March 17, 1942. L. P. KOVANDA 2,276,542

APPARATUS FOR SEALING EXPANSION JOINTS

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FIG. 1

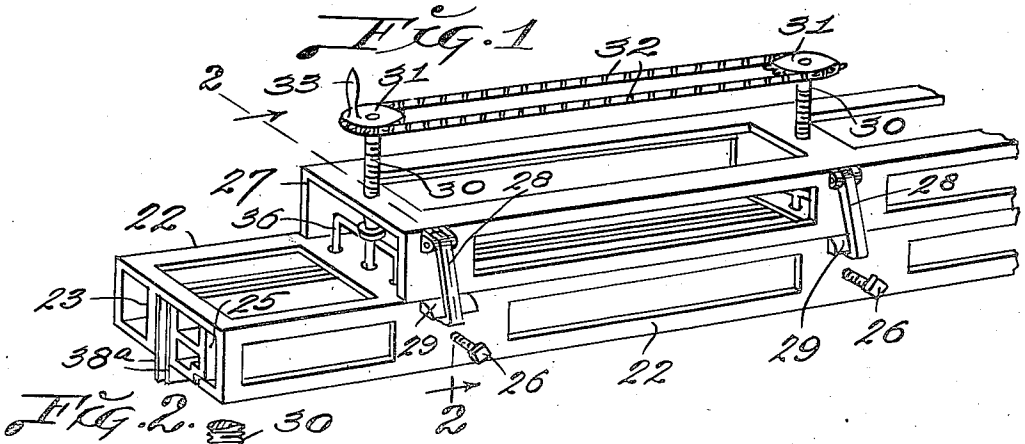
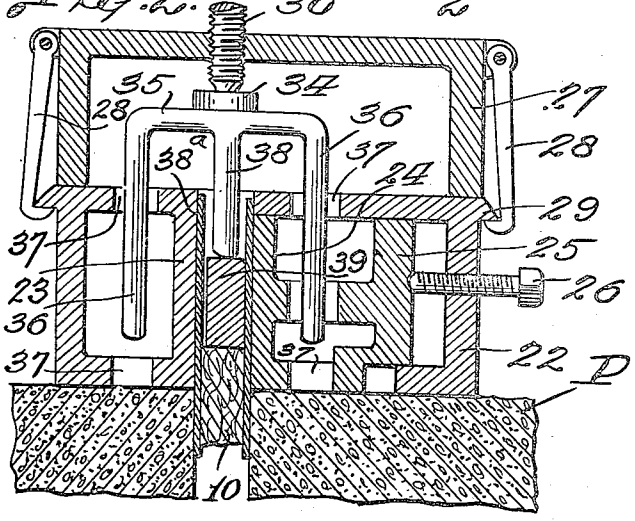


FIG. 2.



INVENTOR.
LOUIS P. KOVANDA.
BY Martin P. Smith
ATTY.

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APPARATUS FOR SEALING EXPANSION JOINTS

Louis P. Kovanda, Sacramento, Calif.

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5 Claims. (Cl. 94—39)

My invention relates to an apparatus for sealing expansion joints and has for its principal object, the provision of a relatively simple, practical and inexpensive apparatus that may be advantageously and economically employed in the packing and sealing of expansion and contraction joints between the slabs or blocks of concrete and which are used in various building structures, bridges, dams, tanks, walls, and particularly the joints between the slabs used in the construction of roadways, pavements, and the like.

It is a known fact that all structures expand when hot or moist and contract when cold and dry and unless means in the form of suitable contraction and expansion joints are provided between the building blocks or slabs to take care of the stresses set up within the structures produced by the slabs or blocks due to expanding and contracting forces, the structure will rupture and thereby be rendered unfit for service or destroyed.

In the case of pavement and roadway slabs of concrete, it is customary to provide contraction and expansion joints at regular intervals or spaces in order to protect the slabs from the destructive forces of contraction and expansion.

However, the introduction of these contraction and expansion joints between the pavement slabs, creates new dangers of destruction for the pavement, in that the joints permit moisture or water to enter the joints or to leave the soil of the subgrade and of the structure itself and to enter the joints. These conditions generally occur immediately adjacent the joints and thereby cause changes in the moisture content of the subgrade and in the mass of the structure.

Most soils expand or swell when wet and contract or shrink when dry and therefore changes in the moisture content of soils cause considerable volume changes and also changes in the bearing power of the soils.

These changes of moisture content in the soils of the subgrade coupled with changes of moisture content of the pavement slab and which changes are the most marked or of greatest extremes at and adjacent the joints, cause the pavement slabs to warp or distort at the joints and not only impair the riding qualities of the pavement slabs but by heavy traffic establishes conditions that result in the rapid destruction of the slabs.

In cold weather moisture enters the subgrade through the expansion joints between the pavement slabs and when said moisture freezes the resulting ice lenses cause the pavement slabs to be forced upward with the result that said slabs are rapidly destroyed by the traffic traveling over the slabs.

Another destructive element that frequently occurs in the contraction and expansion joints between pavement slabs is the passage of foreign materials such as sand and small stones into the joints, for under such conditions when the slabs expand, the foreign materials within the joints being incompressible cause the slabs to spall or to shear or break off sections of the slabs along the joints, which condition tends to rapidly bring about the ultimate destruction of the slabs.

Thus in order to overcome the destructive elements introduced by the contraction and expansion joints, it is necessary to provide a filler for these joints which is not only capable of sealing the joints so as to prevent the passage of moisture therethrough and to resist the entrance of foreign material into the joints, but which will not impede or in any way counteract the natural functioning of the joint.

My invention has as one of its principal objects, the provision of a permanent, effective and economical means for the filling and sealing of contraction and expansion joints and particularly the joints of pavement slabs. This object is accomplished by placing or inserting into the joint spaces or voids, premoulded filler strips composed of durable and resilient material or substances, or compound of mineral or vegetable matter, or a mixture thereof, for instance, cork, rubber, impregnated fibers, vegetable hulls, asbestos, or any other suitable materials. In placing the filler strips in the expansion joints, the strips used are of such width or thickness as to permit the maximum contraction of the structure or pavement slabs and still be capable of exerting considerable pressure on the faces of the joints filled by the strips and the filler strips must also be capable of becoming further compressed without unduly extruding from the joint when the slabs are fully expanded.

Thus in the placing of the filler strips in the joints, I first compress the strips to a thickness or width which will permit easy insertion into preformed joints between the blocks of a building structure or between pavement slabs.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts that will be hereinafter more fully described and claimed and illustrated in the accompanying drawing in which:

Fig. 1 is a perspective view of an expansion

joint sealing apparatus constructed in accordance with my invention,

Fig. 2 is an enlarged vertical cross section taken approximately on the line 2—2 of Fig. 1.

In the drawing I have illustrated a practical apparatus for conveniently compressing premoulded filler strips and inserting the same into the void of the joint between the slabs or blocks of old work or preformed joints. This apparatus is formed in two parts, one disposed above the other, the lower part being used primarily for compressing the filler strip and the upper part cooperating with the lower part in inserting the compressed filler strip into the void of the preformed contraction and expansion joint. The lower part of the apparatus comprises an elongated substantially rectangular skeleton box-like structure **22** provided with an internally arranged longitudinally disposed vertical partition **23** and arranged for sliding movement toward and away from the fixed partition **23** is a sliding partition **24** that is carried by a frame **25**.

A screw **26** passes through one of the side walls of member **22** and bears against frame **25** so as to move partition **24** against the fixed partition **23**.

The upper member **27** of the apparatus comprises an elongated inverted channel, the lower edges of the said flanges thereof being adapted to rest on top of the sides of base **22**. To hold the two parts of the structure in assembled relation for operation, hooks **28** are pivoted to the upper portions of the side walls or flanges of member **27** and the lower ends of which hooks engage beneath lugs or ears **29** that project outwardly from the upper portions of the sides of base member **22**.

Passing through the top of upper member **27** in longitudinal spaced relation are screws **30** carrying on their upper ends sprocket wheels **31**, the latter being connected by a sprocket chain **32**. One of the sprocket wheels **31** is provided with a handle **33** whereby it may be conveniently rotated.

The lower ends of the screws **30** rotate freely in bearings **34**, each of which latter rests on a cross bar **35** and depending from the ends of said cross bar are vertically disposed lifting rods **36** that pass through openings **37** that are formed in the top and bottom plates of base member **22** and the lower ends of said rods are adapted to engage on top of the pavement slabs during the manipulation of the apparatus.

Projecting downwardly from the center of each cross bar, is a rod **38** that is adapted to engage the upper edge of the filler strip and force the same downwardly into the void of the joint between the pavement slabs. Guiding members preferably in the form of plates **38***a* of thin sheet metal are positioned between the fixed partition **23** and movable partition **24** and serve to support the compressed filler as it is forced downward into the void of the expansion joint. These plates are preferably formed integral with the partitions **23** and **24** although they may be separately formed and rigidly secured to said partitions.

In the use of the apparatus just described, the lower member **22** is laid on its side so that the filler strip **10** may be conveniently inserted between the guide plates **38***a*. Positioned on top of the filler strip is a bearing bar or rail **39**, the width of which is preferably slightly less than the required width of the filler strip when the same is compressed to the desired degree.

Screws **26** are now manipulated to move frame **25** inward toward the fixed partition **23** with the result that the filler strip is compressed to the desired degree between the plates **38***a*. Base member **22** is now turned to its normal position and manipulated so that the projecting lower portions of the plates **38***a* extend downward into the upper portion of the void of the joint to be filled.

The upper member **27** is now positioned on base member **22** and secured in such position by the engagement of the lower ends of the hooks **28** beneath the lugs or flanges **29**. Handle **33** on one of the sprocket wheels **31** is now engaged to rotate its sprocket wheel and the resulting rotary motion is imparted by sprocket chain **32** to the other sprocket wheel so that both screws **30** are simultaneously rotated. As the bearings **34** carried by the lower ends of the screws **30** engage on top of cross bar **35**, the rods **36** and **38** carried by said cross bar are moved downward so that said rods **38** force bearing bar or rail **39** downward with the result that the compressed filler strip **10** is extruded or forced between the guide plates **38***a* within the void of the joint between the pavement slabs.

This extruding of the filler strip **10** continues until the lower ends of the lifting rods **36** come in contact with and rest on top of the pavement slabs and as the turning of the screws **30** continues, the entire apparatus rises upon said screws with the load being carried by the lifting rods **36**.

This action is continued until the upper edge of the filler strip is either level with or slightly below the upper surfaces of the pavement slabs and until the lower ends of the guide plates **38***a* are fully withdrawn from between the faces of the joint and the sides of the compressed filler strip.

The successful operation of the apparatus herein illustrated and described is due to the combined use of the guide members **38***a*, the lifting rods **36** and the extruding rods **38** which provides for a construction that is comparatively light in weight and with no anchoring or method of attaching the apparatus to the pavement slabs or structure in which the compressed filler strips are placed.

To insure a perfect bond between the filler strip and the faces of the pavement slabs and to provide an effective water seal, the side faces of the filler strips and the faces of the slabs to the sides of the joint may be coated with a bituminous or other suitable permanent sealing compound.

Thus it will be seen that I have provided an apparatus for sealing contraction and expansion joints of concrete structures, which apparatus is relatively simple in construction, inexpensive of manufacture and very effective in performing the functions for which it is intended.

While I have mentioned certain materials, constructions, arrangement of parts, as well as having specified certain force producing means, I do not limit myself to any specific materials, constructions, arrangement of parts or force producing means as the same may be varied in minor details and substitutions made, without departing from my invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. In an apparatus for compressing a filler strip of resilient material and inserting the compressed strip into an expansion and contraction

joint of structures, roadways, pavements and the like, a frame having a longitudinal vertical wall rigid with respect thereto and a laterally movable wall spaced therefrom and parallel therewith to form an adjustable slot for receiving and compressing a filler strip, said walls terminating in guide members adapted to enter a joint to support said filler strip in alignment therewith and to position said filler strip at the desired depth and position within a joint, means for adjusting the width of said adjustable slot, combined extruding and lifting means comprising forked members disposed in spaced relation in the frame, each member having outer lifting rods that are spaced laterally from an extrusion rod, said lifting rods being of greater length than the depth of said compression frame and said extrusion rod, said extruding and lifting means extending through the compression frame, and adjustable means on said frame for simultaneously forcing said forked members downwardly whereby the filler strip will be forced into the slot and to the desired depth and position with respect to the joint and between the guide members therein, whereupon the lifting rods contact with the surface of the underlying structure, after which the entire apparatus is lifted out of operative position with continued downward movement of the forked member relative to the compression frame so as to leave the compressed filler strip properly positioned within the joint.

2. In an apparatus for compressing a filler strip of resilient material and inserting the compressed filler strip into an expansion and contraction joint of structures, roadways, pavements and the like, as set forth in claim 1, with said guide members entered within the joint to a depth equal to or greater than the depth at which it is desired to position the compressed filler strip within the joint.

3. In an apparatus for compressing a filler strip of resilient material and inserting the compressed filler strip into an expansion and contraction joint of structures, roadways, pavements and the like, means for compressing a filler strip to a width not greater than the width of the joint, including a lower frame having a longitudinal vertical wall rigid with respect thereto and a laterally movable wall spaced therefrom and parallel therewith to form an adjustable slot for receiving and compressing a filler strip, said walls terminating in guide members adapted to enter a joint to support said filler strip in alignment therewith and to position said filler strip at the desired depth and position within a joint, combined extruding and lifting means comprising forked members spaced longitudinally in said lower frame, each forked member comprising outer lifting rods spaced laterally from an extrusion rod, said lifting rods being of greater length than the depth of the lower compression frame and said extrusion rod and extending through said lower frame, a second frame removably positioned on said lower frame, means for securing the second mentioned frame to said lower frame and adjustable means on said second frame for simultaneously forcing said combined extruding and lifting means downwardly to force a filler strip into the slot to the desired depth and position with respect to the joint between said guide members therein, whereupon the lifting rods contact with the surface of the structure beneath the apparatus, after which the entire apparatus is lifted out of operative position by the continued downward movement of the lifting rods with respect to the lower frame, thereby leaving the compressed filler strip properly positioned within the joint.

4. In an apparatus for compressing a filler strip of resilient material and inserting the compressed filler strip into an expansion and contraction joint of structures, roadways, pavements and the like, as set forth in claim 3, with said guide members entered into the joint to a depth equal to or greater than the depth at which it is desired to position the compressed filler strip within the joint.

5. In an apparatus for inserting a compressed filler strip of resilient material into an expansion and contraction joint of structures, roadways, pavements and the like, a frame including a pair of longitudinal vertical walls parallel to each other and spaced from each other to form a slot for holding and maintaining a filler strip compressed to a width not greater than the width of the joint, said walls terminating in guide members adapted to enter the joint to support said filler strip in alignment therewith and to position said filler strip at the desired depth and position within a joint, combined extruding and lifting means comprising forked members spaced longitudinally of said frame, said forked members having lifting rods spaced laterally from an extrusion rod and being greater in length than the depth of said compression frame and said extrusion rod, said lifting rods extending downwardly through said compression frame and adjustable means on said frame for simultaneously forcing the combined extruding and lifting means downwardly whereby a filler strip is forced into the slot to the desired depth and position with respect to the joint and between the guide members therein, whereupon the lifting rods contact with the surface of the structure beneath the apparatus so as to lift the latter out of operative position by continued downward movement of the lifting rods with respect to the compression frame, thereby leaving the compressed filler strip properly positioned within the joint.

LOUIS P. KOVANDA.