wall member, back and against the filler 24, holding same in place at the bottom. The top of the filler is notched at points 26, along its upper edge so that it may preferably extend up and into the seal of the joint as shown. This arrangement of parts holds the filler 24, in place during the shipment and installing of the joint as a whole. The filler, entering the seal, serves the purpose of preventing premature collapse of the seal during the pouring—this feature may be augmented by punching an additional series of clips 27, from the top edge of the wall member 19, which are bent over and impinge against the opposite wall of the seal (see Figs. 3 and 5).

In operation, the joint comprising a seal with a stool, as described, is placed across the road bed and between the side rails of the road forms. The adjoining sections of concrete are next poured, the screed or form 40, as shown Figs. 1, 2 and 3, and in the modified form as shown at 41 in Fig. 6, removed, and the top filler poured into the resultant opening. After the concrete has set it is subject to a lateral or linear converging and separating movement due to temperature change. And as the adjoining sections expand, the joint must compress, in which case, the filler 24, is likewise compressed and forced both into the corrugations 23, of the metallic wall 18, and also up and into the seal of the joint. Figure 4, of the drawings, show this action, and the resultant air space remaining after the slabs have contracted and the seal expanded; here the compressible filler remains compressed in place should it not have the necessary resiliency to also expand back and fill the opening below the seal and between the abutting ends of the adjoining sections of concrete.

Figure 2 of the drawings graphically illustrates a simple modification of the structures previously described; herein the stool is comprised of two strips of compressible filler 24, placed one on each side of the extruded metal wall member 19. The functions and purposes remain the same as before.

When load transmission from one slab to the next adjoining is desired, a dowel bar socket 28, is affixed to the metallic wall member 19, and the dowel 29, cast integral with the slab is extended thru the stool and into the socket as shown. The socket 28, in this case, serves the additional purpose of acting as a temporary reinforcing member to the stool—assisting the clips 25, and 27, in the preventing of the premature collapse or destruction of the joint during the pouring of the concrete.

After the concrete has had its initial set, the reinforcing members and the stool, as such, have served their purpose—as before stated—and their ultimate collapse and destruction effected by the expansion of the slabs does in no way affect the proper functioning of the joint as a unit. The same statement holds true to the compressible wall of the stool, as this member likewise has served its purpose once the concrete has set. The clips 21, and 22, being of relatively smaller cross-section, will shear and permit of the free uninterrupted and independent movement of the anchors and the seal. The stool, as a unit, has no connection to and is not anchored, in any manner, to the ends of the adjoining concrete sections, therefore does not function with the adjoining sections of concrete.

We are aware that premoulded strips of fibre matrix impregnated with a bitumen have been employed as expansion joints prior to this application: that they have been used in combination with bulkhead construction and various forms of seals before this application: and that they are now used in combination with a metallic stool. We do not, therefore, claim them as such, but what we do claim and desire to secure by Letters Patent, is—

1. In a device for forming a space between adjacent ends of concrete sections and sealing said space, the combination of a seal and a support therefore, the seal being formed of a piece of metal bent to form relatively movable side walls, the support consisting of a pair of walls placed in juxtaposition, one of which walls is plastic and impressible and the other immobile and unyielding, said unyielding wall having recesses preformed therein which establish a plurality of cavities between the faces of the respective walls, and which cavities receive portions of said plastic wall when deformed under compression.

2. In a device for forming a space between adjacent ends of concrete sections and sealing said space, the combination of a seal and a support therefor, the seal being formed of a piece of metal bent to form relatively movable side walls, the support consisting of two walls placed in juxtaposition, one of which walls is plastic and impressible and the other immobile and unyielding, said unyielding wall having recesses preformed therein which establish a plurality of cavities at intervals between the faces of the respective walls, and which cavities receive portions of said plastic wall when under compression and the plastic wall deformed, said support just described being capped by said seal.

3. In a device for forming a space between adjacent ends of concrete sections and sealing said space, the combination of a pair of seals

and a member connecting said seals, said member consisting of the combination of a relatively rigid recessed wall and a body comprised of a yieldable mass of material placed adjacent to said wall adapted to be deformed into the recessed wall upon the movement of said concrete sections towards one another.

4. In a device for forming a space between adjacent ends of concrete sections and sealing said space, the combination of a support and a seal capping an edge thereof, and means reinforcing said seal against premature collapse during the setting of the device and the pouring of the concrete, said means consisting of one edge of said support extending across the space between the walls of said seal and positioned within the seal between the upper and lower confines of said seal, and said support itself consisting of a plastic and deformable wall associated with an unyieldable and immobile wall recessed to receive deformed portions of said plastic wall upon movement of said concrete sections toward each other.

5. In a device for forming a space between adjacent ends of concrete sections and sealing said space, the combination of a support and a seal capping an edge thereof, said support consisting of a yieldable and deformable member associated with an immobile and unyielding member recessed to receive deformed portions of said deformable member upon the movement of the adjacent sections of concrete towards one another, and means associated with said members adapted to limit the relative vertical movement of the adjacent concrete sections.

6. In a device for forming and sealing a space between adjacent ends of concrete sections, the combination of a support for the seal, said support consisting of a yieldable and deformable element associated with an unyielding and rigid element, said rigid element being recessed to receive deformed portions of said yieldable element upon the movement of said elements toward each other, said support reinforcing the seal against premature collapse during the setting of the device and the pouring of the concrete, and means associated with said support for preventing relative vertical movement between the adjacent concrete sections.

7. A device for forming a space between adjacent ends of concrete sections and sealing said space, said device being comprised of a stool and a seal, the seal being formed of a piece of resilient material bent back upon itself to provide spaced walls movable in relation to each other within said space and from said bend, each of said walls having an outwardly extending flange at the lower termination thereof providing means for forming a bond between said flanges and the material in which said flanges are adapted to be embedded, said stool consisting of two elements, one a body comprised of a yieldable mass of material, and the other a relatively non-yieldable plate recessed to receive portions of said yieldable body under compression, and a screed supported by said seal.

8. In a device for forming a space between adjacent ends of concrete sections and sealing said space, the combination of a seal and a support therefore, the seal being formed of a piece of metal bent to form relatively movable side walls, said support consisting of a relatively rigid wall having longitudinally extending corrugations and a plastic body comprised of a yieldable and deformable mass of material placed adjacent to said corrugations and adapted to be deformed and when deformed to enter the corrugations in said wall, and said seal being capped by a like plastic body.

9. In a device for forming a space between adjacent ends of concrete sections and sealing said space, the combination of a seal and a support therefore, the seal being formed of a piece of metal bent to form relatively movable side walls, said support consisting of a pair of walls, one of which is plastic and impressible and the other immobile and unyielding and having recesses therein adapted to receive portions of the plastic wall upon the expansive movement of said concrete sections, the walls of said support being capped by said seal, one of said walls being formed at its opposite edges to respectively provide means connecting said seal to said wall and provide means preventing the premature separation of said walls.

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