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INJECTING ADHESIVES AND OTHER
SUITABLE CRACK FILLING MATERIALS

5 This invention relates to an apparatus for
injecting adhesives and other suitable crack filling
materials into a crack in concrete, stone or other
inorganic materials.

10 In order to repair cracks in concrete, stone and
the like, existing methods inject into the crack
adhesives of a liquid or grease type. This injection is
made either at a high pressure and at a high speed,
or at low pressure and at a low speed depending on the
condition of the crack and the kind of adhesive being
15 used. High speed injection provides for more efficient
use of time than low speed injection.

20 When a large number of cracks are repaired, the
total of length of cracks be filled is long and a large
number of workers are required to do this. Prolonged
work at an elevated position may injure workers' health
under a hot or a cold climate. The cracks which require
filling are often in exposed and dangerous places on the
sides of buildings, on bridges and other structures.

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The internal volume of the cracks cannot be judged from the outside and it is therefore difficult to know exactly the quantity of adhesives injected into the cracks. This is disadvantageous since an accurate calculation of the materials used cannot be made.

One object of the present invention is to increase the speed of injection of adhesives into cracks in concrete and the like, and to make the injection of adhesives more efficient in terms of man hours spent on the job.

A second object of the present invention is to provide a method of injecting adhesives which allows the quantity of adhesives used to be simply measured.

According to one aspect of the present invention there is provided apparatus for injecting adhesives and other suitable crack filling materials into a crack in concrete, stone or the like comprising a syringe type device having a cylinder for containing said adhesive, said cylinder having a nozzle and a piston movable within said cylinder to cause the adhesive to flow through said nozzle, said syringe type device being arranged to attach in communication with socket means

attached over a crack in said concrete, said apparatus
further comprises means to urge the discharge or partial
discharge of the contents of the cylinder through said
nozzle, wherein the means to urge the discharge of the
5 contents of the cylinder are disposed externally of said
cylinder.

Embodiments of the invention will have one or more
of the following features

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- (a) An injection device with a transparent cylinder
having a scale graduated upward from the lower end
to the upper end, and with a piston which can move
forward and backward in the cylinder:

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(b) Guide means fixed over a crack to which the injection device can be attached once the adhesives have been drawn into the injection device

5 (c) Rubber bands or springs arranged to push the piston forward into the cylinder by contraction of springs or rubber or by the expansion of compressed springs.

10 Since the injecting device comprises a cylinder and a piston inserted into the cylinder, adhesives can be drawn into the cylinder simply by moving the piston backwards. No other devices are required.

15 The nozzle projected at the top end of the cylinder connects easily to a socket guide means fixed over a crack.

20 The piston is then automatically moved forward by contraction of rubber or springs to inject adhesives into the crack while the injecting device is left as it is.

25 Even when adhesives are injected with a low pressure and at a low speed, the injecting work can be efficient and quick because injection can be made simply by connecting

an injection device to each one of the sockets fixed over the cracks, one after another.

5 The cylinder is made of transparent material and is graduated upward from the tail end to the top end facing to the wall.

10 By pulling the piston back to the zero on the scale when drawing adhesives into the cylinder, the final position of the piston directly indicates the quantity of adhesives injected into a crack, and the injecting quantity can be known at a glance without the need to perform calculations.

15 Since the injection of adhesives can be made quickly, and the injected quantity is known exactly, there is no need for the worker to keep holding a gun for adhesives injection for a long time, which helps prevent the worker from being injured.

20 Another advantage is that total quantity of adhesives used can be known simply by adding readings on the cylinder scale. There is no need to carry heavy equipment such as an adhesives mixer and filler near to any

cracks since adhesives are drawn into the injecting device in advance.

5 As only the cylinder containing adhesives is carried, the preliminary process before injection can be simpler.

The adhesive agent does not flow back into the syringe after injection because the piston is kept depressed by rubber bands and injection work can be continued without
10 worrying. Additional injection is also possible by changing injecting devices one after another.

The following describes the invention by way of-example only with reference to the drawings in which;

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Figure 1 is a part sectional view of an adhesive injection syringe attached to socket guides means covering a crack in a concrete structure;

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Figure 2 is a front view of the adhesive injection syringe shown in Figure one; and

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Figure 3 is a part sectional view of a further adhesive injection syringe attached to a further socket guide means by means of rubber bands.

Referring to the drawings, apparatus for injecting adhesives into a crack comprises an injection syringe, 10, which is attached to a socket or coupling means, 4, the socket means being positioned over a crack, 2, in a piece of concrete, 1.

The socket means, 4, has an annular flange, 6, which is formed integrally with one end of a circular pipe, 5. The pipe has a through bore, 5A. In the end portion of the pipe remote from the flange there is an internal screw thread, 8. The flange, 6, of the socket means, is attached to the surface of the concrete around the crack, 2, by adhesive, 7. An annular seal, 3, secures the socket to the surface of the concrete, the seal covering the outer peripheral edge portion of the flange, 6, and the surface of the concrete, 2, adjacent to the outer peripheral edge of the flange. The seal, 3, is made from putty.

The injection syringe comprises a transparent cylinder, 11, open at its upper end. The lower end of the cylinder is partly closed by a truncated conical portion, 41, and terminates in a neck which forms a nozzle, 17. A screw thread, 18, is formed on the outer surface of the nozzle. At the lower end of the cylinder close to the

truncated conical portion there are two laterally
extending projections 12A and 12B each of which terminates
with a downwardly depending lug. On the outer surface
of the cylinder, 11, there is a graduated scale, 16,
5 which runs from 50cc at the lower end of the cylinder to
0cc towards the upper end.

Extending into the cylinder there is a piston, 13.
The piston has a head, 21, with a conical tip which
10 locates against adhesive, 20, inside the cylinder, 11.
The upper end of the piston projects from inside the
cylinder and carries a bar, 42. On each end of this bar
are laterally extending projections 14A and 14B each of
which terminates in an upwardly depending lug. These
15 projections 14A and 14B, are arranged to align with the
extending projections 12A and 12B. Two rubber bands,
15, are stretched one each over and between the
projections 12A and 14A and over and between projections
12B and 14B and are held there by means of the lugs.

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In use adhesive, 7, is placed on the flange, 6, and
the socket, 4, is fixed by means of the adhesive over
the crack, 2. The socket is sealed to the surface of
the concrete with putty, 3.

The adhesive agent, 20, is drawn into the cylinder, 11, and the syringe, 10, is connected to the socket means, 4, by screwing the nozzle, 17, into the socket means so that the inside of the cylinder, 11, containing adhesive is in communication with the crack, 2, via the nozzle and socket means.

The rubber bands, 15, are then stretched between the projections 12A and 14A and projections 12B and 14B. These bands are in tension and act to urge the projections 14A and 14B towards the projections 12A and 12B. This in turn pushes the piston downwardly inside the cylinder, 11, reducing the volume inside the cylinder available for adhesive, 20, hence forcing adhesive through nozzle, 17, socket means, 4, and into the crack, 2. When the crack has been filled with adhesive the piston will cease to move, the rubber bands can be disconnected and the injection syringe is unscrewed from the socket and can be screwed into further socket means, not shown, attached over the same crack or over a different crack.

A modified syringe, 10A,

is shown in Figure 3, corresponding features are shown by the same reference numbers as are used in Figures 1 and 2. The socket means, 24, has at its end remote from the flange, 6, laterally extending projections 22A, and 22B, each terminates with a downwardly depending lug. The bore of the socket means, 27, is not screw threaded but tapers gradually from a relatively wide upper and to a relatively narrow lower end. The lower end of the cylinder, 11, is free from extending projections and the outer surface of the nozzle is gradually tapered corresponding to the taper of the bore of the socket means so that the syringe push fits into the socket means, 24. The rubber bands, 15, are stretched between projections 14A and 22A and 14B and 22B.

In use, the embodiment 10A operates in essentially the same fashion as embodiment 10, previously described, with rubber bands urging adhesive from the cylinder, 11, into a crack via nozzle and socket means.

Other embodiments are also possible, which lie within the scope of the present invention. For example, instead of using putty to seal the socket to

the surface of the concrete surrounding the crack,
inorganic sealing agent may be used or a tape of hot
metal type can be laid and heated.

5 It is possible to use fine coil springs
between the hooks instead of rubber bands to advance the
piston downwardly into the cylinder. The piston may also
be advanced by using coil springs placed behind the
piston.

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The apparatus for injecting adhesives described
above has the following advantages over the prior art
methods. The injection work is more efficient in terms
of man hours spent since injection of adhesive into a
15 crack is automatic once the apparatus is in position.

Since the cylinder is made from transparent
material, and is graduated, by taking a reading of the
quantity of adhesive inside the cylinder before and
20 after the injection has been carried out, the amount of
adhesive injected into the crack can be calculated by
subtracting the amount of adhesive left in the cylinder
after injection from the amount in the cylinder before
injection.

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CLAIMS:

1. Apparatus for injecting adhesives and other
suitable crack filling materials into a crack in
5 concrete, stone or the like comprising a syringe type
device having a cylinder for containing said adhesive,
said cylinder having a nozzle and a piston movable
within said cylinder to cause the adhesive to flow
through said nozzle, said syringe type device being
10 arranged to attach in communication with socket means
attached over a crack in said concrete, said apparatus
further comprises means to urge the discharge or
partial discharge of the contents of the cylinder
through said nozzle, wherein the means to urge the
15 discharge of the contents of the cylinder are disposed
externally of said cylinder.
2. Apparatus as claimed in claim one wherein the
cylinder of the syringe is transparent and is marked to
20 allow the calculation of the amount of adhesive used
after each discharge or partial discharge of adhesive.



3. Apparatus as claimed in claims 1 or 2 wherein the means to urge the discharge of said cylinder's contents are rubber bands.

5 4. Apparatus as claimed in claims 1 or 2 wherein the means to urge the discharge of said cylinder's contents are coil springs.

10 5. Apparatus as claimed in claim 3 wherein the rubber bands are stretched between projections on the piston and the cylinder of the syringe.

15 6. Apparatus as claimed in claim 4, wherein the coil springs are stretched between projections on the piston and the cylinder of the syringe.

20 7. Apparatus as claimed in claim 3 wherein the rubber bands are stretched between projections on the socket guide means and projections on the piston of the syringe.

8. Apparatus as claimed in claim 4, wherein the coil springs are stretched between projections on the socket



guide means and projections on the piston of the syringe.

5 9. Apparatus as claimed in any preceding claim wherein the socket guide means comprises a conduit provided with an integral flange.

10. Apparatus substantially as hereinbefore described and with reference to the accompanying drawings.

