

The invention relates to sealing apparatus according to the preamble of Claim 1. The invention also relates to a method for introducing a sealant into the sealing apparatus.

A sealing apparatus in the form of a porous tube is known from CH-PS 600 077. This tube consists of a protective body in the form of a helical spring which is surrounded by a first interwoven tube which, in turn, is enclosed by an external net-like porous tube. After mounting of this sealing apparatus and concreting of the second concrete section, a sealant is pressed into the tubular sealing apparatus and is to issue at defects in the concrete.

A drawback of this known sealing apparatus is that it is expensive to lay and the laid tubes can be displaced or crushed and/or tear during concreting. Furthermore, the porous tube material can clog due to concrete sludge, preventing the sealant from issuing. In addition, the production costs of such tubes are high.

The sealing apparatus according to DE-GM 83 35 231 attempts to overcome the drawback of the clogging of the tubular body in that a non-woven material which is permeable to liquid but impermeable to fine concrete particles is introduced between the protective body in the form of a helical spring and the external net-like hose.

The drawback of the clogging of the net-like tube can possibly be overcome by the arrangement of the non-woven material, but the above-mentioned drawbacks still remain during the use of a tubular sealing apparatus.

Finally, DE-GM 86 08 396 discloses a further sealing apparatus in the form of an injection tube which, on the one hand, is to overcome the drawback of the positioning of the tube by tabs provided on the tubular body and, on the other hand, proposes a set breaking point in the longitudinal direction of the tubular

body through which the sealant is to issue into the concrete. However, the fundamental advantages of the injection tube are to be retained.

The drawbacks of the crushing and/or tearing of the injection tube still remain with this known sealing apparatus and also the drawback that the laying of the injection tube is extremely labour-intensive. Moreover, the production of such injection tubes is expensive.

All known sealing apparatuses have the common feature that sealant is introduced directly into the beginning or end of the tube. The beginning and end of the tube have to be freely accessible from the exterior on completion of concreting measures in the joint region.

This method of introducing the sealant has the drawback, on the one hand, that the concrete formwork has to have recesses for the tube ends, increasing the formwork labour. The tube ends can also be damaged during forming or concreting, making the penetration of the sealant more difficult or possible only with complex additional measures.

The object of the present invention is to provide a sealing apparatus according to the preamble of Claim 1 with which reliable positioning of the sealing apparatus is possible, destruction or damage thereof is prevented and an inexpensive sealing apparatus which is easy to lay is provided, with which concrete joints can be reliably sealed.

This object is achieved with a generic sealing apparatus according to the preamble of Claim 1 by the characterising features of Claim 1.

Advantageous developments of the invention are characterised in the sub-claims.

The proposed sealing apparatus is completely different from the former use of tubular apparatuses and proposes the use of a profile which is open in cross-section and is dome-shaped in design. The profile is mounted with the free longitudinal edges of its side regions or side walls resting on the concrete surface, forming the free passage or flow channel between the profile and the concrete surface, the sealant being able to issue between the free longitudinal edges of the profile and the concrete surface into the joint region. Depending on the material, such profiles can be produced rapidly and inexpensively by injection moulding or extrusion and can be laid simply.

Silicates or hardening single- or multiple-component plastics material in a liquid consistency, for example, are used as sealant. Synthetic resin, in particular two-component acrylic resin, is also used as sealant, as well as bentonite and/or cement mixtures.

The profile, seen in cross-section, is advantageously a U-shaped profile with a top face and two side walls coming vertically down from it.

The stackability of the profiles during storage can be improved in that the profiles have a trapezoidal or arched cross-section.

Advantageous fastening of the profile is achieved using one or more screws, pins or nails passing through the profile transversely to its longitudinal axis and fixing into the concrete.

The fastening of the profiles can preferably be enhanced in that the screw or the nail rests by its head preferably with a washer, on the top area or top face of the profile, has the shaft passing through a hole in the top face and fixes into the concrete surface, possibly into a dowel set into it.

Rapid mounting of the profile is advantageously permitted in that the pin or nail is shot in.

The top face is supported in that the top face is fixed between the head and the shaft. Fixing is preferably achieved using a counter nut on the screw, on the pin or on the nail.

A further advantageous method of supporting the top face is achieved using a spacer arranged between the concrete surface and the inner surface of the top face.

The production of the profiles is also particularly desirable because the entire profile consists of one and the same material.

Sealing lips, preferably in one piece, can advantageously be moulded onto the longitudinal edges and also simplify the escape of sealant.

The sealing lips are preferably flexible, in particular of soft plastic or rubber or something similar, which also simplifies the escape of the sealant.

On the longitudinal edges of the profile, when seen in cross-section, there are advantageously horizontally arranged fins extending away from the profile with a foam strip placed on the fin surface facing the concrete surface. The support of the profile via the fins provided with a foam strip allows, on the one hand, improved resting of the profiles on the concrete surface and, on the other hand, increased escape of the sealant in the region of the longitudinal edges of the profile. The escape of sealant is permitted by the porous properties of the foam strip. Furthermore, the profiles can also be fastened on the concrete surface in the fin surface region by suitable holding means.

It is advantageously proposed that the interior of the profile be filled with a synthetic foam (filter foam) having open cells,

wherein the sealant can be conveyed in the flow channel through the cells of the synthetic foam. The synthetic foam additionally supports the cross-sectional shape of the profile and ensures that the consumption of the sealant used is substantially reduced. The synthetic foam is selected in such a way that it has a sufficient number of sufficiently large cells to avoid obstructing and even preventing the introduction of sealant.

It is preferable if the interior of the profile is also foamed with synthetic foam or a synthetic foam strip is fitted into the interior. The interior can be rapidly and inexpensively filled with the synthetic foam in the proposed manners.

The synthetic foam or the synthetic foam strip advantageously has a projection extending beyond the longitudinal edges of the profile. This projection gives the sealant an enlarged cross-section for escaping from the profile.

In the longitudinal direction of the profile below the top face there is preferably a free passage with a base panel arranged approximately in the centre of the height of the side walls which has a longitudinal slot or similar passages, the flow channel being filled with synthetic foam under the base panel. Owing to this design of the profile, a free flow channel is formed in that the sealant can initially enter and distribute itself in an unobstructed manner and can then issue through the longitudinal slot into the synthetic foam and thence into the joint region.

The flow channel can preferably also be formed in that in the inner surface of the profile facing the flow channel, preferably in the inner surface of the top face, there is a groove running in the longitudinal direction of the profile. The aforementioned advantages similarly arise in this alternative design.

To connect at least two profiles there are preferably connecting elements, preferably also of plastic, between the abutting edges of the profiles and exhibiting their cross-sectional shape. The

profiles can be arranged in any directions on the concrete surface by means of such connecting elements.

The connecting elements are preferably straight connecting pieces, plane corner angles, up-ended corner angles, T-pieces or cross-pieces. The most important changes of direction can be made when laying the profiles by means of the proposed connecting elements.

It is advantageous if the connecting elements can be placed over the profiles and held on them preferably in an interlocking and/or non-positive manner. The individual profiles are therefore connected in a simple manner by means of the connecting elements and the proposed connection ensures that sealant cannot issue from the profiles in the abutting region.

The connecting elements can advantageously be screwed to the concrete surface together with profiles. Therefore, it is only necessary to use one mounting for profile and connecting element at the abutting point.

An impervious adhesive tape is used to connect the profiles to one another or the profiles to the connecting elements at the abutting points, to prevent, on the one hand, cement sludge and other particles from penetrating into the profiles in the joint region during the concreting process and, on the other hand, sealant from issuing from the top face and side wall region as it is not actually required there. The adhesive tape is arranged in the top face and side wall region of the abutment and can also end before the termination of the free longitudinal edges as a reinforced escape may be quite desirable in the lower region of the side walls. The abutting points can preferably also be welded.

To inject the sealant, the profile or the connecting elements advantageously have a connection, particularly in the form of a tube or a non-porous hose, which is arranged with its free end

outside the joint region or a formwork. Certain elements of the sealing apparatus can therefore already be provided with such a connection so it is unnecessary to provide such a connecting point on site. However, the method described hereinafter can be employed particularly advantageously to the introduction of sealant.

To allow deformation of the sealing profile round its longitudinal axis and to allow adaptation to curved concrete surfaces, the profiles or connecting elements advantageously have notches in the side walls of which the corners or notch points end at the top face or just before the top face.

In an advantageous embodiment of the invention, the profiles or connecting elements are arched about their longitudinal axis and can be fastened on a curved concrete surface or on a curved or circular body, for example a pipe, the lateral edges of the notches abutting against one another and the notches thus being closed when the longitudinal edges of the side walls lie on the concrete surface or the body. By means of this embodiment, the sealing apparatus can be arranged not only on curved concrete surfaces but even on arched or circular bodies. It is important for the notches to be completely closed when the longitudinal edges rest on the concrete surface or the surface of the corresponding body. The notches can additionally be sealed with an adhesive tape.

With an advantageous method of fastening the profile, the profile and/or a connecting element are held by a pipe-clamp-shaped clip.

Fastening, for example on a reinforcing rod, is preferably carried out in that the clip has, at the free end of its retaining arm which extends approximately parallel or slightly at an angle to the concrete surface, an attachment apparatus for attaching, for example, to a reinforcing rod.

In a particular embodiment, the attachment apparatus is formed

by a curve of the retaining arm through about 360° taking a diagonal course, preferably toward the side of the support arm so formed facing away from the profile being retained, the diameter of the bend and the distance from the starting area to the finishing area of the bend being greater than the diameter of the reinforcing rod. The proposed holding apparatus can therefore be arranged reliably and unmovably in a simple manner.

The spring clip is preferably made of a material which bends elastically, in particular spring steel, in order to be able to compensate any tolerances.

The clip is preferably bent out of round wire which can be brought correspondingly easily and simply to the desired shape.

The object set is achieved according to the method by the features of Claim 33.

An important basic idea resides in the fact that one or more external connections for the introduction of the sealant, which are arranged outside the second concrete section or the formwork can be dispensed with so the sealing apparatus is arranged without a connection to the exterior in the joint region between the two concrete sections. All formerly known sealing apparatuses and similar recently developed sealing apparatuses can be filled with a sealant by means of a subsequent connection between an outer side of the concrete or the second concrete section and the sealing apparatuses. The sealant is, for example, silicates or hardening single- or multi-component plastics in a liquid or compressible consistency. Synthetic resin, in particular two-component acrylic resin, can also be used as sealant as well as bentonite and/or cement mixtures.

The subsequent connection is produced in particular, for example, by drilling into the hardened concrete between one outer side of the concrete and the sealing apparatus. It will be appreciated that drilling must be continued until the flow channel or the

passage in the sealing apparatus is accessible. The sealant is then introduced or injected through the connection or the drilled hole. A further connection to the sealing apparatus is advantageously provided through which air can escape during the injection process and which also serves as a control point for checking whether the sealant has also penetrated the entire sealing apparatus. It is also conceivable to provide a larger number of such connections and then to seal them if the sealant issues from the connecting points.

The point at which the sealant is introduced into the sealing apparatus can be arranged as desired, whereas further connecting points serving as control points are to be arranged at the beginning or at the end of the joint for checking whether the sealant has also penetrated into the end regions of the sealing apparatus.

Depending on the local conditions, the connection can be provided horizontally or from obliquely upwardly or obliquely downwardly in the direction of the sealing apparatus. The connecting points are preferably provided at predetermined positions, and the height or angle and, in particular, length of the connecting point can be determined in advance to ensure that the sealing apparatus is located or drilled in the desired manner.

With the proposed method of introducing sealant into sealing apparatuses, it is not necessary for the formwork to have one or more perforations for previously laid connecting orifices or connecting nozzles. It is also unnecessary to tear or destroy these previously provided connecting points during the formwork process or during concreting. The load-bearing capacity or safety of the drilled concrete is not reduced by the arrangement of several connecting points either.

The invention will be described schematically and by way of example hereinafter with reference to preferred embodiments.

Figure 1 is a perspective view of a portion of a first embodiment of the sealing apparatus according to the invention in the form of a profile.

Figure 2 is a perspective view of the embodiment according to Figure 1 with sealing lips.

Figure 2a is a perspective view of a portion of a second embodiment of the sealing apparatus according to the invention in the form of a profile.

Figure 2b is a perspective view of a portion of a third embodiment of the sealing apparatus according to the invention in the form of a profile.

Figure 3 is a perspective view of a portion of a fourth embodiment of the sealing apparatus according to the invention in the form of a profile.

Figure 4 shows the embodiment according to Figure 3 with sealing lips.

Figure 5 is a perspective view of a portion of a fifth embodiment of the sealing apparatus in the form of a profile.

Figure 6 shows the embodiment according to Figure 5 with sealing lips.

Figure 6a is a perspective view of a portion of a sixth embodiment of the sealing apparatus according to the invention in the form of a profile.

Figures 7a to 7e show connecting pieces for abutting edges of the sealing apparatus according to the invention in the form of a profile.

Figure 8 shows an injection nozzle for the sealing apparatus according to the invention in the form of a profile.

Figures 9a/b show the design of the sealing apparatus according to the invention in the form of a profile as a sleeve for tubular bodies.

Figure 10 is a cross-section of a sealing apparatus in the form of a profile held by a clip.

Figure 11 is a pictorial illustration of the method according to the invention for introducing a sealant into sealing apparatuses.

According to Figure 1, the sealing apparatus in the form of profiles consists of a profile 2 which is U-shaped in cross-section, is mounted on a hardened concrete surface 1 and has a top face 4 and two side walls 3. The synthetic profile 2 is mounted on the concrete surface 1 in such a way that the free longitudinal edges 5 of the side walls 3 rest on the concrete surface 1, forming a flow channel 6 between the concrete surface 1 and the profile 2.

The profile 2 can be fastened on the concrete surface 1 by clips or the like. However, a simple screw connection is preferably provided, in which a screw 7 rests with its screw head 8 optionally over a washer (not shown), on the top face 4, penetrates a hole in the top face 4 with its shaft and is screwed, for example, in a dowel arranged in the concrete. Instead of a screw, it is also possible to use a pin or nail (not shown) which is driven into the concrete or is shot using a shooting apparatus, the pin or nail also being able to secure the profile 2 with or without a head. The latter case applies in particular if it passes (shoots) through the profile 2 in a clamping manner. The sealing apparatus according to the invention is therefore positioned stationarily and cannot be displaced by the fresh concrete of the second concrete section. The profile 2 is therefore sufficiently rigid to resist harmful

deformation or crushing by the fresh concrete applied or by the effect of the forces occurring when a concrete vibrator is used.

The sealant is introduced into the flow channel 6 and cannot escape through the walls of the profile 2 because its walls are impervious to sealant. However, the sealant can penetrate outwardly between the longitudinal edges 5 of the profile 2 and the concrete surface 1, and seals pervious regions located in the respective environment, in the regions of the wall connections or the connecting points of the profile 2 in each case or regions capable of absorbing the sealant. The roughness of the concrete surface is normally sufficient to provide an adequate number of outlets for the sealant.

Figure 2 shows a variation in which relatively flexible sealing lips 9, in particular in one piece, are formed on the longitudinal edges 5, the sealing lips 9 consisting of flexible plastic or rubber or the like and assisting the escape of the sealant into absorbent regions.

Figure 2a shows a profile 42 with a trapezoidal cross-section whereas the profile 52 shown in Figure 2b has an arched cross-section. The fastening of the two profiles 42, 52 and the additional arrangement of the sealing lips shown in Figure 2 take place in a similar manner. The advantage of the cross-sectional shapes of the profiles 42, 52 resides, among other things, in the fact that the stackability is substantially increased during storage of profiles 42, 52 of this design, so space can be saved for storage. With these profiles, the side walls 43 and 53 can also consist of a material which is more elastic than the corresponding top faces 44 and 54.

The following figures invariably show a profile with a U-shaped cross-section as an embodiment. It should be noted here that the advantageous embodiments illustrated in the following figures can also be used for other cross-sectional shapes of the profile, in particular for the cross-sectional shapes of the profiles 42, 52.

In Figures 3 and 4, the flow channel 6 is foam-filled in each case with a synthetic strip or synthetic foam having open cells so the sealant is conveyed in the flow channel 6 through the cells of the plastic foam 10. Instead of a foam-filled profile 12, a profile 12 can advantageously be used into which the synthetic foam fits, or is preferably adhered, in the form of a synthetic foam strip. A projection 10a with which the synthetic foam 10 or the synthetic foam strip projects beyond the longitudinal edges 5 of the profile 12 is advantageous. The projection 10a ensures that the longitudinal edges 5 remain spaced somewhat from the concrete surface 1 so that a larger quantity of sealant can escape in this region. The synthetic foam will possibly be crushed somewhat in the region of the projection 10a, but the longitudinal edges of the profile 12 are still at a distance from the concrete surface 1. A profile 12 filled in this way with or without a projection 10a can additionally be provided with sealing lips 9. Relatively pronounced unevenness of the concrete surface 1 can also be compensated by the projection 10a or the sealing lips 9, so a particularly smooth or flat concrete surface 1 is not required prior to the mounting of the sealing apparatus.

Figures 5 and 6 show a variation of the sealing apparatus, a free passage 6a with a base panel 11 arranged approximately in the centre of the height of the side walls 3 being provided in the longitudinal direction of the profile 22 below the top face 4, the base panel having a longitudinal slot 13. Below the base panel 11, the flow channel 6 is filled with a synthetic foam 10 or has a synthetic foam strip, as shown in Figures 3 and 4. Similarly, a projection 10a of the synthetic foam 10 or of the synthetic strip and/or a sealing strip 9 may be provided. Holes or similar apertures can also be provided in the base panel 11 instead of a slot 13 or in combination with a slot 13.

With this alternative embodiment of the sealing apparatus, the sealant is initially introduced and injected or squeezed into the passage 6a and passes through the slots 13 or holes which may be

provided in the base panel 11 into the synthetic foam 10 in the flow channel 6 and thence below the longitudinal edges into the region which is capable of absorbing the sealant and is to be sealed in the joint between the first and second concrete section, for example of a wall connection.

Figure 6a is a cross-section of a further variation of a profile 62. With this profile 62, the passage 6a is formed in that a groove which extends in the longitudinal direction of the profile 62 and represents the free passage 6a is arranged in the internal face of the top face 4 turned toward the flow channel 6. As described with reference to Figures 5 and 6, the sealant is initially introduced into this free passage 6a. Once the passage 6a has been filled, the synthetic foam 10 provided is impregnated with the sealant and subsequently issues in the desired manner in the region of the free longitudinal edges 5.

The cross-section of the profile 62 illustrated in Figure 6a is shown without sealing lips 9 on its left-hand side, producing the above-described projection 10a. Alternatively, as shown on the right-hand side of the cross-section, a fin 46 can be provided as a horizontal extension of the side wall 3, a foam strip 47 being provided below the fin, facing the concrete surface 1. This foam strip 47 is squeezed somewhat as the profile 62 is fastened, but remains sufficiently porous for the sealant to issue through the foam strip 47 at the free end of the fin. In addition, it is possible to fasten the profile 62 on the fin 46 in the concrete surface 1.

The proposed sealing apparatus is particularly simple in construction and is therefore also to provide correspondingly simple connecting elements between the abutting edges of the profiles 2, 12, 22, 42, 52, 62. Connecting elements of which the dimensions are selected in such a way that they can be placed, for example in an interlocking manner and/or non-positively, on the profiles 2, 12, 22, 42, 52, 62 can be connected.

Figures 7a to 7e show that straight connecting pieces 14 (Figure 7a), plane corner angles 15 (Figure 7b), up-ended corner angles 16 (Figure 7c), T-pieces 17 (Figure 7d), or cross-pieces 18 (Figure 7e) can be used. However, connecting elements of any other design are also feasible. The connecting elements can be fastened in the above-described manner by screws, pins, needles or the like, preferably together with the profiles 2, 12, 22, 42, 52, 62, on the concrete surface 1, or can be stuck on the profiles 2, 12, 22, 42, 52, 62 or can be mounted on them by locking means.

However, it is also possible to produce a connecting point by selecting connecting elements of which the cross-sectional shape exactly matches the form of the profile 2, 12, 22, 42, 52, 62. In this case, the profiles 2, 12, 22, 42, 52, 62 are simply placed on the connecting elements, i.e. laid so as to abut with them. The connecting point which can be imagined intellectually as a cross-section can then simply be covered with an adhesive tape to prevent the sealing apparatus from slipping. The individual profiles 2, 12, 22, 42, 52, 62 as well as the connecting elements can then be fastened in the usual way. The adhesive tape can also be guided over the abutting point in several layers, and the adhesive tape should extend at a maximum in the region of the free longitudinal edges 5 on the abutting point or just in front of it. It is not advisable completely to surround the abutting or connecting point as this would prevent the escape of sealant in this region.

Figure 8 shows that, for a particularly simply designed connecting point for the injection of the sealant with the sealing apparatus, the abutting edge 19 of two profiles 2, 12, 22 can be spaced apart and that an injection nozzle 23 of which the dimensions are adapted to the profiles 2, 12, 22 and which, for example, can have the physical shape of the connecting piece 14 is placed over the abutting edge region, a movable, load-bearing, non-porous hose being inserted in a hole 24 arranged, for example, in one side wall 20 of the injection nozzle 23 or

a connecting nozzle placed there, the hole or nozzle being located in the region between the abutting edges 19.

It should again be noted at this point that, on the one hand, other cross-sectional shapes of profiles, in particular the profiles 42, 52, 62, can also have a connecting point designed according to Figure 8 and that it is possible, in particular, to allow the illustrated profiles 2, 12, 22 to abut directly against the injection nozzle 23 if the injection nozzle 23 has the cross-sectional shape of the profiles 2, 12, 22 in an identical manner.

The profiles 2, 12, 22 may be laid not only on plane surfaces 1 but also on arched or curved or round surfaces, for example of pipes or tubes which are surrounded or wrapped with the profiles 2, 12, 22 in the manner of sleeves. For this purpose, notches 25 are punched from the side walls 3 of the profiles 2, 12, 22 or are left out during the moulding of the profiles 2, 12, 22, the notch points 26 ending at the top face 4 or just in front of the top face 4, as shown in Figure 9a.

A profile 2, 12, 22 of this type can be bent according to Figure 9b at least to an arc, preferably to a ring (not shown) because the material of the profiles 2, 12, 22, which is preferably composed of plastic, is sufficiently flexible. The profile 2, 12, 22 is placed against the external surface, for example of a pipe (not shown) and is appropriately bent and fastened on the pipe. The lateral edges 27 of the notches 25 advantageously abut against one another. A second concrete section is then concreted round the pipe in the region of the profiles 2, 12, 22. The sealant is then conveyed via supply systems (not shown) into the interior of the profiles 2, 12, 22, from which it can flow along beneath the longitudinal edges 5 and/or through the abutting edge slots of the notches 25 into absorbent cavities. When laying the profiles in the illustrated manner on curved or bent surfaces, it is desirable to close the notches 29, i.e. to cause the respectively opposed lateral edges 27 of the notches 25 to abut

against one another when the longitudinal edges 5 of the profiles 2, 12, 22 rest firmly on the respective curved or bent surface.

The profiles 2, 12, 22, 42, 52, 62, the connecting elements 7a to 7e and the injection nozzle can advantageously also be held on the concrete surface 1 by a clip 31, a clamping clip which exerts a certain initial tension against the profiles 2, 12, 22, 42, 52, 62 or the connecting elements 7a to 7e and the injection nozzle and therefore prestresses them against the concrete surface 1 preferably being used. A clip 31 of this type can be designed in the form of a conventional pipe clamp so lateral fixing is also achieved. The clip 31 can be fastened on the concrete or on the concrete surface 1 by means of a fastening element which passes through its fastening tabs, in particular a disc, a pin or a nail - as illustrated and described with reference to the fastening of the profiles 2, 12, 22. To save time during assembly, a clip mounting in which the clip 31 is secured by insertion into an interlocking mounting is preferred. Figure 10 shows an embodiment of this, the profiles 2, 12, 22 being shown by way of example but the other profiles 42, 52, 62, the connecting elements 7a to 7e and the injection nozzle 23 also being securable in the same manner.

The clip 31 embraces the profile 2, 12, 22 in the form of a pipe clamp and, for this purpose, is bent substantially into the form of a U at its mounting end so the profile 2, 12, 22 is also held at the sides. From the U-shaped mounting member 32 there extends horizontally or substantially obliquely at a distance a from the concrete surface 1 a retaining arm 33 which continues into a support arm 34 which loops a reinforcing rod 35 extending perpendicularly to the concrete surface 1 and also loops the side of the reinforcing rod 35 facing the profile 2, 12, 22 preferably by extending obliquely to the retaining arm 33. The loop points 36, 37 which consequently have spacing b from one another directed transversely to the concrete surface 1 represent stops which prevent the clip 31 from lifting from the profile 2, 12, 22. The clip 31 preferably consists of a flexible material, in

particular spring steel, the retaining and supporting arm 33, 34 being arranged at such a distance from the concrete surface 1 and the reinforcing rod 35 that the holding arm 33 is prestressed against the concrete surface 1. Between the end part 38 of the supporting arm 34 and the retaining arm 33 there is provided a distance c which is greater than the cross-sectional dimension or the diameter of the reinforcing rod 35. This design allows the support arm 34 to be threaded into the illustrated mounting point by embracing and tilting. The clip 31 preferably consists of a round wire. The sealing apparatus or the profile 2, 12, 22 is preferably arranged centrally between the illustrated reinforcing rods 35. It is therefore possible to hold identical clips 31 selectively or alternately in an interlocking manner and/or non-positively also on the reinforcing rod 35 shown on the left of Figure 10.

Finally, it should also be mentioned that all illustrated profiles 2, 12, 22, 42, 52, 62 as well as the connecting elements 7a to 7e and the injection nozzle 23 can consist of flexible material, preferably plastic.

Finally, Figure 11 shows methods of introducing a sealant into sealing apparatuses in order to seal a joint occurring between two concrete sections. The sealing apparatuses arranged in the joint area are the sealing apparatuses according to Claims 1 to 32. The joint area between a concrete surface 101 and a concrete wall 137 arranged thereon is shown by way of example. A sealing apparatus 138 which has been applied to the concrete surface 101 prior to formwork and concreting the concrete wall 137 is shown schematically in the joint area. Instead of previously arranged inlet nozzles which generally produce tubular connections to the sealing apparatus, the sealing apparatus 138 is concreted in without a connection of this or a similar design with the novel method. After the concreting of and removal of the formwork from the concrete wall 137, a subsequent connection is produced between the exterior of the concrete wall 137 and the sealing apparatus 138, in particular by drilling into the concrete of the

concrete wall 137. The sealant is finally introduced or injected through this bore 139 into the interior of the sealing apparatus 139. It is preferable to provide several such connection points or bores 139 so sealant can be introduced at several points and control points are provided for checking whether the sealant also penetrates the entire sealing apparatus. Control or input points in the forms of bores 139 are preferably arranged at the beginning or end region of the joint - as viewed in the longitudinal direction. The local conditions determine whether the connection is preferably guided horizontally or obliquely to the sealing apparatus 138.



CLAIMS

1. Sealing apparatus for sealing a joint occurring between two concrete sections, consisting of a body of a material impenetrable to sealant forming a flow channel as an injection passage for a sealant and which is fitted in the region of the joint on the concrete surface of one concrete section, from which sealant emerges via an opening into defective areas of the concrete in the joint region when the sealant is injected into the body,

characterised in that

- a) the body consists of a domed profile, of open cross-section and having free longitudinal edges,
- b) the flow channel is bounded by the profile and the concrete surface before injection in that the free longitudinal edges of the profile are placed on the concrete surface, and
- c) the opening is formed between the free longitudinal edges of the profile and the concrete surface.

2. Sealing apparatus as in Claim 1,
characterised in that

the profile, seen in cross-section, is a U-shaped profile (2, 12, 22, 62) with a top face (4) and two side walls (3) coming vertically down from it.

3. Sealing apparatus as in Claim 1,
characterised in that,

the profile, seen in cross-section, is a trapezoidal (42) or arched (52) profile.



4. Sealing apparatus as in one of Claims 1 to 3,
characterised in that

the profile (2, 12, 22, 42, 52, 62) is attached by one or more screws (7), pins or nails passing through transversely to its longitudinal axis and fastening into the concrete.

5. Sealing apparatus as in Claim 4,
characterised in that

the screw (7) or the nail has the screw head (8) or nail head against the top area or the top face (4, 44, 54) of the profile (2, 12, 22, 42, 52, 62), preferably with a washer, has the shaft passing through a hole in the top face (4, 44, 54) and fastens into the concrete surface 1, possibly into a dowel set into it.

6. Sealing apparatus as in Claim 4 or 5,
characterised in that
the pin or nail is shot in.

7. Sealing apparatus as in Claim 5 and/or 6,
characterised in that
the top face (4, 44, 54) is clamped between the screw head (8) and the shaft.

8. Sealing apparatus as in Claim 7,
characterised in that
a counter nut is provided on the screw (7), the pin or the nail for clamping.

9. Sealing apparatus as in one or more of Claims 1 to 8,
characterised in that
spacers are placed between the concrete surface (1) and the inner surface of the top face (4, 44, 54).

10. Sealing apparatus as in one or more of Claims 1 to 9,
characterised in that
the profile (2, 12, 22, 42, 52, 62) consists of one and the same material.



11. Sealing apparatus as in one or more of Claims 1 to 10, characterised in that sealing lips (9), preferably in one piece, are moulded onto the longitudinal edges (5).

12. Sealing apparatus as in Claim 11, characterised in that the sealing lip (9) is made to be flexible, in particular of soft plastic or rubber or something similar.

13. Sealing apparatus as in one or more of Claims 1 to 10, characterised in that on the longitudinal edges (5), when seen in cross-section, there are horizontally arranged fins (46) extending away from the profile (2, 12, 22, 42, 52, 62) with a foam strip (47) placed on the fin surface facing the concrete surface (1).

14. Sealing apparatus as in one or more of Claims 1 to 13, characterised in that the interior of the profile (2, 12, 22, 42, 52, 62) is filled with a synthetic foam (10) having open cells, the sealing medium in the flow channel (6) being able to pass through the cells of the synthetic foam (10).

15. Sealing apparatus as in Claim 14, characterised in that the interior of the profile (2, 12, 22, 42, 52, 62) is completely foamed with synthetic foam (10).

16. Sealing apparatus as in Claim 14, characterised in that a synthetic foam strip is fitted into the interior of the profile (2, 12, 22, 42, 52, 62).

17. Sealing apparatus as in one or more of Claims 14 to 16, characterised in that the synthetic foam (10) or the synthetic foam strip has a



projection (10a) extending beyond the longitudinal edges (5).

18. Sealing apparatus as in one or more of Claims 14 to 17, characterised in that in the longitudinal direction of the profile (2, 12, 22, 42, 52, 62) below the top face (4, 44, 54) there is a free passage (6a) with a base panel (11) arranged approximately in the centre of the height of the side walls (3, 43, 53) which has a longitudinal slot (13) or similar passages, under the base panel (11) the flow channel (6) being filled with synthetic foam (10).

19. Sealing apparatus as in one or more of Claims 14 to 17, characterised in that in the inner surface of the profile (2, 12, 22, 42, 52, 62) facing the flow channel (6), preferably in the inner surface of the top face (4) there is a groove running in the longitudinal direction of the profile (2, 12, 22, 42, 52, 62) which represents a free passage (6a).

20. Sealing apparatus as in one or more of Claims 1 to 19, characterised in that to connect at least two profiles (2, 12, 22, 42, 52, 62) there are connecting elements, preferably of plastic, between the abutting edges of the profiles (2, 12, 22, 42, 52, 62) and exhibiting their cross-sectional shape.

21. Sealing apparatus as in Claim 20, characterised in that the connecting elements are straight connecting pieces (14), plane corner angles (15), up-ended corner angles (16), T-pieces (17) or cross-pieces (18).

22. Sealing apparatus as in Claim 20 or 21, characterised in that the connecting elements can be placed over the profiles (2, 12, 22, 42, 52, 62) and held on them preferably in an interlocking and/or non-positive manner.



23. Sealing apparatus as in one of Claims 20 to 22, characterised in that the connecting elements can be screwed to the concrete surface (1) together with the profiles (2, 12, 22, 42, 52, 62).

24. Sealing apparatus as in one of Claims 1 to 21, characterised in that an impervious adhesive tape is used to connect the profiles (2, 12, 22, 42, 52, 62) to one another or the profiles (2, 12, 22, 42, 52, 62) to the connecting elements at the abutting points.

25. Sealing apparatus as in one of Claims 1 to 24, characterised in that to inject the sealing medium, the profile (2, 12, 22, 42, 52, 62) or the connecting elements have a connection, particularly in the form of a tube or a non-porous hose (21), which is arranged with its free end outside the joint region or a casing.

26. Sealing apparatus as in one or more of Claims 1 to 25, characterised in that the profiles (2, 12, 22, 42, 52, 62) or connecting elements have notches (25) in the side walls (3) of which the notch points (26) end at the top face (4, 44, 54) or just before the top face (4, 44, 54).

27. Sealing apparatus as in Claim 26, characterised in that the profiles (2, 12, 22, 42, 52, 62) or connecting elements are arched about their longitudinal axis and can be fastened on a curved concrete surface (1) or on a curved or circular body, for example a pipe, the lateral edges (27) of the notches (25) abutting against one another and the notches thus being closed when the longitudinal edges of the side walls (4, 44, 54) lie on the concrete surface (1) or the body.

28. Sealing apparatus as in one or more of Claims 1 to 27, characterised in that



the profile (2, 12, 22, 42, 52, 62) and/or a connecting element (14, 15, 16, 17, 18) are held by a pipe-clamp-shaped clip (31).

29. Sealing apparatus as in Claim 28, characterised in that

the clip (31) has, at the free end of its retaining arm (33) which extends approximately parallel or slightly at an angle to the concrete surface (1), an attachment device for attaching to a reinforcing rod (35).

30. Sealing apparatus as in Claim 29, characterised in that

the attachment device is formed by a curve of the retaining arm (33) through about 360° taking a diagonal course, preferably towards the side of the support arm (34) so formed facing away from the profile being retained, the diameter of the bend and the distance (c) from the starting area to the finishing area of the bend being greater than the diameter of the reinforcing rod (35).

31. Sealing apparatus as in one or more of Claims 27 to 30, characterised in that

the spring clip (31) is made of a material which bends elastically, in particular spring steel.

32. Sealing apparatus as in one or more of Claims 27 to 31, characterised in that

the clip (31) is bent out of preferably round wire.

33. A method for introducing a sealing medium into a sealing apparatus as in one or more of Claims 1 to 32, in which after laying the sealing apparatus and subsequent hardening of the second concrete section and removal of the formwork, at least one connection is made between an outer side of the concrete and the sealing apparatus especially by boring into the hardened concrete, through which finally the sealing medium is introduced into the interior of the sealing apparatus.