C. GILMAN AND W. C. PARMLEY.

EXPANSIBLE JOINT CONSTRUCTION.

APPLICATION FILED JAN. 27, 1919.

1,388,558.

Patented Aug. 23, 1921.

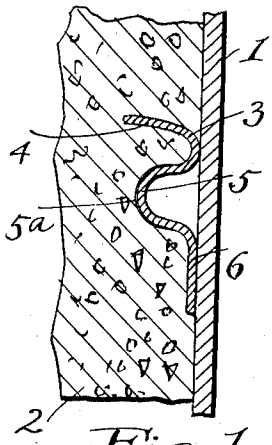


Fig. 1.

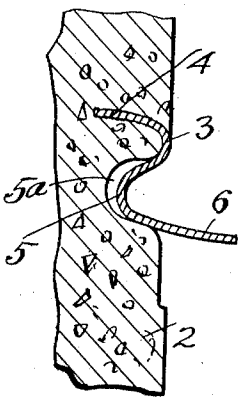


Fig. 2.

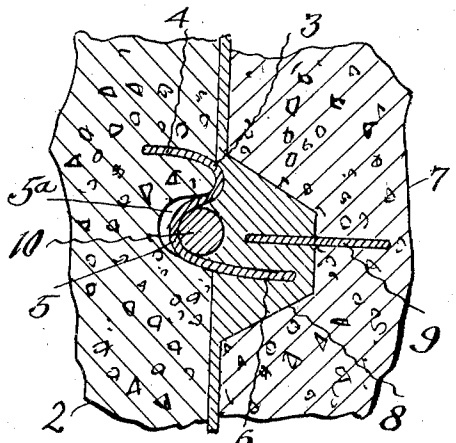


Fig. 3.

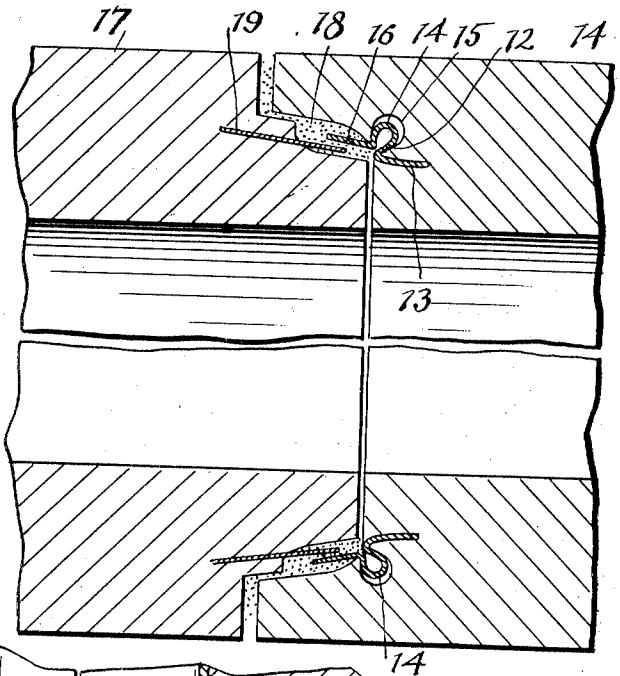
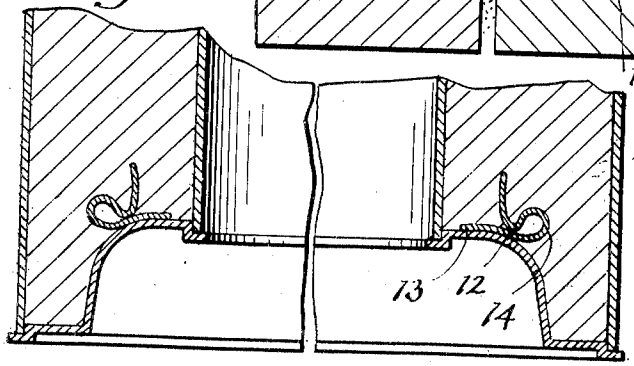


Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

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EXPANSIBLE-JOINT CONSTRUCTION.

1,388,558. Specification of Letters Patent. Patented Aug. 23, 1921.

Application filed January 27, 1919. Serial No. 273,276.

To all whom it may concern:

Be it known that we, CHARLES GILMAN and WALTER C. PARMLEY, citizens of the United States, and residents, respectively, of Plainfield, in the county of Union and State of New Jersey, and Montclair, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Expansible-Joint Construction, of which the following is a full, clear, and exact description.

The present invention provides an improved form of expansion joint by which an impervious joint is obtained between contiguous sections of walls, floors and similar structures, as well as between contiguous sections of pipes which are built of concrete or of reinforced concrete.

We are aware that expansion joints have heretofore been proposed in which the joint is formed by a metal strip which is folded, crimped or pleated with the edges of the metal strip embedded in the adjacent portions of the wall, floor or pipe, as the case may be, these metallic strips compensating for the expansion or contraction by the movement of the strip usually after the fashion of a bellows.

The various forms of strips which have heretofore been used are effective for the purpose for which they are designed, except that the metal strip is very apt to become cracked or broken along its folded edge, in which event the seal becomes broken and the joint leaks.

Furthermore, there have been certain difficulties inherent in the forming and molding of concrete parts employing the folded metal strips, usually requiring special molds.

It is an object of this invention to provide a construction in which the metal strip forming the seal is free from sharp folds; in which the metal strip is formed with a gradual or rounded fold which may move in order to compensate for expansion and contraction. Furthermore, the form of metal strip herein disclosed is of such a nature that forms for molding the strip into the concrete member with which it is associated may be of usual construction.

Generally speaking, the invention may be said to comprise the elements and combinations thereof set forth in the accompanying claims.

Reference should be had to the accompanying drawings forming a part of this specification, in which Figure 1 is a sectional elevation showing a metal strip in position within a mold in accordance with the present invention; Fig. 2 is a sectional elevation showing the mold removed and the metal strip in position to coöperate with a contiguous concrete part; Fig. 3 is a sectional elevation showing the manner in which the metal strip is utilized to form a seal between adjacent concrete parts; Fig. 4 is a sectional elevation showing the reinforcing strip as applied to contiguous sections of concrete pipe; Fig. 5 is a sectional elevation showing the manner in which a metallic strip may be formed at the end of a concrete pipe during the molding operation.

Referring to Fig. 1, 1 may designate the end of a mold, in which there is formed a mass of concrete 2. This mass of concrete may represent a block, a slab, or a portion of a wall or floor, as the case may be. Within the mold and at a suitable place therein there is placed a metal strip 3. This strip is formed with an end portion 4 which extends into the mass of concrete 2, and becomes permanently fixed therein, and in order to facilitate amalgamation between the strip and the mass of concrete 2, the end 4 of the strip may be roughened or otherwise formed to insure a fast and holding grip between the concrete and the portion 4 of the strip. The strip 3 is bent so as to have a reëntrant curved or looped portion 5, and from the curved portion 5 there extends a straight portion 6 which lies along the inner face of the mold portion 1. It will be noted that the reëntrant looped portion 5 excludes concrete from the portion of the loop which is adjacent to the side of the mold so that when the mold is removed the strip is free to move away from the concrete which surrounds the new portion 5 of the strip, and likewise the end portion of the strip 6 may be bent outwardly into a more or less straight position, as indicated in Fig. 2. If desired, the strip 3 upon the inner side thereof, or in other words, that portion which is next to the concrete within the mold, may be greased, painted or otherwise prepared so that the concrete will not tend to adhere to the strip, thus making it easier for the strip to be pulled outwardly into the position as shown in Fig. 2.

It will be observed from an inspection of

Fig. 2 that when the metal strip is pulled outwardly, as shown in that figure, there is behind the curved portion 5 a space or recess 5^a and into this space the strip may move more or less as may be required in subsequent usage, as will later appear.

In Fig. 3 there is shown the manner in which the strip 3 may function when forming part of a joint between two contiguous masses of concrete, such as the masses 2 and 7. The concrete mass 7 is molded so as to have a reëntrant groove. This groove is so situated as to come opposite the portion of the mass of concrete 2 which is provided with the strip 3. When the masses of concrete 2 and 7 are brought into proper relationship with each other, the portion 6 of the strip 3 extends into the groove 8, and when concrete grout or mortar is poured to fill the space between the masses 7 and 8, the reëntrant groove 8 is filled with concrete and the end 6 of the strip is embedded in the grout thus poured in.

It will be apparent that the strip 3 prevents the entrance of any grout behind the portion 5 of the strip, so that the cavity 5^a as originally described is always present, even when the space between the adjacent concrete parts 2 and 5 is filled with grout.

It will be seen that the strip 3 extends across the joint between the concrete masses 2 and 7, and forms a seal. Furthermore, it will be seen that if there be expansion or contraction between the concrete parts 2 and 7 the strip 3 may accommodate such movement as there may be because the strip is free to move into the recess or cavity 5^a.

If desired, the concrete part 7 may have molded therein a strip of metal 9 which may be of any suitable form, as for instance wire mesh. This strip 9 extends into the recess portion 8, and when the concrete grout is poured to form the joint between the concrete parts 2 and 7, the strip 9 becomes embedded in the grout, thereby firmly holding the grout to the concrete part 7.

It is of course quite desirable, in fact, necessary, that any tendency to cracking along the surfaces forming the joint between the parts 2 and 7 should be along the juncture between the grout and the mass 2, inasmuch as if cracking should take place along the surface between the concrete part 7 and the grout, it would be possible for moisture to pass around the extension 6 of the strip 3. In order to insure the condition above mentioned, it may be desirable to provide the end of the concrete part 2 with a coating of paint, asphalt, grease, or some similar material which will prevent the grout from adhering to the end of the concrete mass 2. Therefore, under any expansion or contraction which may take place, the grout will not be ruptured along its contact with the face of the concrete part 7. It will be seen that the metal strip 3 extends across the face of contact between the grout and the block 2, hence there can be no passage of moisture beyond the metal strip 6.

In Fig. 3 there is shown a gasket 10 which is placed within the fold 5 of the strip 3, this gasket extending throughout the length of the fold and preferably is formed of hemp or other yielding substance, the hemp being suitably impregnated with asphalt or a similar preparation, which acts as a preservative when the gasket 10 is used. It is placed in proper relationship with the strip 3 before the grout forming the filling for the joint is poured, so that when the grout is poured it forms around the gasket 10 which is in effect in part embedded in the grout forming the joint. By the use of the gasket 10 a compressible yielding contact is provided between the strip and the gasket, this lessening the likelihood of cracking or undue strain being placed upon the strip 3, so that the greatest degree of flexibility for the strip 3 is provided by which it may accommodate itself to the relative movements between the concrete portions 3 and 7 due to the expansion and contraction or to relative displacement between the concrete parts 2 and 7 due to a shearing action.

The strip 3 may be made of any suitable material, such as copper or lead, or any other material which fulfils the requirements of flexibility and which is not subject to corrosion.

It will be obvious that the joint which has been described is suitable for use in a variety of structures, as for instance, in the making of floors, walls and other structures, when used in connection with the strip 3, usually a straight strip.

The construction described is, however, applicable for use in connection with concrete pipes, for the purpose of forming a sealing joint between the adjacent sections of the pipe. In Fig. 4 the manner in which it may be utilized for forming a sealing joint between adjacent sections of concrete pipe, is illustrated.

Here it will be seen that strip 12 has one end 13 molded into the pipe section 14, and for the purpose of anchoring part 13 in contact it may be roughened or otherwise suitably prepared. The strip 12 has the looped portion 14 which occupies a recess 15 which is formed in the concrete pipe and the end of the strip 16 extends into the space between the adjacent sections of pipe which are brought together. In Fig. 5 there is shown a mold for forming the bell end of a pipe, and also the metal strip 12.

The strip 12 is inserted in the mold in the fashion illustrated in Fig. 3, the end 13 lying along a surface of the mold, while the loop portion 14 excludes concrete from admission within the folded part thereof so that when

the concrete pipe is fully formed, a space remains within the fold 14 which permits the strip to be pulled out of the cavity 15 in the manner appearing in Fig. 4. When the spigot end of the pipe 17 and the bell end of the pipe 14 are brought into the position as shown in Fig. 4, the space between the pipes may be filled in with a cement grout or mortar, as indicated by 18. This will embed the end of the strip 16 so that one end of the strip is embedded in the grout while the opposite end is embedded in the wall of the pipe 14. It is, of course, desirable and necessary in order to form a water impervious joint, that any cracking or cleavage which may take place in the grout for the joint between the pipes 17 and 14 takes place along the surface of contact between the pipe 14 and the grout 18 rather than between the surface of the pipe 17 and the grout, for reasons which will be obvious. In order to insure the desired condition the metallic strip 12 may be embedded in the pipe 17 during the molding thereof, which strip has a portion that extends into the space between the pipe sections 14 and 17, wherefore when the joint between the pipes is filled with grout, the strip 19 serves to hold the grout to the section 17.

Furthermore, the bell surface of the pipe 14 may be provided with a coating of paint, asphalt, grease or other suitable substance which will prevent the adhesion of the grout to the pipe 14, thereby insuring against parting of the grout along the surface of the spigot end of the pipe 17, any tendency toward parting occurring along the surface of contact between pipe 14 and the grout, which is bridged by the strip 12. Obviously the end 16 of the strip 12 may be roughened, crimped or otherwise suitably prepared in order to secure a positive anchorage in the grout.

In action, the strip 12 may move in or out with respect to the recess 15, thus accommodating itself to any relative movement due to expansion or contraction of the joint, or to limited amounts of sidewise displacement between the pipes 14 and 17.

It will be seen that in the foregoing disclosure the strip in all instances has a substantially closed rounded fold with a vacant space behind it. There are no sharp corners in the metal strip; consequently there is no likelihood of the metal of the strip becoming strained to the point of cracking.

Having described our invention, we claim:

1. The combination of two adjacent bodies of concrete, one of said bodies having an inwardly extending recess, of an expansion joint between said bodies, said joint comprising a continuous strip of impervious material having an open rounded fold between the ends thereof, the ends being anchored with respect to the two bodies to form a bridge between the bodies, the fold in the strip extending within the aforesaid recess.

2. The combination of two adjacent bodies of concrete, of an expansion joint between said bodies, said joint comprising a continuous strip of impervious material having an open rounded fold between the ends thereof, and a yielding cushion member coöperating with the folded portion of the said strip, the ends of the strip being anchored with respect to the two bodies to form a bridge between the bodies.

3. The combination of two adjacent bodies of concrete, one of the bodies having a recess therein, of an expansion joint between the said bodies, said joint comprising a continuous strip of impervious material having an open rounded fold between the ends thereof, which rounded fold extends into the aforesaid recess, a cushion member coöperating with the folded portion of the strip on the side thereof opposite to that which extends within the recess, the ends of the strip being anchored with respect to the two bodies to form a bridge between the bodies.

4. The combination of two adjacent bodies of concrete, an intermediate cementing body, one of the bodies of concrete being provided with a recess, of an expansion joint between said bodies, said joint comprising a continuous strip of impervious material having an open rounded fold between the ends thereof, which fold extends into the aforesaid recess but is of less dimensions than the recess, one end of the said strip being anchored in one of the adjacent bodies of concrete, the other end being anchored in the cementing body.

5. The combination of two adjacent bodies of concrete, an intermediate cementing body between them, one of the adjacent bodies of concrete being provided with a recess, of an expansion joint between said bodies, said joint comprising a continuous strip of impervious material having an open rounded fold between the ends thereof, which fold extends into the aforesaid recess, but being of less dimension than the recess, a yielding cushion member which coöperates with the fold in the strip upon the side of the strip opposite to that which is within the recess, one end of said strip being anchored in one of the adjacent bodies of concrete, the other being anchored in the said cementing body.

6. The combination of two adjacent bodies of concrete, one of the said bodies being provided with a reinforcing member which is embedded therein and extends from that portion of the body which is adjacent the other of said bodies, an intermediate cementing body which imbeds the said reinforcing member, of an expansion joint between said bodies, said joint comprising a continuous strip of impervious material having an open rounded fold between the ends thereof, one

of the ends of said strip being anchored in the body of concrete which is opposite that body having the reinforcing member embedded therein, the other end of said strip being embedded in the intermediate cementing body.

7. The combination of two adjacent bodies of concrete, one of said concrete bodies being provided with a recess in the end thereof, a reinforcing member embedded in the other of said members and extending outwardly from the end between the said bodies, an intermediate cementing body which embeds the said reinforcing member, of an expansion joint between said body, said joint comprising a continuous strip of impervious material having an open rounded fold between the ends thereof, which fold extends into the aforesaid recess but is of less dimension than said recess, one of the ends of said strip being embedded in the concrete body having the recess therein, the other end of said strip being embedded in the intermediate cementing body.

8. The combination of two adjacent bodies of concrete, one of said bodies being provided with a recess in the end thereof, a reinforcing member embedded in the other of said bodies of concrete and extending in the space between the adjacent bodies, an intermediate cementing body which embeds the said reinforcing member, of an expansion joint between said bodies, said joint comprising a continuous strip of impervious material having an open rounded fold between the ends thereof, which fold extends into the aforesaid recess but is of less dimension than said recess, a yielding cushion member cooperating with the fold in said strip upon the side of the strip opposite to that which extends within the recess, one end of said strip being anchored in the concrete body having the recess therein, the other end of said strip being anchored in the intermediate cementing body.

9. The combination of two adjacent concrete pipe sections, one of said sections being provided with a recess in the end thereof, of an expansion joint between said pipe sections, said joint comprising an annular strip of impervious material having an open rounded fold between the edges thereof, which rounded fold extends into the said recess but is of less dimension than said recess, the edges of the said strip being anchored with respect to the two bodies to form a bridge between the bodies.

10. The combination of two adjacent concrete pipe sections, one of said bodies having a recess therein, an intermediate cementing body, of an expansion joint between said pipe sections, said joint comprising an annular strip of impervious material having an open rounded fold between the edges thereof, said fold extending within the said recess but being of less dimension than the recess, one of the edges of said strip being anchored in the end of the pipe section which has the recess, the other end of the strip being anchored in the intermediate cementing body.

11. The combination of two adjacent concrete pipe sections, one of the pipe sections having a recess therein, a reinforcing member embedded in the other of said pipe sections, said reinforcing member extending from said pipe into the space between the pipe sections, an intermediate cementing body which embeds the said reinforcing member, of an expansion joint between said bodies, said joint comprising a continuous strip of impervious material having an open rounded fold between the edges thereof, said fold extending within the said recess but being of less dimension than the recess, one of the edges of said strip being embedded in the pipe section which has the recess therein, the other end of the strip being embedded in the intermediate cementing body.

In testimony whereof, we hereunto affix our signatures.

CHARLES GILMAN.
WALTER C. PARMLEY.

Witnesses:
JOSINE JACOBS,
LOUISE MEYER.