


EUROPEAN PATENT APPLICATION

 Application number: 89302417.4

 Int. Cl.⁵: **B01F 5/06**

 Date of filing: 10.03.89

 Date of publication of application:
 12.09.90 Bulletin 90/37

 Designated Contracting States:
AT BE CH DE ES FR GR IT LI LU NL SE

 Applicant: **Briggs, Leslie George**
Treehurst 28 Western Road
Rayleigh Essex(GB)

Applicant: **Coventry, Edward Kenneth**
Little Bassetts Farm Magpie Lane
Little Warley Brentwood Essex(GB)

 Inventor: **Briggs, Leslie George**
Treehurst 28 Western Road
Rayleigh Essex(GB)

Inventor: **Coventry, Edward Kenneth**
Little Bassetts Farm Magpie Lane
Little Warley Brentwood Essex(GB)

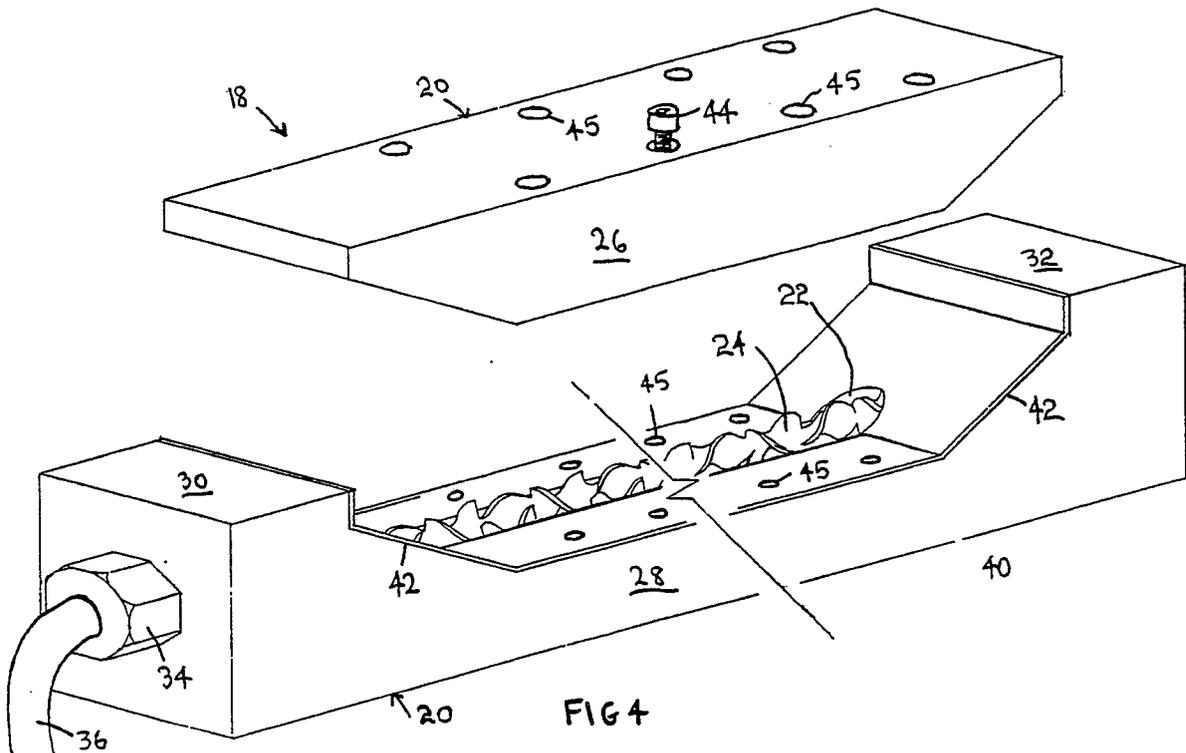
 Representative: **Jones, Graham H.**
Graham Jones & Company 77 Beaconsfield
Road Blackheath
London SE3 7LG(GB)

 **A mixing unit.**

 A mixing unit (18) comprising a housing (20), a bore (22) in the housing (20), and a mixing device (24) which extends along the bore (22), the housing

(20) being such that it is formed of at least two parts (26,28) for the purpose of allowing cleaning of the mixing device (24) and the bore (22).

EP 0 386 354 A1



This invention relates to a mixing unit, for example for use in mixing a chemical sealant and a chemical hardener so that the mixture can then be used for sealing double glazing panels.

In the glazing industry, manufacturers of double glazing panels for windows, sliding doors and other products seal glass panels in spaced apart relationship using a sealing mixture which is formed of a chemical sealant and a chemical hardener. The sealant and the hardener are forced along a known mixing unit which comprises a spiral mixing device formed of a plurality of spiral segments which are offset from one another. The spiral mixing device is located in the bore of a tube and the sealant and the hardener become mixed together as they pass over the spiral segments along the length of the spiral mixing device. The formed sealing mixture then sets in a relatively short time, for example from 15 to 40 minutes. The setting time or pot life of the sealing mixture can vary with conditions so that a warm environment can cause the sealing mixture to set more speedily than it would otherwise have done. Some of the sealing mixture invariably sets in the known mixing unit, for example on the spiral segments of the spiral mixing device, and on the inside of the pipe.

Substantially the entire glazing industry uses the known mixing unit and the above mentioned problem of setting or gelling of the sealing mixture in the known mixing unit means that the known mixing unit has to be flushed through immediately at the end of each working day in order to keep it free. Even with daily flushing with a chemical solvent such for example as trichloroethylene, after a period of about one week, there is often a substantial build up of sealing mixture within the mixing unit and this means that the sealant and hardener have to be pumped through the mixing unit at increased pressure. The mixing device soon becomes blocked and it cannot be used. Flushing with the chemical solvent cannot remove the blockage and it is necessary to remove the spiral mixing device. However, the spiral mixing device gets stuck in the mixing unit due to the gelled sealing mixture and it is not possible simply to pull the spiral mixing unit out from the bore of the pipe. It is necessary to heat the pipe, usually with acetylene burners, in order to cause the set sealing mixture to go very hard. The very hard sealing mixture can then be broken away. In addition to the heated pipe giving off unpleasant fumes from the gelled sealing mixture, the heating of the pipe tends to distort the pipe, as can tapping the pipe to break away the hard set sealing mixture. Distortion of the pipe can in turn prevent the smooth introduction and removal of the spiral mixing device.

Factories producing double glazing units may have several of the known mixing units in operation

on machines sealing the edges of double glazing units. The daily cleaning of the mixing units is time consuming and the machines cannot operate whilst cleaning is taking place. The weekly heating of the mixing units is especially time consuming and apart from the loss of working time for the machine during the heating and dismantling of the mixing units, there is the additional problem that the continued heating tends to distort the pipe, resulting in the fact that a new mixing unit may be required after a period of about three months. The known mixing units are not cheap items to purchase and this all adds to manufacturing costs.

It is an aim of the present invention to reduce the above mentioned problem.

Accordingly, this invention provides a mixing unit comprising a housing, a bore in the housing, and a mixing device which extends along the bore, the housing being such that it is formed of at least two parts which are separable to open up the bore and expose the mixing device for the purpose of allowing cleaning of the mixing device and the bore.

preferably, the housing is an elongate housing.

The housing may be longitudinally separable into two parts. Preferably, the housing is longitudinally separable into two parts about a centre line of the bore.

The housing may be such that it has one end part having an inlet fitting for connection to a feed pipe for a chemical sealant and a chemical hardener to be mixed, and another end part having an outlet fitting for connection to an outlet pipe for receiving the mixed chemical sealant and chemical hardener.

The housing will usually have flat sides. The housing will thus usually be square or rectangular in cross section.

The parts of the housing may be such that they bolt together. Other ways of connecting the parts of the housing together may however be employed.

The mixing device preferably includes at least one sealing gasket for giving a seal between the parts of the housing when they are secured together. The or each sealing gasket is preferably a copper gasket. Other types of gaskets and other types of sealing devices may however be employed.

The mixing device used in the mixing unit of the invention may be of the standard known construction. Thus, the mixing device may be composed of a plurality of spiral segments which are off-set from one another. Usually, the spiral segments will be off-set from one another by 90°. The mixing device may be in two or more separate connected parts. Other types of mixing devices may be employed.

The mixing unit may be connected to dispensing means for dispensing mixed chemical sealant and chemical hardener. The dispensing means may be a dispensing gun.

The chemical sealant may be a polyurethane resin. The polyurethane resin has a putty-like consistency. The chemical hardener may be a diisocyanate hardener. The diisocyanate hardener is a liquid. Preferably, 12% by weight of the diisocyanate liquid hardener is mixed with 88% by weight of the polyurethane resin sealant. The mixing of the liquid hardener with the putty-like sealant occurs very nicely in the mixing unit of the present invention, in spite of the fact that it is usually difficult to get liquids and semi-solids to mix together satisfactorily.

The present invention also extends to a glazing work station including at least one of the mixing units.

Usually, the glazing work station will include two of the mixing units, one being for feeding a static dispensing gun, and the other being for feeding a moving dispensing gun. Usually the glazing work station will be for producing double glazed sealing units but it may also be for producing other products which require to be sealed.

Embodiments of the invention will now be described solely by way of example and with reference to the accompanying drawings in which:

Figure 1 is a section through a known mixing unit;

Figure 2 shows the outside of the known mixing unit;

Figure 3 shows a section through the known mixing unit which is like the section shown in Figure 1 but which shows the known mixing unit in a blocked condition;

Figure 4 is an exploded view of a first mixing unit in accordance with the invention;

Figure 5 is an exploded view of a second mixing unit in accordance with the invention;

Figure 6 shows in more detail the bottom part of the mixing unit shown in Figure 5; and

Figure 7 shows two of the mixing units shown in Figure 4 in use in a glazing work station.

Referring to Figures 1, 2 and 3, there is shown a known mixing unit 2 which comprises a mixing device 4 located in a bore 6 of the pipe 8. The pipe 8 has an inlet connection nut 10 at one end and an outlet connection nut 12 at its other end.

As can be seen from Figure 1, the mixing device 4 comprises a plurality of spiral segments 14 which are off-set from one another by 90°. In use of the mixing unit 2, a sealing mixture of a chemical sealant and a chemical hardener is forced in a known manner through the pipe 8 and the sealant and the hardener become mixed together as they pass over the spiral segments 14. If the

known mixing unit 2 is not washed out quickly enough after use with an appropriate chemical solvent, the sealing mixture in the bore 6 of the pipe 8 can set. Figure 3 shows set sealing mixture 16. Even if the known mixing unit 2 is washed out in time, a build up of sealing mixture invariably occurs so that the situation shown in Figure 3 with set sealing mixture 16 in the pipe 8 still occurs after a period of use of, for example, one week. The set sealing mixture 16 prevents the cleaning chemical solvent from being used and it is necessary to heat the outside of the pipe 8. This is usually done with acetylene burners. The effect of the heat causes the set sealing mixture 16 to go very hard and it can then be broken away in order to remove the mixing device 4. This is a time consuming business and the heat on the pipe 8 can cause distortion of the pipe 8, thereby making it necessary to buy a new mixing unit 2.

Referring now to Figure 4, there is shown a mixing unit 18 comprising a housing 20, a bore 22 in the housing, and a mixing device 24 which extends along the bore 22 as shown. The mixing device 24 is the same as the mixing device 4 as shown in Figure 1.

The housing 20 is an elongate housing 20 and it is longitudinally separable into two parts 26, 28 about a centre line of the bore 22. The part 28 has two integral end parts 30, 32. The end part 30 has an inlet fitting 34 for connection to a feed pipe 36. The feed pipe 36 receives a chemical sealant in the form of polyurethane resin, and a chemical hardener in the form of a diisocyanate liquid. The sealant and hardener are pumped along the feed pipe 36 under pressure.

The end part 32 has an outlet fitting (not shown) for connection to an outlet pipe 38 as shown in Figure 7 and as will be described in more detail hereinbelow.

As can be seen from Figures 4, the parts 26, 28 are separable from each other to open up the bore 22 and expose the mixing device 24 for the purpose of allowing cleaning of the mixing device 24 and the bore 22. The parts 26, 28 can easily be separated from each other so that it is a simple matter to expose the mixing device 24 for cleaning, especially in the case where sealing mixture has set in the bore 22 and the mixing device 24 cannot be pulled out of the bore 22.

The housing 20 is straight sided as shown and it is of square cross section. The housing could also be of rectangular cross section if desired. Because the housing 20 is solidly constructed, and much more solidly constructed than the pipe 8 shown in Figures 1 to 3, it will be apparent that the housing 20 cannot easily be distorted, even if it should be necessary to tap the various parts 26, 28 of the housing 20 in order to separate the parts

26,28.

In order to avoid the possibility of leaks where the parts 26,28 connect to each other, a copper sealing gasket 40 is employed. The sealing gasket 40 is shaped as shown to give good sealing between the parts 26,28. As shown, the sealing gasket 40 extends up inclined portions 42 of the end parts 30,32.

In order to easily locate the various parts 26,28 together, dowels (not shown) may be employed. The sealing gasket 40 is appropriately apertured to receive bolts 44 which pass through apertures 45 to bolt the parts 26,28 together.

Referring now to Figures 5 and 6, there is shown a second mixing unit 18 in which similar parts as in Figure 4 have been given the same reference numerals for ease of understanding. In Figures 5 and 6, it will be seen that the end parts 30,32 are separable and that four copper gaskets 40a, 40b, 40c and 40d are employed. The end parts 30,32 shown in Figures 5 and 6 bolt to the adjacent ends of the parts 26,28 with bolts passing through holes 43.

Referring now to Figure 7, there is shown a glazing work station 46 which has two of the mixing units 18. One mixing unit 18 feeds dispensing means in the form of a static dispensing gun 48. The other mixing unit 18 feeds dispensing means in the form of a moving dispensing gun 50. The connection between the mixing units 18 and the guns 48,50 is via the above mentioned pipes 38.

The work station 46 shows a double glazed unit 52 that has been moved along on rollers 54 to a position in which the static dispensing gun 48 seals the bottom 56 of the double glazed unit 52. The moving dispensing gun 50 moves to seal the vertical sides 58,60 and the top 62 of the double glazed unit 52. The double glazed unit 52 leans against an inclined support wall 64.

The work station 46 includes a chemical storage and feeding section 66 having containers 68,70,72. A pump (not shown) pumps polyurethane resin sealant (which is of a putty-like consistency) into a metering reservoir. When this metering reservoir is full, di-isocyanate liquid hardener is placed in a container with oxygen free nitrogen at a pressure of, for example, five bars. The sealant and the hardener are mixed together in an amount of 12% by weight of the hardener and 88% by weight of the sealant in a valve mixing block (not shown). The material is then expelled from the valve mixing block along feed pipes 36 to the mixing units 18 for proper mixing in the mixing units 18 as described above.

It is to be appreciated that the embodiments of the invention described above with reference to the accompanying drawings have been given by way of example only and that modifications may be

effected. Thus, for example, a different type of work station 46 may be employed and other pieces of apparatus other than the illustrated double glazed unit 52 can be sealed. Also, various other chemicals can be mixed together using the mixing units 18. In Figure 4, the mixing device 24 is in three separate connected parts but more or less than these three parts may be used if desired.

Claims

1. A mixing unit comprising a housing, a bore in the housing, and a mixing device which extends along the bore, the housing being such that it is formed of at least two parts which are separable to open up the bore and expose the mixing device for the purpose of allowing cleaning of the mixing device and the bore.

2. A mixing unit according to claim 1 in which the housing is an elongate housing.

3. A mixing unit according to claim 1 or claim 2 in which the housing is longitudinally separable into two parts.

4. A mixing unit according to claim 3 in which the housing is longitudinally separable into two parts about a centre line of the bore.

5. A mixing unit according to any one of the preceding claims in which the housing has one end part having an inlet fitting for connection to a feed pipe for a chemical sealant and a chemical hardener to be mixed, and another end part having an outlet fitting for connection to an outlet pipe for receiving the mixed chemical sealant and chemical hardener.

6. A mixing unit according to any one of the preceding claims in which the housing has flat sides.

7. A mixing unit according to any one of the preceding claims and including at least one sealing gasket for giving a seal between the parts of the housing when they are secured together.

8. A mixing unit according to any one of the preceding claims in which the mixing device is composed of a plurality of spiral segments which are off-set from one another.

9. The combination of a mixing unit as claimed in any one of the preceding claims connected to a dispensing means for dispensing mixed chemical sealant and chemical hardener.

10. A glazing work station including at least one of the mixing units as claimed in any one of claims 1 to 8.

11. A glazing work station according to claim 10 and including two of the mixing units, one being for feeding a static dispensing gun, and the other being for feeding a moving dispensing gun.

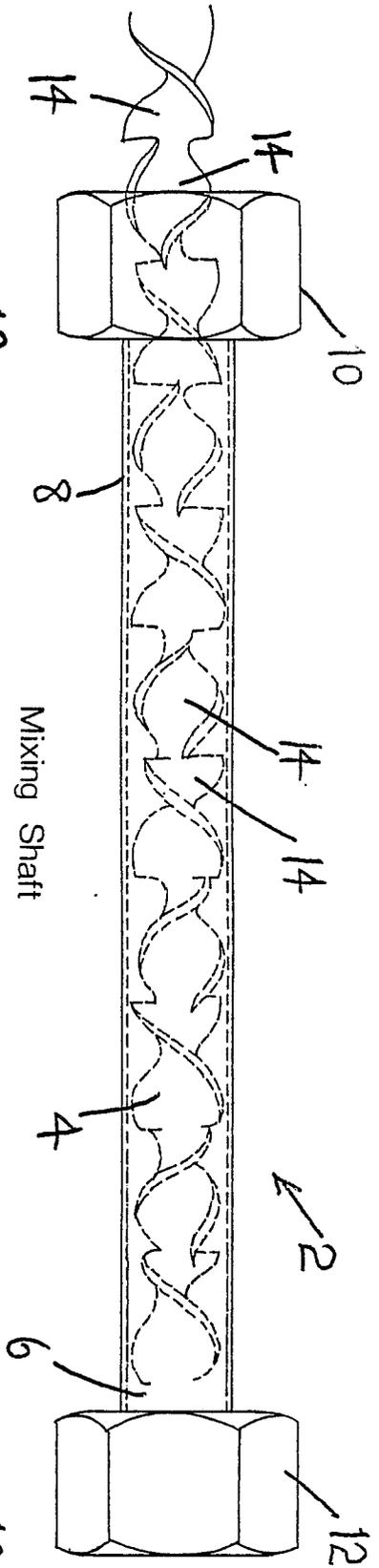


FIG 1

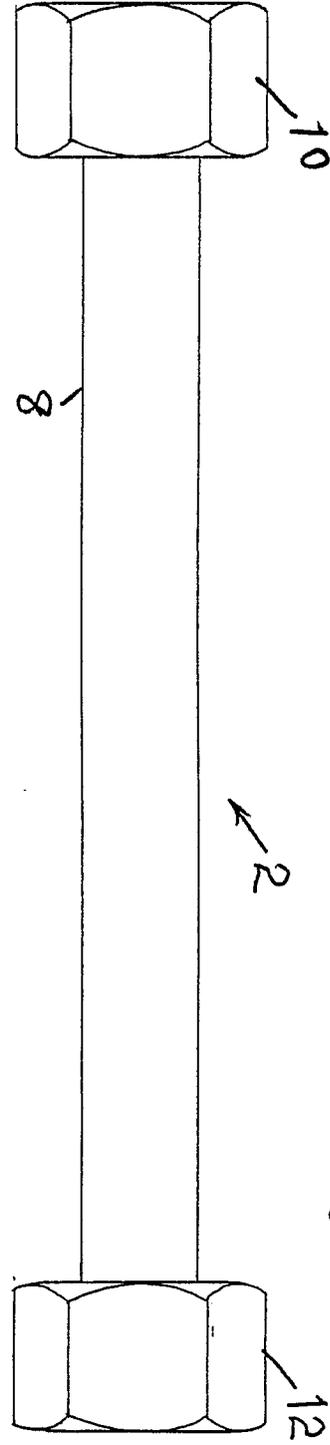


FIG 2

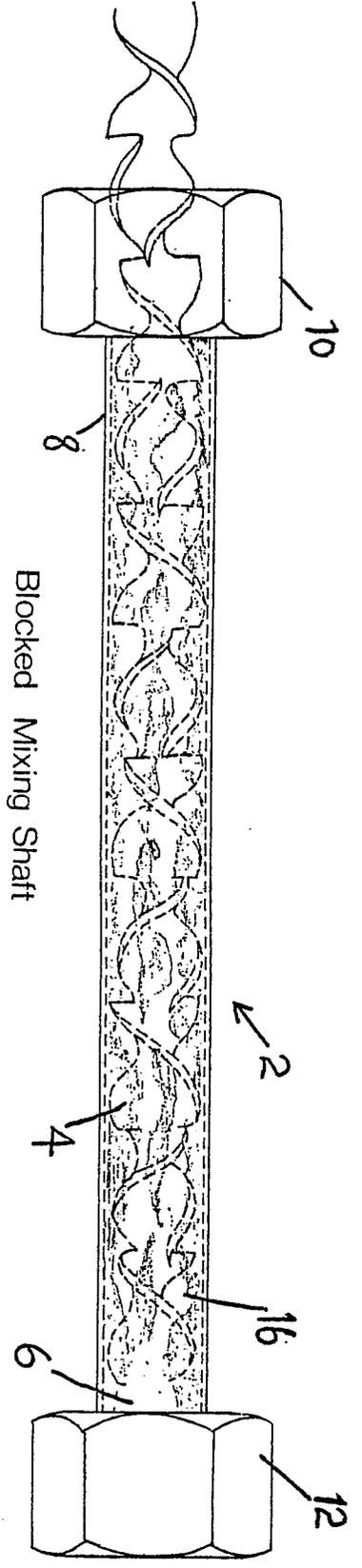


FIG 3

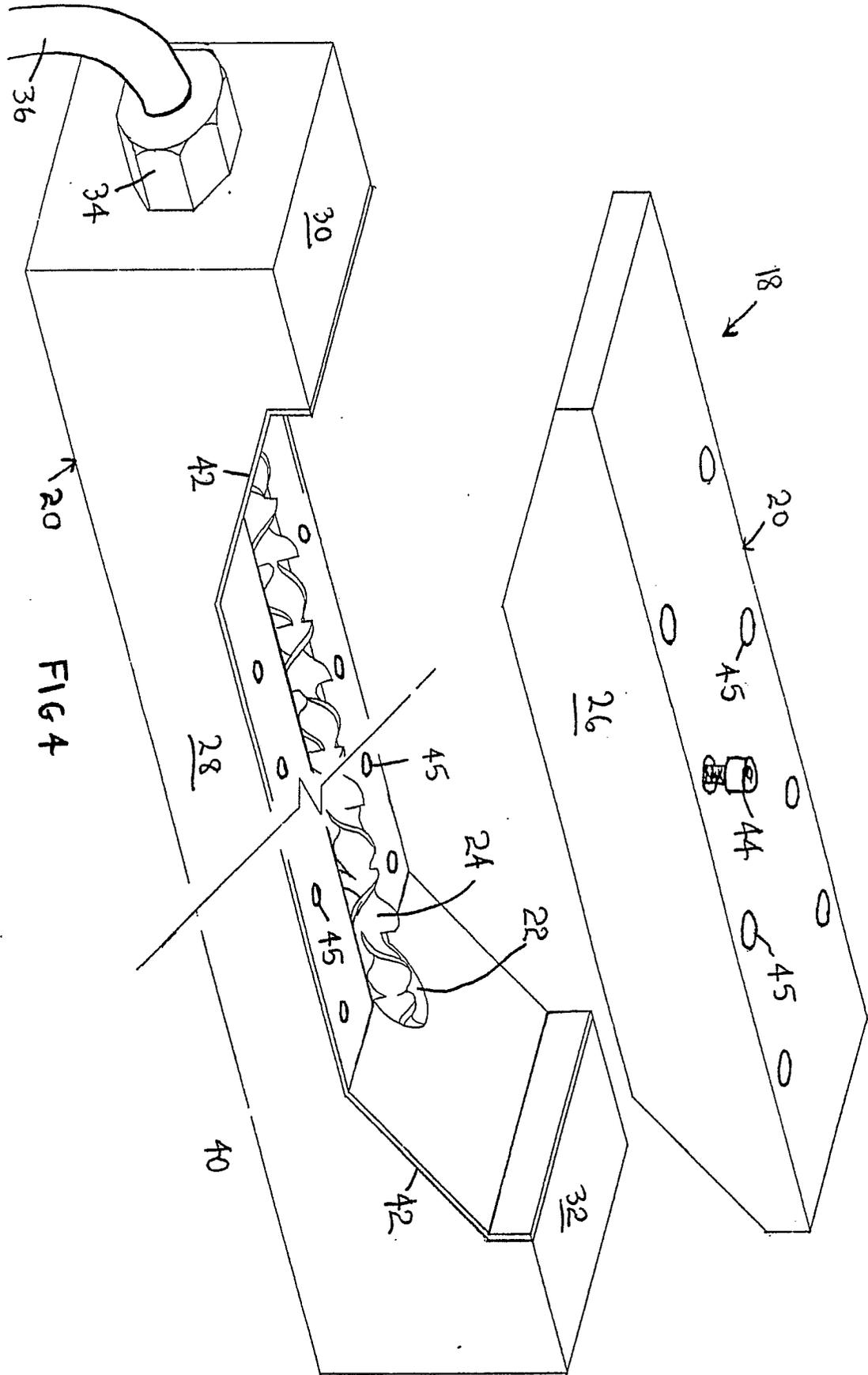
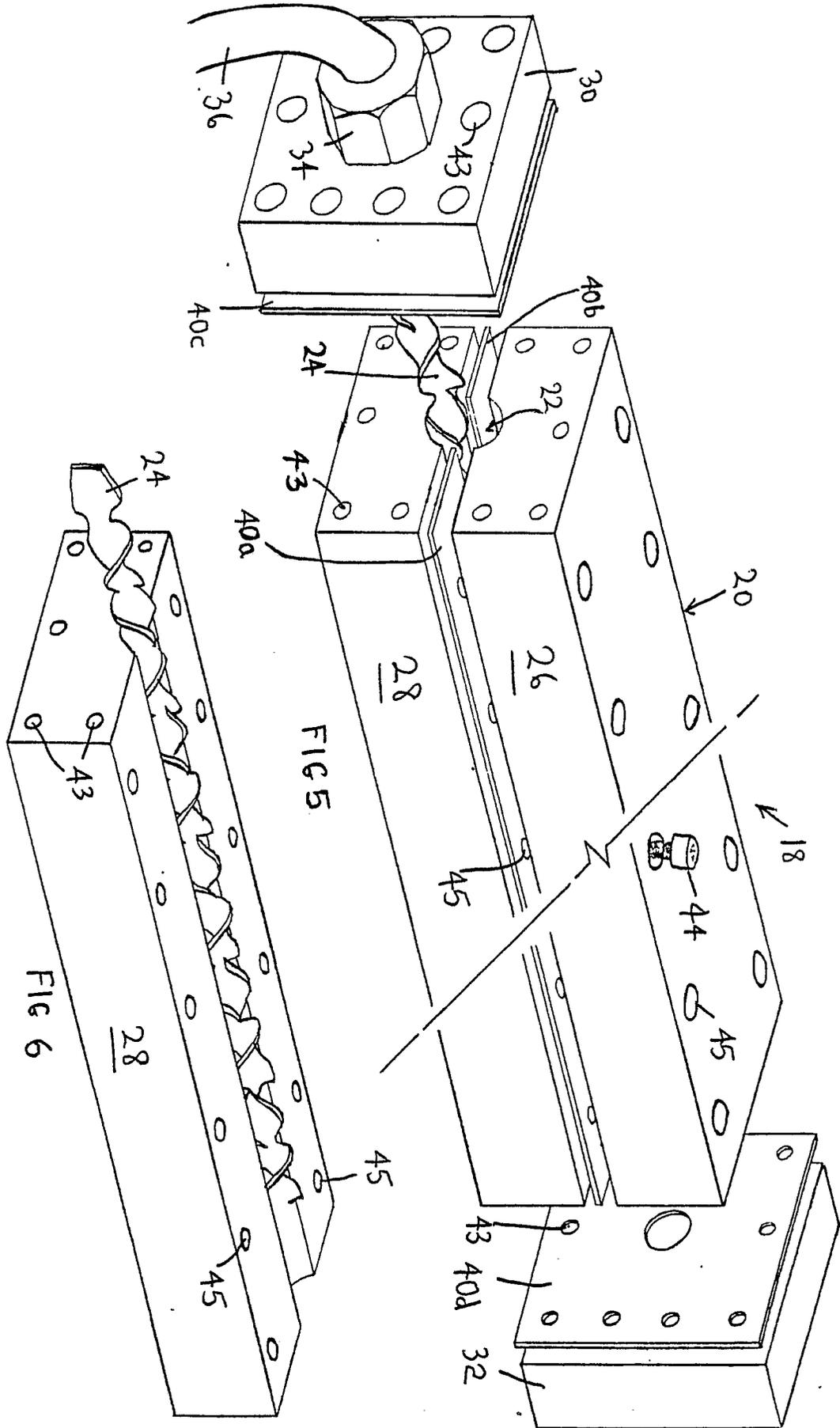
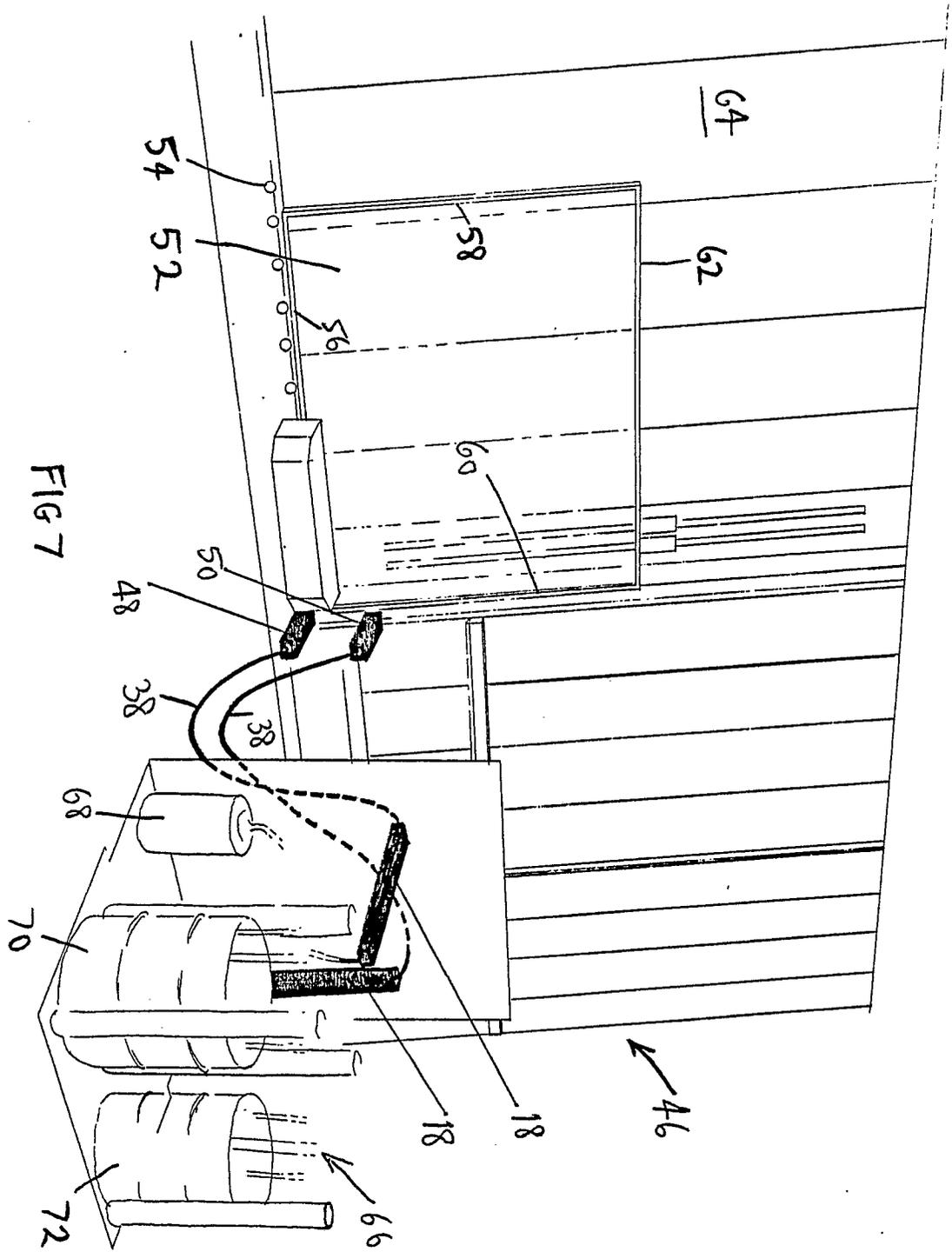


FIG 4







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	US-A-4 316 673 (SPEER) * Column 4, lines 32-44 * ---	1-10	B 01 F 5/06
X	FR-A-2 407 019 (ELF) * Page 4; figures * ---	1-10	
X	FR-A-1 338 562 (RESEARCH) * Page 3, left-hand column, paragraph 9; figures * ---	1-10	
X	GB-A- 941 893 (DOW CHEMICAL) * Page 2, lines 110-123; figures * ---	1-10	
X	US-A-3 476 521 (WISE) * Abstract; figures * ---	1-10	
A	US-A-4 408 893 (RICE) * Figures * ---	8	
A	US-A-3 927 868 (MOORE) -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 01 F
Place of search		Date of completion of the search	Examiner
THE HAGUE		26-10-1989	PEETERS S.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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 L : document cited for other reasons & : member of the same patent family, corresponding document</p>			