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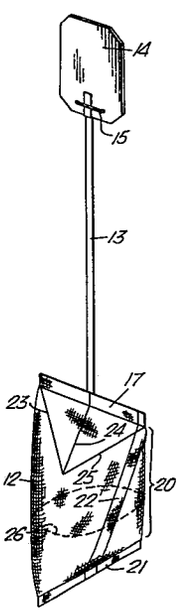
(54) Infusion package and method of forming it.

(57) An infusion package, such as a tea bag, has a stable three-dimensional expanded configuration and a flattened configuration suitable for packing. Preferably, the bag (12) hat a generally tetrahedral shape whereby its internal volume is greater than that of prior bags of essentially similar height and width and whereby the tea leaf particles are less constrained during brewing. Although ordinarily such a shape would be inconvenient for packing purposes, folds (23, 24, 25) in the tea bag permit its collapse to a flattened configuration that can be packed in quantity. A string or plastic strip (13) can be affixed at or near a fold (24) so that, by pulling on the string or strip, the bag can be expanded to its stable, three-dimensional configuration.



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TITLE MODIFIED
see front page

"INFUSION PACKAGES"

The present invention relates to infusion packages and to methods by which they are made.

The invention provides improved infusion packages that have a flattened configuration for packing and a stable, three-dimensional, expanded configuration that provides a large-volume interior for better, more effective contact between the infusing liquid and the contents of the package.

In one embodiment of the invention, an infusion package comprises a bag of liquid-permeable material having a large-volume stable configuration enclosing a three-dimensional interior space and containing a substance to be infused, the bag having at least one fold flattening the bag from the large-volume stable configuration to a configuration of relatively lower internal volume, and a pull means affixed to the bag in cooperation with the fold and providing, with the fold, means for expanding the bag to the large-volume stable configuration. Preferably, the bag has an inward fold in the flattened configuration, and the pull means is affixed to the bag on or near the inward fold to facilitate unfolding the fold outwardly to enlarge the bag interior. Preferably, the bag includes a tubular body with top and bottom seams formed thereacross and at least substantially perpendicular to each other, the fold being formed across one of the seams and at least substantially perpendicular thereto.

The invention further provides an infusion package comprising a generally tetrahedral bag of liquid permeable material incorporating fold means for flattening the bag from its tetrahedral shape. Ideally, the generally tetrahedral bag comprises a tubular body, seams at opposite ends of the tubular body, and a fold means including a first fold at least substantially perpendicular to one of the seams and intersecting that seam, one pair of folds on one side of the one seam converging from at or near the ends of the one seam to the first fold, another pair of folds on the other side of the one seam converging from at or near the ends of the one seam to the first fold.

The invention also provides a method of forming

an infusion package including the steps of:

(a) forming a package of liquid pervious material having a stable, expanded, three-dimensional shape,

(b) filling and sealing the package,

(c) folding the package to a flattened shape, and

(d) (optionally) attaching a pull means to the package where it is folded to expand the package when pulled.

Specifically, a tea bag is provided herein that has a generally tetrahedral shape whereby its internal volume is greater than that of prior bags of essentially similar height and width and whereby the tea leaf particules are less constrained during brewing. More internal volume is provided than conventional pillow bags that use similar amounts of bag material and more internal volume is provided than in commercial two-pouch bags that use much more material. Although ordinarily such a shape would be inconvenient for packing purposes, folds in the tea bag permit its collapse to a flattened configuration that can be packed in quantity. A string or plastic strip can be affixed at or near a fold so that, by pulling on the string or strip, the bag can be expanded to its stable, three-dimensional configuration. Moreover, air initially filling the remainder of the volume of the expanded bag prevents the bag's collapse when immersed. Water then displaces the air within the expanded bag.

Tea that is brewed by being placed loose in a cup or pot of boiling or near boiling water is constrained only by the boundaries of the cup or pot and is freely moved about by the water so that essentially the entire surface area of all the tea leaf particles contribute to the brewing. Any movement in the water enhances brewing by bringing fresh liquid near the tea leaf surfaces. For a tea bag to approximate this condition, it should have a stable three-dimensional shape that does not constrain the tea. However, packing such relatively bulky tea bags in any quantity would require a very large volume increase for any number of packed bags. A particularly attractive feature of tea bags of this invention is their ability to be packed in little or no more space than the ordinary flat tea bag currently on the market and yet to provide relativley large increases in useful internal volume for brewing.

Bags formed in accordance with the invention can increase the rate of extraction by which steeping or infusion occurs. The bags contribute one or more of (a) faster, more effective steeping, (b) less tea per bag, and (c) greater choice of tea mixtures to give good brewing from mixes that previously would not have been satisfactory. Approximately forty percent less of the liquid permeable bag material is needed than with a commercial two-pouch bag having the same height and width. The bag gives better filter flow characteristics with better movement of extracted solids from within the bag to the liquid outside.

The infusion bags of the invention can be manufactured from the conventional water-pervious sheet material used to make traditional tea bags. So-called "heat seal" tea bag paper is ideal.

The infusion bags of the invention can contain a wide variety of fills. In general this will be any soft plant material such as leaves (which in practic can comprise a proportion of stems and/or shoots in addition to a predominate leaf content), petals and flowers in general, from which an aqueous beverage can be prepared. The infusion material in most common use is derived from the tea plant, Camellia sinesis, (L) O. Kuntze. Depending on the extent to which fermentation of the leaf tea after picking, cause by the natural enzymes in the leaf, has been allowed to continue prior to firing, the leaf tea can be green, black or oolong. A wide variety of other soft plant materials, derived for example from matté, chamomile, mint, vervien, linden, hibiscus, orange blossom, lemon grass, blackberry leaves, skullcap, verbena, camfrey and alfalfa, are used in various parts of the world in the preparation of infusions consumed as beverages for refreshment or medicinal purposes. In addition, ground coffee beans can be infused using a bag in accordance with the invention.

A prefered embodiment of the invention will now be described with reference to the accompanying drawings, of which:

Figure 1 is a perspective view of a tea bag in collapsed ready-to-pack condition.

Figure 2 is a perspective view of the tea bag of Figure 1 during its withdrawal from an associated individual envelope.

Figure 3 is a further perspective view of the tea bag of Figures 1 and 2 and illustrates the stable, expanded configuration of the bag as it is used in brewing tea.

Figure 4 is a diagramatic illustration of the steps of forming, filling and packing tea bags according to the invention.

In Figure 1 a tea bag combination 10 includes a bag 12, a plastic strip 13, and a tab 14. A staple 15 affixes the strip to the tab. The strip 13 can be adhesively secured to an upper seam area 17 better illustrated in Figure 3, or can be tacked by heat-infusing or stapling. Likewise, an ordinary string can replace the strip 13 and may be stapled, if desired, to the seam area 17 of the bag. As used herein the term "pull means" includes a string, the long thin plastic strip 13, or any other long pull member suitable for dunking a tea bag in or retrieving the bag from a prepared cup or pot of tea.

Figure 2 illustrates a packet or wrapper 18 for the tea bag 10. As is known in the art, the tab 14 can be a tear away part of the packet sidewall, perforated for easy removal.

Figure 3 illustrates the generally tetrahedral shape of the bag 12. This is the bag's intended configuration for brewing tea.

The bag 12 has a tubular body portion closed at its upper end by the seam area 17 extending entirely across the top and closed at its bottom end by another seam area 21 extending entirely across its bottom. The top and bottom seam areas are not parallel. Rather, viewed from the top or bottom one crosses over the other. In particular, in the embodiment illustrated, the directions in which the seam areas extend appear generally perpendicular, again when viewed from the top or the bottom. And in the case of this particular bag the seams are also both perpendicular to the axis or lengthwise direction of the body. A side seam 22 by which the tubular body 20 was formed is clearly visible in each of Figures 1, 2 and 3. The material from which the bag 12 is formed is a liquid permeable paper or other material known in the art. The term "generally tetrahedral" means that although the tubular body can be exactly a tetrahedron if desired, the bag body is not necessarily sharply folded to form four distinctly defined flat sides, but may be left partly rounded between the top and bottom seams, as shown.

Lines of fold 23, 24 and 25 enable the bag 12 to collapse to its flattened configuration shown in Figure 1. The line of fold 24 crosses the seam 17 at or near its centre and is generally parallel the lower seam 21. On each side of the seam 17 the lines of fold 23 and 25 begin at the ends of the seam 17 and converge upon the fold 24 at a point 24'. These folds permit the tea bag to be packed in the packet 18 and in a small carton with numerous other tea bags.

The strip 13 is affixed to the upper seam area 17 near the centre fold 24 so that, as the bag 12 is pulled from the packet 18, it begins to open and air enters the bag. This helps prevent collapse when the bag is immersed.

For best use, one should pull the upper seam area 17 to its straight or nearly straight position. The bag approaches the tetrahedral shape and remains in its stable, expanded, three-dimensional condition. A line 26 in Figure 3 shows the dry tea level in the bag 12 with the bag in an upright position. A large percentage of the internal volume of the bag 12 is free, not only to accommodate swelling of the tea, but to permit greater looseness, better liquid-tea contact, better tea and liquid movement, and improved steeping. The tea can occupy less than half the volume of the expanded bag and without increasing the overall height and width beyond those of an ordinary tea bag. In an actual embodiment the bag height measured approximately 2.25 inches (57.2mm) and the width approximately 1.5 inches (38.1mm.) These are substantially the same height and width as at least one tea bag that is currently widely sold in individual envelope packaging.

As for the method of making infusion packages of the kind illustrated in Figures 1 through 3, the diagram of Figure 4 sets out the steps which can be performed automatically and continually, or partly or wholly manually, to form the improved tea bags from a continuous strip 30 of liquid permeable material. The continuous strip or web 30 is first formed into a tube at a station 31. This can be done by continuously wrapping a web of the permeable material about a shoe 32 and crimping or sealing lateral edges 33 and 34 to form the side seam 22 that appears in Figures 1 through 3.

Downstream the tube is sealed at a sealing station 35, for example by sealing bars 36. The bars may crimp the tube across its width or apply heat to either activate adhesive at the top and bottom seams or to use the permeable material of the bag into a seam if the material is thermoplastic for example. Alternate seams are formed at 90°

with respect to each other by moving the bars 36 through 90° or by providing, for alternate activation, a second set of bars (not shown) perpendicular to the bars 36.

After each seal has been made a suitable dispensing mechanism 38 adds fill, such as a single serving of tea. The strip 13 can be attached at any one of a number of places in the bag forming process, but in Figure 4, a station 40 is shown wherein the plastic strip is tacked to the upper seam area 17 by stapling or heating to form the pull means.

The next station 42 severs the web into individual packages. A pair of blades 43 is diagramatically shown for this purpose. Again they may alternately be moved 90° to sever each seam into an upper and lower seam area of the bags being separated, or a second pair of blades (not shown) may be provided at 90° to the blades 43 and alternatively activated.

Next, at a station 45 the fold lines 23, 24 and 25 of Figures 1 through 3 are formed. The centre fold 24 is formed inward across the upper seam area 17 and parallel the lower seam area 21. Again, this can be done manually or automatically by engaging the upper seam area, centrally pushing it inward, and then flattening the bag. The bag is thus folded and flattened for packing.

At an optional station 46, the outer packet or envelope 18 is wrapped about the bag. If the tab 14 is part of the packet 18, attachment of the tab to the strip 13 can occur here.

At a last station 48, the bags are boxed for shipping and sale. The box 49 is shown housing a quantity of the packets 18, each containing a folded and flattened infusion package. Far more bags are packed than

would have been possible had the tetrahedral shape been maintained.

It will be appreciated that infusion packages of the kind described herein can be useful other than as tea bags. In summary, their use can lessen brewing time, permit use of less fill per package, or of a different fill or a combination of these improvements without lessening the quality of the product prepared. The increased volume that the package contributes is achieved with little or no loss of packing space.

* * * *

CLAIMS

1. An infusion package comprising a bag of liquid-permeable material having a large-volume stable configuration enclosing a three-dimensional interior space and containing a substance to be infused, characterised in that the bag has at least one fold (24) flattening the bag from the large-volume stable configuration to a configuration of relatively lower internal volume, and a pull means (13) affixed to the bag in cooperation with the fold (24) and providing, with the fold, means for expanding the bag to the large-volume stable configuration.

2. An infusion package according to claim 1, characterised in that the bag has a generally tetrahedral shape in the large-volume stable configuration.

3. An infusion package according to claim 1 or 2, characterised in that the bag has an inward fold (24) in the flattened configuration and the pull means (13) is affixed to the bag on or near the inward fold to facilitate unfolding the fold outwardly to enlarge the bag interior.

4. An infusion package according to claim 2, characterised in that the bag includes a tubular body with top and bottom seams (17 and 21) formed thereacross and at least substantially perpendicular to each other, the fold (24) being formed across one of the seams (17) and at least substantially perpendicular thereto.

5. An infusion package according to claim 4, characterised in that the pull means (13) adjoins the bag at or near the intersection of the fold (24) and the one seam (17).

6. An infusion package according to claim 2, characterised in that the generally tetrahedral bag (12) comprises a tubular body, seams (17 and 21) at opposite ends of the tubular body, and a fold means including a first fold (24) at least substantially perpendicular to one of the seams (17) and intersecting that seam, one pair of folds (23 and 25) on one side of the one seam (17) converging from at or near the ends of the one seam to the first fold (24), another pair of folds on the other side of the one seam converging from at or near the ends of the one seam to the first fold.

7. A method of forming an infusion package as claimed in claim 1, characterised in that it includes the steps of:

(a) forming a package of liquid pervious material having a stable, expanded, three-dimensional shape,

(b) filling and sealing the package,

(c) folding the package to a flattened shape, and

(d) attaching a pull means (13) to the package where it is folded to expand the package when pulled.

8. A method according to clain 7, characterised in that it includes the steps of:

(a) forming a generally tetrahedral package of liquid permeable material by forming top and bottom angularly-related seams (17 and 21) in a tubular package body,

(b) forming an inward fold (24) across one of the seams (14) and

(c) affixing a pull means (13) to the package at a location moved inward by the fold (24) so as to enable unfolding of the fold to be effected by pulling the pull means.

9. A method according to claim 8 characterised in that the step of forming an inward fold (24) across one of the seams (17) includes folding the one seam inwardly along an intersecting fold crossing the one seam in substantially the same direction as the other seam.

10. A method according to claim 9, characterised in that it includes the step of attaching the pull means (13) to the package at or near the intersection of the fold (24) and the one seam (17) so that the fold can be unfolded to straighten the one seam and expand the package to its generally tetrahedral shape.

11. A method according to any one of claims 7 to 10, characterised in that the step of filling includes adding an infusible substance to fill less than half of the volume of the expanded package.

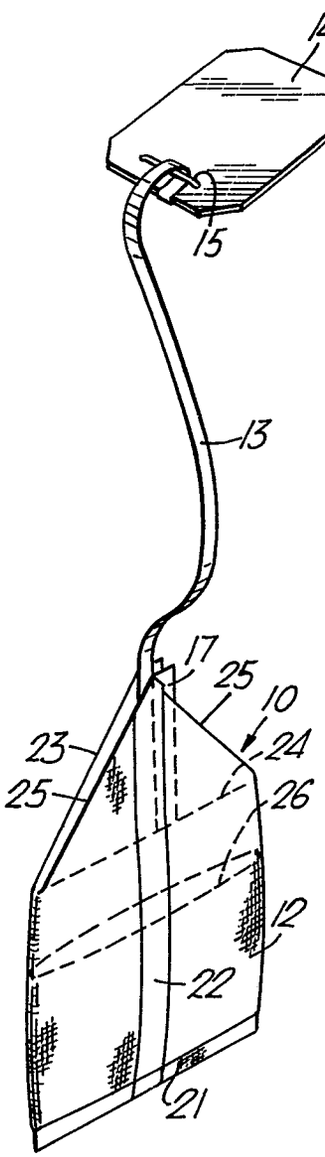


Fig.1.

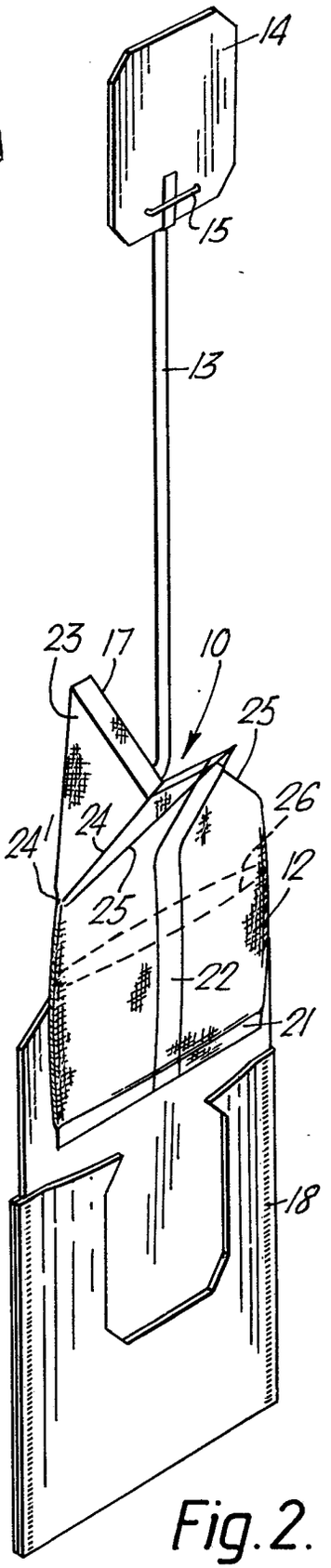


Fig.2.

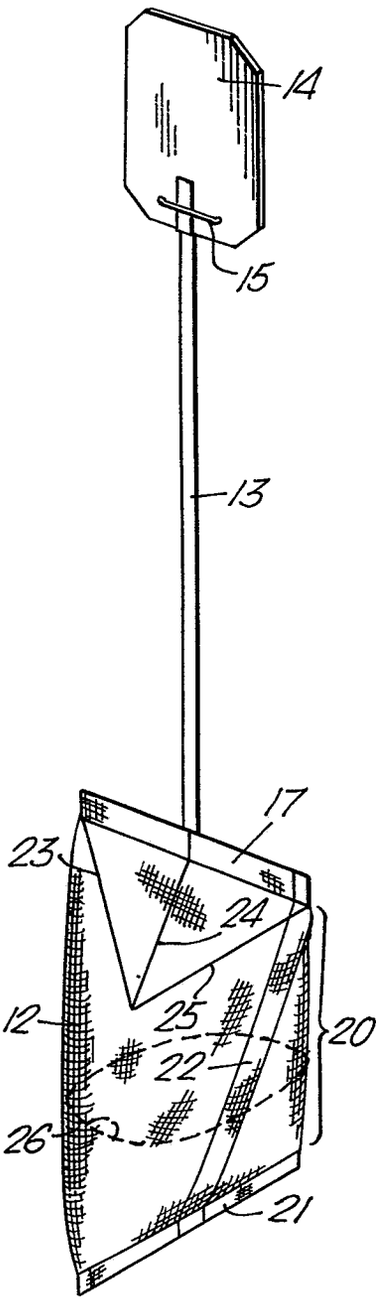
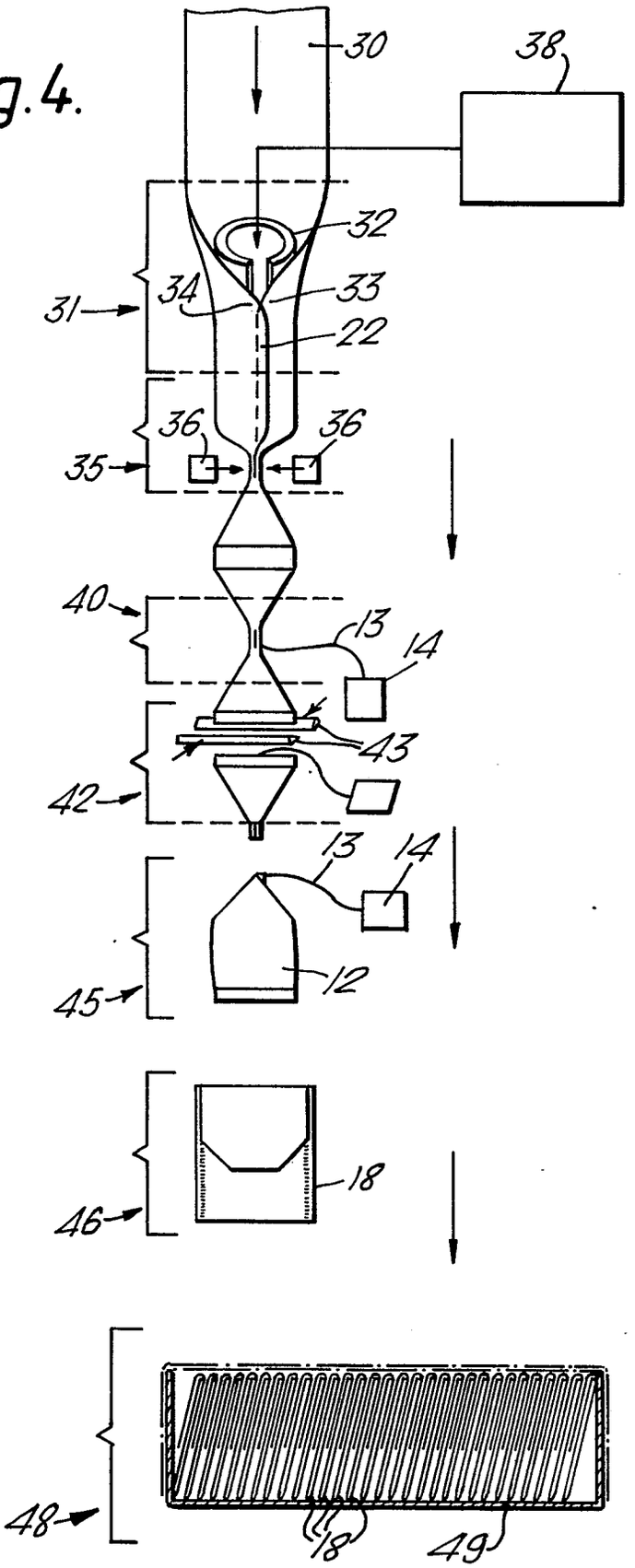


Fig.3.

Fig. 4.



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EUROPEAN SEARCH REPORT

Application number
0053204
EP 80 30 4095

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	GB - A - 1 575 845 (RODRIGUES-ELY) * Page 3, line 18 - page 5, line 51; figures 3-9 *	1,2,4, 7,8
	US - A - 1 581 578 (KIESELBACH) * Page 1, line 88 - page 2, line 18; figures 1-11 *	1,2
	GB - A - 990 153 (WELIN-BERGER) * Page 2, lines 21-37; figure 3 *	3
	US - A - 2 328 017 (IRMSCHER) * Page 1, line 36 - page 2, line 36; figures 1-8 *	7
A	GB - A - 2 012 235 (SIG) * Patent specification *	
A	GB - A - 1 157 513 (RAMBOLD) * Patent specification *	

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

B 65 D 81/34

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

B 65 D
B 65 B

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26-06-1981	FLINTOFF

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