Oct. 24, 1961 F. D. REILAND 3,005,292

ANCHOR SLOT CHANNEL ATTACHMENT BLOCK WITH RESILIENT ANTI-SKID RETAINING MEANS

Filed Oct. 31, 1957

FIG. 1

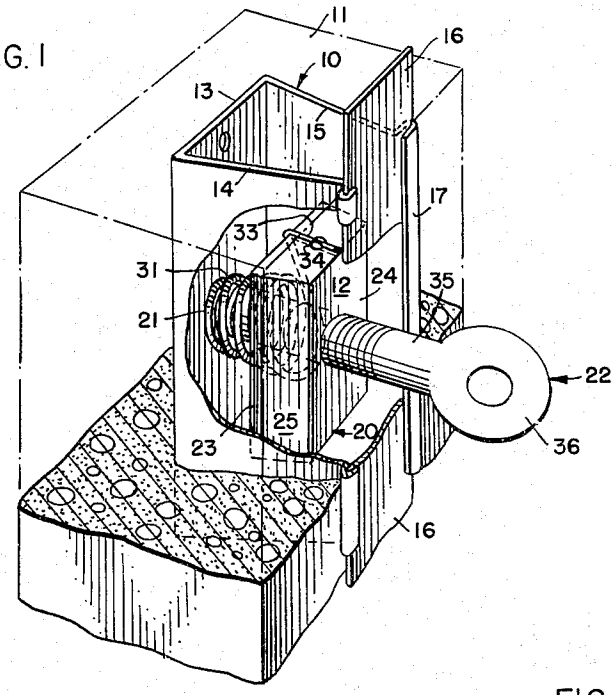


FIG. 2

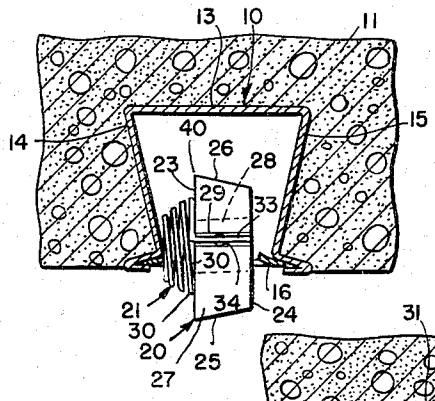


FIG. 3

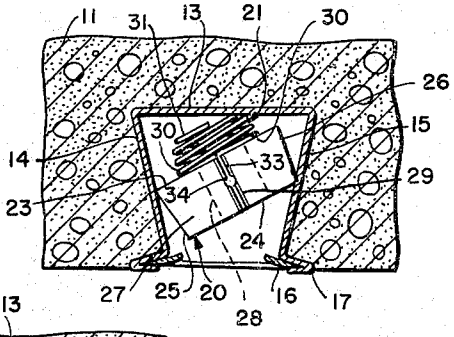


FIG. 4

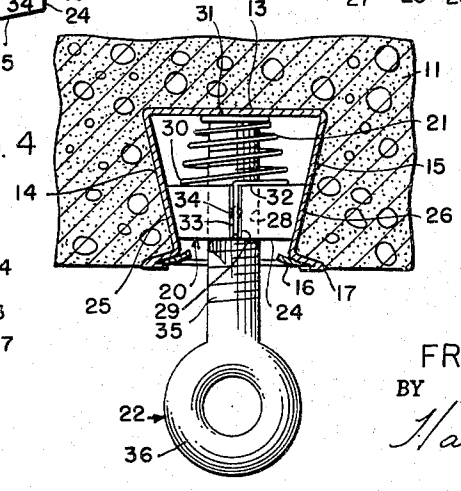
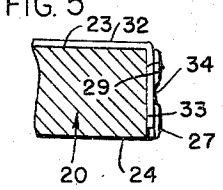


FIG. 5



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ANCHOR SLOT CHANNEL ATTACHMENT BLOCK WITH RESILIENT ANTI-SKID RETAINING MEANS

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1 Claim. (Cl. 50—71)

The improved attachment device comprising the present invention has been designed for use in connection with metallic channels of the type which are embedded in the facing side of a concrete structure, as for example a column, beam, wall, floor, ceiling or the like, the channel presenting an outwardly facing dovetail slot. The invention is specifically concerned with an anchoring device which is capable of insertion into such outwardly facing dovetail slot of a channel and which is provided with inclined side faces which are adapted to interlock with the sloping walls of the metallic channel, the device having associated therewith suspension or attachment means whereby various structural or other members or objects may be suspended from or supported by the block and thus be indirectly suspended from or supported by the concrete facing in which the channel is embedded.

Dovetail channels of the type briefly set forth above are commonly embedded in concrete structures in order that they may support the weight or thrust or such objects as wall ties which are designed to interlock with the bonding mortar of a brick or stone wall erected as a siding or facing, bolt supports for anchoring equipment or machines to a concrete floor, slab, wall or the like, door and window frame anchors and numerous other anchors of varying types capable of accommodating a wide variety of uses. Since channel members of this type are of considerable length, and since the wide portion of the dovetail channel is embedded deep in the concrete, these channels are firmly lodged in the concrete and will support the weight or thrust of a large number of anchoring devices, together with the loads carried thereby. The reason for this is that the weight or thrust afforded by each anchoring device and its load is distributed along the channel over a wide region instead of being localized at the specific region where the thrust takes place. Such anchoring devices, as currently manufactured, depend for their interlocking engagement with the channel side walls upon the provision of a metal body, usually in the form of a strip of sheet metal stock having sloping edges which are designed for interlocking engagement with the sloping walls of the dovetail channel. When the body is projected into the channel slot and turned about an axis extending normal to the base wall of the channel, the sloping edges of the body are brought into tight frictional engagement with the sloping side walls of the channel with the body extending transversely across the channel slot and being firmly wedged between the two side walls. Devices of the character are not easy to install and occasions have arisen where an insufficient turning of the device about the axis normal to the channel base wall, or too great an extent of turning of the body, will not bring the sloping edges of the body into proper interlocking relationship with the channel side walls. Furthermore, it is difficult to position such bodies at a precise and predetermined position longitudinally along the channel inasmuch as the friction brought to bear against one channel side wall may exceed the friction brought to bear against the other channel side wall so that during turning movement of the block the same will creep along the channel and assume a position other than the intended

position when the body assumes its final transverse home position.

The present invention is designed to overcome the above noted limitations that are attendant upon the use of conventional anchor blocks and, toward this end, it contemplates the provision of an anchor block provided with sloping side wall surfaces designed for interlocking engagement with the channel side walls when the block is received within the channel and moved to its home position. The block is relatively thick and is adapted to be inserted into the channel slot through the open mouth thereof in endwise fashion with the block extending longitudinally of the chanel slot. After the block is wholly contained in the slot it is adapted to be rotated, not about an axis normal to the base wall of the channel as is the case in connection with conventional anchor devices, but about a longitudinal axis of the channel and, when so rotated, the sloping side walls of the block may be brought into register and interlocking engagement with the sloping side walls of the channel member without any tendency for unequal friction developed on either side of the block and cause the same to creep along the channel. The overall width of the block is somewhat less than the width of the channel base wall, yet it is appreciably greater than the width of the channel mouth. The block may thus have freedom of turning movement within the channel and, when the block is moved to a position wherein it is in close proximity to the base wall of the channel, the sloping sides thereof will clear the channel sides so that the block may be manually slid along the channel to any desired point, after which the block may be moved outwardly toward the mouth of the channel to bring the sloping sides thereof into proper interlocking relationship with the channel side walls. The block is thus readily adjustable along the metallic channel after it has been fully received within the channel and brough to its proper position of orientation within the channel for subsequent interlocking within the channel side walls.

Although the present attachment device is capable of use in connection with anchor slot channel members which are embedded in facings which extend in any direction whatsoever, the device has been designed for use primarily with such channels as are positioned either vertically or at a steep incline, one of the principal features of the invention residing in the provision of a friction device which is carried by the block and which, after the block has been inserted into the channel and moved to its proper position of orientation therein, engages the base wall of the channel and forces the block to its home position wherein the sloping sides thereof interlock with the sloping sides of the channel so that there will be no tendency for the block to slide longitudinally along the channel under the influence of gravitational forces acting upon the block.

In order to more securely and permanently lock the attachment block in a selected home position, a combined locking and attachment member is provided, this member being in the form of a threaded rod designed for reception in a threaded bore which is provided in the block and which extends completely through the same. After the block has been properly positioned in the channel in its home position at the selected point along the longitudinal extent of the channel, the rod is threaded completely through the bore until such time as the projecting end of the rod engages the base wall of the channel. Further turning movement of the rod serves to tighten the end of the same against the channel base wall and thus firmly force or wedge the block outwardly toward the channel mouth so that the sloping side walls of the block are firmly bound between the two sloping channel side walls.

The outer end of the rod has formed thereon suitable attachment means whereby a structural or other object may be applied to the rod. One of the principal advantages over conventional anchor devices offered by the present device as outlined above resides in the fact that inasmuch as the device is initially introduced into the channel slot in a longitudinal direction and thereafter turned throughout an angle of 90° about the longitudinal axis of the slot, there is no limitation upon the length of the device and as a consequence greater distribution of pulling forces on the concrete wall structure through the thin metal channel walls may be attained. With conventional devices, since the longitudinal extent of the device can be no longer than the maximum width of the channel slot, it follows that when the device is in its home position within the channel, the maximum face-to-face contact between the interlocking sloping surfaces of the device and channel is extremely limited, thereby in turn limiting the amount of pull which the device is capable of withstanding.

The provision of an anchor device of this character which is relatively simple in its construction, consisting of but three principal parts and which therefore may be manufactured at a low cost; one which is rugged and durable and which will withstand a high degree of pull; one which is capable of ease of manipulation when undergoing assembly in the channel structure, and one which otherwise is well adapted to perform the services required of it, are further desirable features which have been borne in mind in the production and development of the present invention.

With these and other objects in view which will become more readily apparent as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts shown in the accompanying single sheet of drawings forming a part of this specification and in which drawings:

FIG. 1 is a perspective view of an attachment device constructed in accordance with the principles of the present invention and showing the same operatively installed within an anchor slot;

FIGS. 2, 3, and 4 are transverse sectional views taken through the installed device and, when considered collectively, illustrated schematically the manner in which the device is manually installed within an anchor slot channel member; and

FIG. 5 is a fragmentary side elevational view of a portion of a block and spring assembly employed in connection with the present invention.

Referring now to FIG. 1: A fragmentary length of a metallic anchor slot channel **10** is shown as being embedded in a concrete structure **11** with the attachment device of the present invention being operatively installed therein and designated in its entirety at **12** (see FIG. 1). Although the structure **11** is shown as being in the form of a vertically extending column from which it is desired to provide one or more attachment devices for supporting a suitable object or objects, it will be understood that the structure **11** may be in the form of an inclined or horizontally disposed column, pillar, wall, floor, ceiling or the like, or in fact, a concrete structure which presents an outwardly directed surface at any angle whatsoever and from which surface it is desired to support, hang or otherwise secure an object.

The anchor slot channel structure **10** is in the form of a channel or shell having a transverse wall **13** and outstanding side walls **14** and **15** which converge slightly toward each other as is customary in connection with such channels. The channel is shown in FIG. 1 as being embedded in the facing side of the column **11** for the purpose of retaining therein one or more of the attachment devices **12** of the present invention by means of which devices various structural or other objects may be supported from the channel member **10** at selected locations therealong.

The open side of the channel member **10** is adapted to be completely closed and sealed against the ingress of concrete during pouring operations and during the time that the freshly poured concrete becomes set, the closure being effected by means of an elongated strip **16** of building paper material. The longitudinal edge portions **17** of the side walls **14** and **15** of the channel member **10** are folded upon the outer face of the strip **16** over the edges thereof in the usual manner so that the strip is firmly clamped in position and forms an effective seal.

The attachment device **12** is comprised of three principal parts namely an elongated block portion **20**, a friction member **21**, in the form of a resilient helical spring, and a combined locking and attachment rod **22**. The block **20** is in the form of a solid casting of rectangular design in plan and side elevation but of trapezoidal shape in end elevation. The block is formed with a relatively wide upper face **23**, a somewhat narrower lower face **24**, sloping side walls **25** and **26** respectively, and vertical trapezoidal end walls **27**. The block **20** is formed with a threaded bore **28** therethrough, the bore extending substantially centrally through the upper and lower faces **23** and **24** in the medial regions thereof. A vertical groove **29** is provided in one end wall **27** of the block and serves a purpose which will be made clear presently.

The friction device **21** is in the form of a wire spring helix of cone-configuration to facilitate greater compression than is possible with a helical cylindrical type spring of similar length. The end convolution or base **30** of the spring is of relatively large diameter and seats on the face **23** of the block **20** when the two parts are assembled, with the convolution **30** encircling the upper rim of the threaded opening **28** and with the spring extending coaxially with this opening. The small base or end convolution **31** of the tapered helical spring **21** is free so that the spring projects outwardly away from the surface **23** when the parts are in their free state. In order to maintain the spring **21** in its seated relationship on the face **23** or the block **20**, the wire of the base convolution **30** is extended laterally as shown at **32** in FIGS. 1 and 5 and is turned downwardly as at **33** with the downturned end of the wire being seated in the groove **29**. This end region **33** is anchored in the groove **29** by peening the metal of the groove side walls over the wire at **34** as shown best in FIGS. 4 and 5.

The combined locking and attachment bolt **22** may be in the form of an ordinary eye bolt having a threaded shank portion **35** provided with an attachment eyelet **36** at one end thereof. When the anchoring device **12** is assembled in its operative relationship within the anchor slot of the channel member **10**, the bolt **22** extends completely through the bore **28** of said block **20** so that the extreme end of the shank portion **35** engages the base wall **13** of the channel member **10** and thus forces the block **20** outwardly in the slot toward the mouth of the slot, thus forcing the side walls **25** and **26** of the block **20** firmly into engagement with the side walls **14** and **15** respectively of the channel member **10**. With the bolt **22** in position in the assembled device, the distal regions of the shank portion **35** extend completely through the helical spring **21** as shown in FIG. 4 with the small base or convolution **31** of the spring likewise bearing against the base wall **13** of the channel member **10**.

As previously stated, the attachment device **20** of the present invention is admirably adapted for use in connection with anchor slot channels **10** which are disposed in concrete installations in a vertical position or at a relatively steep incline, although the invention is not to be limited to such use. Assuming however, for purposes of discussion herein, the channel **10** of a given installation is truly vertical, assembly of the attachment device **12** is made by initially inserting the spring and block assembly **21, 20** through the open mouth of the channel slot with the eye bolt **22** detached from the latter. Insertion is made as indicated in FIG. 2 by turning

the block 20 edgewise with respect to the channel and causing the same to penetrate the paper sealing strip 16, assuming of course that such a strip is associated with the channel. The relatively sharp edge shown at 40 in FIG. 2 will serve as a penetrating medium for initially puncturing the paper material 16. The spring 21 may be compressed upon the block 20 by grasping the spring and block between the thumb and forefinger and applying pressure so that the overall width of the block and spring is less than the width of the mouth of the channel. After the block has been fully received within the channel, the same is rotated in one direction or the other as indicated in FIG. 3 by the arrow and the block is brought to a position wherein it extends transversely of the slot with the sloping side walls 25 and 26 thereof in opposition to the sloping side walls 14 and 15 of the channel 10. The block and spring are then released and the spring will bear at the small base 31 thereof against the inner face of the base wall 13 of the channel and force the block 20 lightly to its home position wherein the sides 25 and 26 are in face-to-face contact with the walls 14 and 15 respectively. In this position of the block and spring assembly 20, 21, the assembly is held frictionally against vertical downward shifting movement within the channel slot under the influence of gravitational forces acting upon the block. The block may then be slid to any desired elevation along the vertical channel 10 at which it is desired to provide an anchoring point and thereafter the combined locking and attachment bolt 22 is threaded completely through the bore 28 so that the free end 36 thereof firmly engages the base wall 13 of the channel 10. The eye bolt is tightened and thus a strong thrust is exerted upon the block 20 tending to force the sloping sides 25 and 26 into binding engagement with the walls 14 and 15 respectively of the channel 10. The assembly, when thus completed is firmly anchored in the channel slot and the eyelet 35 may be employed for attachment purposes to hang, suspend or attach a structural or other object to the device and thus support the same from the concrete facing.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawing or described in this specification as various changes in the details of construction may be resorted to without departing from the spirit of the invention. Only insofar as the invention has particularly been pointed out in the accompanying claim is the same to be limited.

I claim:

In combination with a metallic anchor slot channel of dovetail cross-section having a base wall and opposed side walls the latter of which converge to define a mouth of restricted width, the mouth being closed by a strip of relatively frangible material, an attachment device comprising a block having top and bottom faces and opposed side wall surfaces the latter of which converge in conformity with the angle of convergence of said opposed side walls of the channel, the said block being provided with a threaded bore extending therethrough in a direction normal to the plane of said top face and the block being adapted to be thrust edgewise through said frangible strip and restricted mouth into the interior of the channel and thereafter rotated about a longitudinal axis to position the said side wall surfaces of the block for flat engagement with the converging side walls of the channel, and means for resiliently retaining the block in a selected position within the channel comprising a helical spring one end of which encircles said threaded bore and is fixed to the block and the other end of which seats against the base wall of the channel, the said spring being of cone-shape and includes a series of convolutions of progressively decreasing diameter, whereby the outer end of the spring may be compressed to a position closely adjacent to the top face of said block to facilitate thrusting of the latter through said strip of frangible material and into the said channel, and a locking element comprising a rod threaded through said bore and engaging the base wall of the channel to positively hold the block in its applied position.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,005,292 October 24, 1961

Frank D. Reiland

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 37, for "brough" read -- brought --;
column 3, line 44, for "illustrated" read -- illustrates --.

Signed and sealed this 3rd day of April 1962.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents