



(12)

EUROPEAN PATENT APPLICATION

(21) Application number : **91306537.1**

(51) Int. Cl.⁵ : **E04F 21/14**

(22) Date of filing : **18.07.91**

(30) Priority : **20.07.90 GB 9016032**

(43) Date of publication of application :
22.01.92 Bulletin 92/04

(84) Designated Contracting States :
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

(71) Applicant : **NORTHERN CHIMNEY LINING
SYSTEMS LIMITED**
21, Willow Crescent, Wrose
Bradford, West Yorkshire (GB)

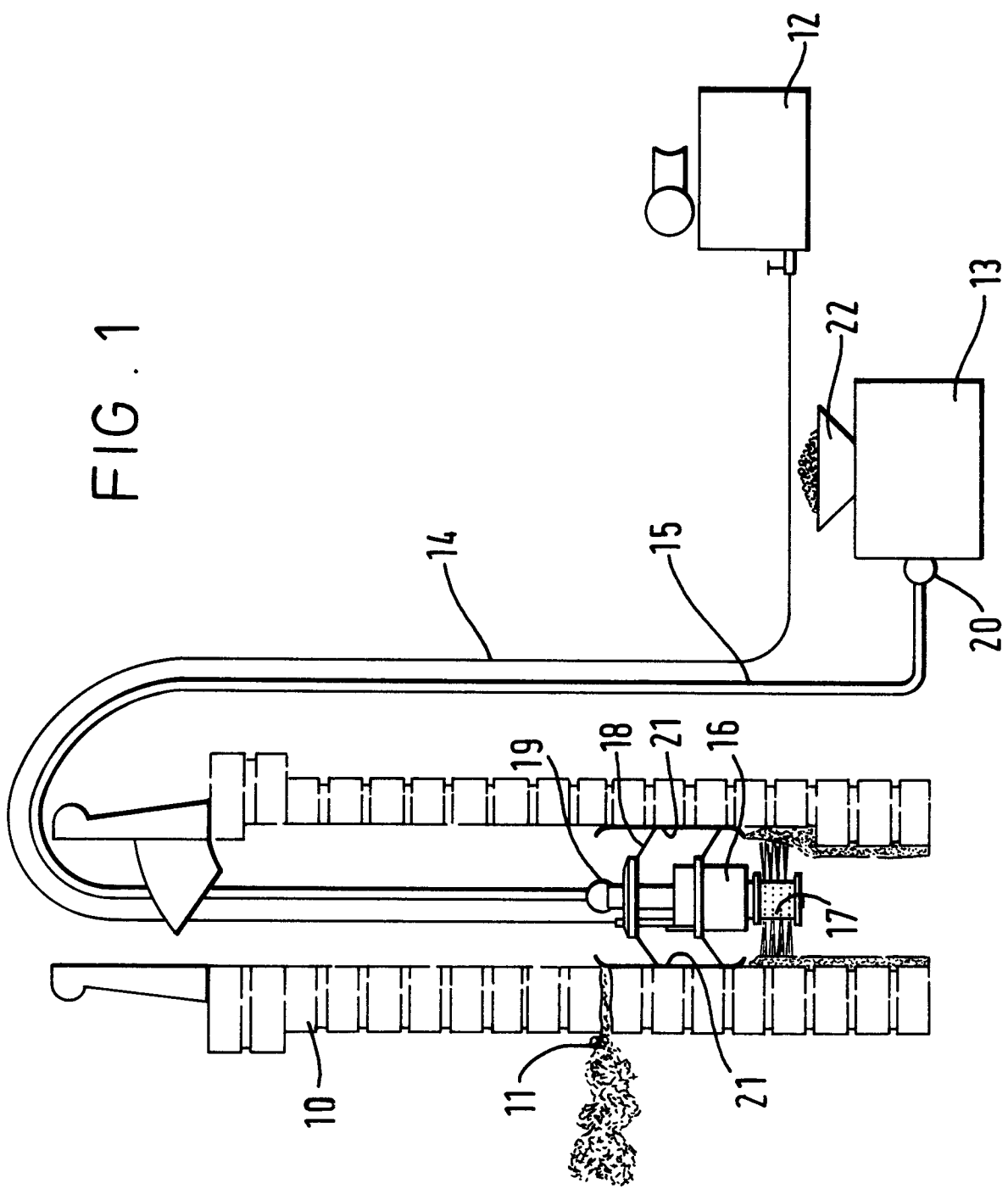
(72) Inventor : **Barnes, Allan**
21, Willow Crescent, Wrose
Bradford, West Yorkshire (GB)

(74) Representative : **Neill, Alastair William**
APPLEYARD LEES 15 Clare Road
Halifax, Yorkshire HX1 2HY (GB)

(54) **Sealing method and apparatus.**

(57) A method and apparatus is provided for sealing chimneys. The apparatus comprises a spray device 16 positionable within a chimney 10, and operable to spray sealant from the spray device onto the internal walls of the chimney, there being means 15, 18 for moving the spray device along at least a part of the length of the chimney. There is a sealant feed pipe 15 which provides sealant to a spray head and can also be used to lower the device down a chimney. The device is guided and centralised by a sledge 18 which may be fitted with wheels and may be adjustable to suit different diameters of chimney.

FIG. 1



The invention relates to a method and apparatus for sealing chimneys.

The need to seal chimneys is a problem which has been known for some considerable time. Old chimneys obviously deteriorate, from a combination of heat, acid attack, and ageing of brickwork and mortar. The consequences can prove disastrous, since toxic fumes can leak into the building.

There are several known techniques for sealing chimneys to provide an efficient chimney flue.

One possibility is to cut into the chimney stack and re-build it with a ceramic liner. This is however very disruptive and very expensive.

Another possibility is to line the chimney with a flexible stainless steel liner, but this sort of liner is not suitable for all forms of heating.

A third known technique involves inflating a rubber former within the chimney, the former having the shape of a long thin balloon. The liner is held clear of the chimney walls by steel spacers and a heat resistant sealing compound is then pumped into the chimney filling the space around the liner.

This is a very effective system, but a lot of preparation work is required, and the process is quite lengthy to carry out.

We have now developed yet another system which is at least as effective as known systems, but is much easier to carry out.

Accordingly, our invention provides a method of sealing a chimney, comprising positioning a spray device within the chimney, spraying sealant from the spray device onto the internal walls of the chimney and moving the spray device along at least a part of the length of the chimney.

Preferably, the spray device is moved along the entire length of the chimney, but where leakage from the chimney is only a problem over part of the length of the chimney, then the method may be used merely to seal this part.

The invention includes apparatus for sealing a chimney, comprising a spray device positionable within the chimney, and operable to spray sealant from the spray device onto the internal walls of the chimney, and means for moving the spray device along at least a part of the length of the chimney.

The means for moving the spray device may comprise a sealant feed pipe by means of which the spray device can be lowered down a chimney.

The spray device may have a rotatable spray head to throw sealant out onto the internal walls of the chimney.

Means may be provided to guide the spray device along the length of the chimney.

The guide means may be arranged to centralise the spray head in the chimney.

The guide means may comprise a sledge having a plurality of skids spaced apart around the spray device, each skid being arranged to contact a part of

the wall of the chimney.

The spray device may be operated by compressed air.

There may be two feed pipes, one to feed the sealant and one to feed compressed air.

The sealant may be fed to the spray device by a sealant pump.

Different sizes of centralising sledge may be provided to suit different diameters of chimney.

Alternatively, the size of the sledge may be adjustable. The sledge may for example be adjustable to suit chimneys having diameters of 6", 9" and 12".

For some applications, a preliminary adhesive may be sprayed onto the internal walls of the chimney, to assist the bonding of the sealant to the chimney walls.

The invention includes chimneys when sealed using the method or apparatus according to the invention.

The invention includes a spray sealant for use in sealing chimneys.

The sealant may comprise 45% to 65% by volume of calcined alumina, 25% to 35% by volume of silica sand/flour, 7% to 15% by volume of plastic ball clay, reduced to a powder, and 4% to 10% by volume of a binder.

The binder may comprise soluble silicate powder.

The particle size of the calcined alumina may be 60 mesh.

The particle size of the silica sand/flour may be 30 mesh.

By way of example, specific embodiments of the invention will now be described, with reference to the accompanying drawings in which :

Figure 1 is a diagrammatic illustration of an embodiment of method and apparatus according to the invention in use; and

Figure 2 shows an alternative embodiment of centralising sledge.

Figure 1 shows a typical brick built chimney 10, one leaking joint being shown, by way of example only, at 11. In serious cases, an entire chimney can be defective, for example because of broken or faulty mortar, and cracked or porous brickwork.

The apparatus comprises a compressor 12, a sealant pump 13, an air line 14, a delivery hose 15, a spray device 16 having a spray head 17, and a centralising sledge 18.

The compressor is connected to the spray device 16 by the air line 14. The sealant pump 13 is releasably connected to the spray device 16 by hose couplings 19 and 20.

The spray head 17 is arranged to rotate at high speed on the spray device 16, driven by a compressed air motor within the spray device. Rotation of the spray head, coupled with pumping of the sealant under pressure into the spray head, causes sealant to be sprayed out onto the internal walls of the chimney

10.

For some applications, where the material of the chimney is such that the sealant is unlikely to adhere securely to the chimney material, an adhesive spray nozzle is initially lowered down the chimney to spray preliminary adhesive over the internal walls of the chimney. This increases the degree of bonding between the sealant and the chimney walls.

Once the chimney has been cleaned and is ready for sealing, the spray device 16 is lowered down to the bottom of the chimney by means of the delivery hose 15. The compressor 12 and sealant pump are then started, and as the sealant sprays out of the spray head 17, the device is gradually hauled back up the chimney until the entire length of the chimney is sealed.

Alternatively, only a limited length of the chimney may be sealed if there is a single readily identifiable problem in a particular area.

In order to ensure that the device 16 moves centrally along the chimney, adjustable skids 21 of the sledge 18 are moved to a position in which they lie adjacent to the internal walls of the chimney, with the spray device 16 centrally positioned between the skids.

In this particular embodiment, the chimney sealant compound comprises 45% to 65% by volume of 60 mesh calcined alumina, 25% to 35% by volume of 30 mesh silica sand/flour, 7% to 15% by volume of plastic ball clay reduced to a powder, and 4% to 10% by volume of soluble silica powder.

Further details of the process are as follows.

If it is necessary to apply preliminary adhesive, the apparatus as shown in the Figure is used, except that the delivery hose 15 is connected to the adhesive spray nozzle, instead of to the spray device 16. A hopper 22 on the sealant pump is filled with a sufficient quantity of adhesive. The nozzle is initially held over the hopper 22, the pump is turned on, and then the speed of the pump is regulated until a good spray pattern is exhibited. During this test period, the adhesive sprays back into the hopper.

The pump is then turned off, the nozzle is taken to the top of the chimney, and is inserted in the top of the flue. The pump is then turned on again, and the nozzle is lowered slowly down the flue, making sure that as much of the flue is sprayed as is possible.

The pump 13 and delivery hose are then washed out ready for use in applying the sealant.

One embodiment of adhesive that may be used is a soluble silicate liquid, compatible with the chimney sealant compound.

The pump and compressor should be set up on level ground as near as possible to the chimney. The spray device 16 is reconnected to the pump using the delivery hose 15 and the air line is connected between the compressor and the spray device.

The compressor 12 is turned on with its outlet

valve closed.

Approximately half a pint of water is placed in the pump and is pumped into the delivery hose.

The mixed sealant is then loaded into the hopper 22 and pumping continues.

The spray head 17 is initially positioned in a bucket to collect the water as it is pumped through the system and the pump is then switched off.

The spray head 17 is then held in or above the hopper 22 and the pump 9 is switched on again until pump sealant runs out of the spray head into the hopper.

The air valve on the compressor 12 is now opened and the spray pattern exhibited by the spray head 17 can be inspected.

The compressor is then adjusted to vary the pressure until a satisfactory spray pattern is produced. It has been found that the optimum pressure is somewhere between one bar and five bar, for example two bar.

The sealant should be allowed to pump back into the hopper for about three to four minutes to ensure that there is nothing in it that will block the spray head. The pump and air supply are then switched off, the spray head is taken to the top of the chimney and is lowered down inside it. The pump and air supply are then switched on again and spraying proceeds as already mentioned in the general description above.

If necessary, the spray device 16 may be moved along the chimney more than once, to ensure full coverage.

Other arrangements and configurations are of course possible. A different range of sledge sizes may be provided for example, as an alternative to an adjustable sledge. In general, the skids 21 should be set at a diameter 1" less than the internal diameter of the chimney.

Turning now to Figure 2, an alternative form of centralising sledge 23 is shown. The sledge comprises a metal cylinder 24 which is about 100 mm in length. The spray head 17 can be secured within this cylinder by means of fixing bolts 25.

At one end of the cylinder, there are four lugs 26, spaced apart at 90° intervals. The internal diameter of the cylinder is about 50 mm.

Each lug 26 has a hole 27 therein.

The sledge is shown in Figure 2 in exploded form. In use, each lug 26 has bolted thereto a pair of arms 28 and each arm carries at its free end a rotatable wheel 29.

The arms are secured to the lugs by a bolt which passes through holes 30 in the arms and hole 27 in the associated lug. A butterfly nut (not shown) is secured to the bolt.

For the sake of clarity, only two pairs of arms are shown in Figure 2, although it will be appreciated that in practise there are four pairs of arms. Thus, each end of the sledge is supported by four wheels which

engage with the internal wall of the chimney.

By slackening the butterfly nuts and pivoting the arms, the overall external dimensions of the sledge can be adjusted to suit many sizes of chimney.

For particularly large chimneys, longer arms can be used.

In use, the spray head is arranged to project from the lower end of the cylinder 24 to appoint lying below the lower wheels 29, so that the wheels do not hinder the spray pattern emerging from the spray head.

The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

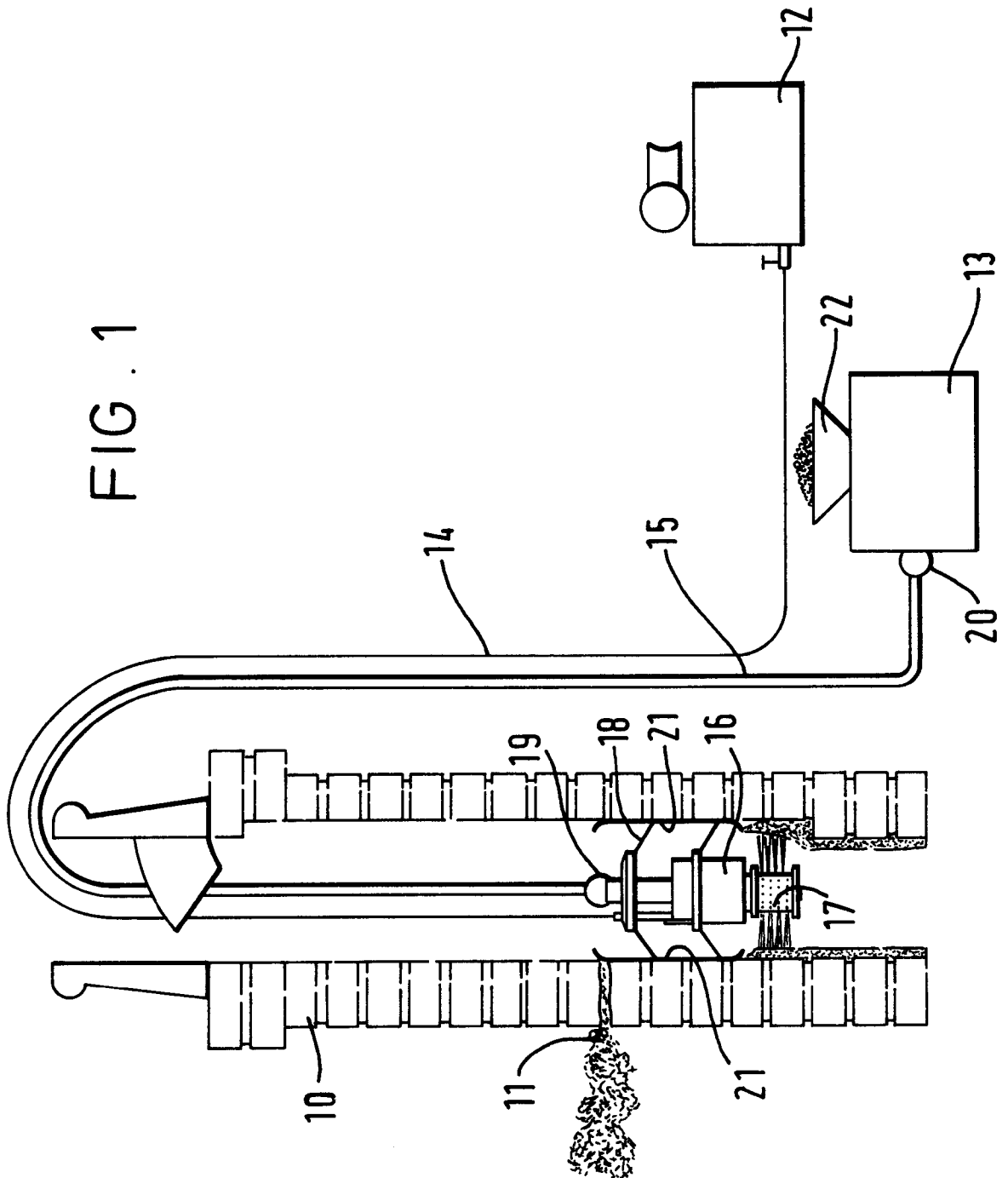
Claims

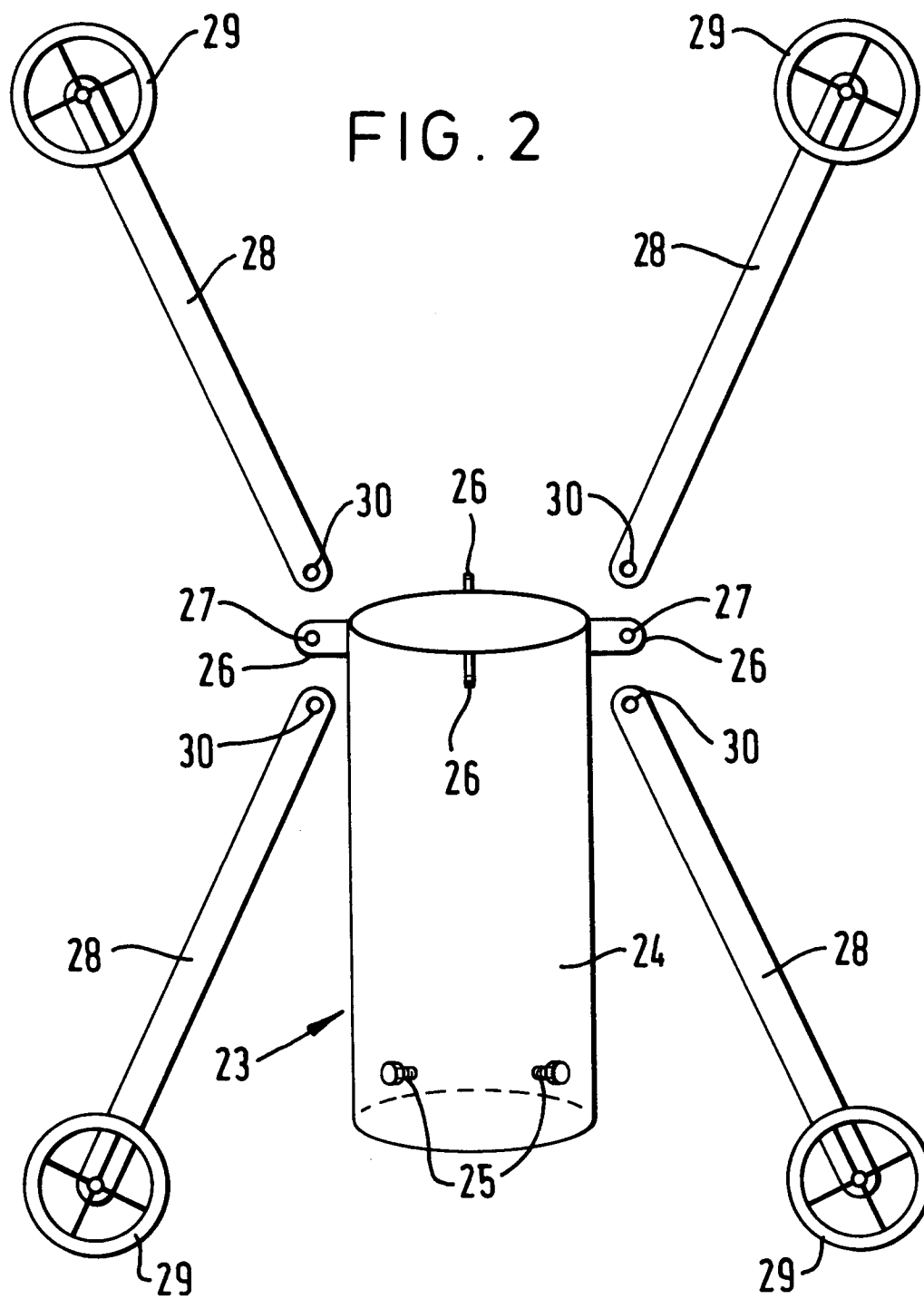
1. A method of sealing a chimney, characterised by the steps of positioning a spray device within the chimney, spraying sealant from the spray device onto the internal walls of the chimney and moving the spray device along at least a part of the length of the chimney.
2. A method as claimed in Claim 1, in which the spray device is moved along the entire length of the chimney.
3. Apparatus for sealing a chimney, characterised in that it comprises a spray device (16) positionable within the chimney (10), and operable to spray sealant from the spray device onto the internal walls of the chimney, and means (15, 18) for mov-

ing the spray device along at least a part of the length of the chimney.

4. Apparatus as claimed in Claim 3, in which the means for moving the spray device (16) comprises a sealant feed pipe (15) by means of which the spray device can be lowered down a chimney.
5. Apparatus as claimed in any one of the preceding Claims, including means (18) to guide the spray device (16) along the length of the chimney.
6. Apparatus as claimed in Claim 5, in which the guide means (18) is arranged to centralise a spray head (17) in the chimney.
7. Apparatus as claimed in Claim 6, in which the guide means (18) is adjustable to such different diameters of chimney.
8. A spray sealant for use in sealing chimneys, comprising 45% to 65% by volume of calcined alumina, 25% to 35% by volume of silica sand/flour, 7% to 15% by volume of plastic ball clay, reduced to a powder, and 4% to 10% by volume of a binder.
9. A spray sealant as claimed in Claim 8, in which the binder comprises soluble silicate powder.
10. A spray sealant as claimed in Claim 8, in which the particle size of the calcined alumina is 60 mesh and -the particle size of the silica sand/flour is 30 mesh.

FIG. 1







European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 30 6537

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	AT-A-379 425 (VRBA FRANZ) * the whole document *	1-7	E04F21/14
X	AT-A-389 553 (VRBA FRANZ) * the whole document *	1-7	
X	DE-U-8 626 491 (ZELLNER) * page 1 - page 2; figure 1 *	1-6	
A	FR-A-2 418 849 (SOCIETE CIVILE DE RECHERCHES APPLIQUEES A LA MECANIQUE)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E04F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 09 OCTOBER 1991	Examiner VIJVERMAN W.C.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application I : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1502 03.92 (P0401)