

EUROPEAN PATENT APPLICATION

Application number: **80304063.3**

Int. Cl.³: **B 24 C 5/06**

Date of filing: **13.11.80**

Priority: **13.11.79 GB 7939172**

Applicant: **Auto Alloys R & D Limited, Berristow Lane Hilcote, Blackwell, Derbyshire, DE55 5JB (GB)**

Date of publication of application: **27.05.81**
Bulletin 81/21

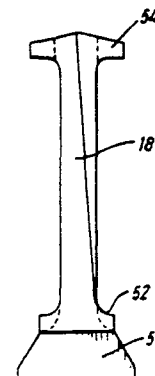
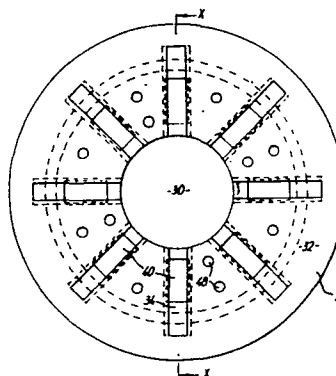
Inventor: **Taylor, Dan c/o Auto Alloys R & D Limited, Berristow Lane Hilcote, Blackwell, Derbyshire, DE55 5JB (GB)**

Designated Contracting States: **CH DE FR LI NL SE**

Representative: **Drever, Ronald Fergus, Swindell & Pearson 44, Friar Gate, Derby DE1 1DA (GB)**

Improvements in or relating to rotary impeller wheels for a blast cleaning apparatus.

A rotary impeller wheel for blast cleaning apparatus comprises a blade mounting plate (20) having a central aperture (30) and a plurality of radially extending slots (34) opening into the aperture. Each slot (34) is adapted to receive a blade (18) for throwing of abrasive medium, each blade (18) having a lug (50) extending along part of one side edge, and the cross sections of the slots (34) and the lugs (50) being complementary. The length of the lugs (50) is such that the lugs (50) can enter the slots (34) from the central aperture (30) and the complementary cross sections are such that the blades (18) are retained in the respective slots in an axial direction.



Improvements in or relating to Rotary Impeller Wheels
for a Blast Cleaning Apparatus

The invention is concerned with improvements in or relating to rotary impeller wheels for blast cleaning apparatus and the components of such wheels.

In one conventional kind of blasting apparatus a rotary impeller wheel is located within a housing. Metallic abrasive or other cleaning material is fed to the centre of the wheel in an axial direction and discharged radially under centrifugal action as the wheel rotates. A control member or control cage is located around the central hub of the wheel and has a peripheral opening through which the cleaning material is discharged. The control cage is rotatable relative to the wheel hub in order to alter the direction of discharge of the cleaning material.

The rotary impeller wheel includes radially extending blades which are subject to considerable wear and thus require frequent replacement. It is convenient to be able to replace the blades by removing the control cage, removing the worn blades through the central aperture and inserting replacement blades through the aperture, as this does not therefore require dismantling of any of the components of the housing.

According to the present invention there is provided a blade mounting plate for a rotary impeller wheel, the plate comprising a centrally located through aperture, and, in one side face of the plate, and opening on to said one side face, a plurality of radially extending slots, each of which opens at one end into the aperture, and has such



a cross section that the side face opening has a lateral dimension less than a corresponding internal dimension, whereby a blade having a cross section/^{substantially}complementary to that of the slots can be retained in a respective slot when one side edge of the blade is entered from the central aperture through the open end of the slot.

Preferably the other end of each slot terminates short of the radially outermost edge of the plates.

Preferably also means are provided for biasing the blade in a direction parallel to the axis of the plate into intimate engagement with internal walls of the slot. The biasing means may comprise a recess formed in the base of each slot for receiving a biasing spring.

In one arrangement the slots may be arranged in diametrically opposed pairs on said one side face of the plate. In an alternative arrangement the slots may be arranged such that each is diametrically opposed to a location intermediate another pair of slots.

On said one side face of the plate, the slots extend over an area which may be of substantially truncated conical cross section, terminating in a raised edge at the central aperture.

According to the present invention there is also provided a rotary impeller wheel comprising a blade mounting plate as described in any of the five preceding paragraphs, and at least one blade, one side edge of which has a cross section complementary to that of the slots.

Embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings, in which:-



Fig. 1 is a sectional front elevation of a blast cleaning apparatus;

Fig. 2 is a plan view of a blade mounting plate for use in a rotary impeller wheel according to one embodiment of the invention;

Fig. 3 is a section on X-X of Fig. 2;

Fig. 4 is a side view of a blade for use with the blade mounting plate of Figs. 2 and 3;

Fig. 5 is a perspective view from one end of the blade of Fig. 4;

Fig. 6 is a plan view of a blade mounting plate for a rotary impeller wheel according to a second embodiment of the invention;

Fig. 7 is a section on A-A of Fig. 6;

Fig. 8 is a side view of a plate for use with the blade mounting plate of Figs. 6 and 7; and

Fig. 9 is a perspective view from one end of the blade of Fig. 8.

Referring to Figs. 1 to 5 of the drawings an airless blast cleaning apparatus, i.e. an apparatus wherein the abrasive cleaning medium is thrown by mechanical means, eliminating the need for compressed air, includes a rotary impeller wheel 10 mounted on the end of a rotatable shaft 12 by means of a hub assembly 14. The wheel 10 includes a central impeller 16 of cage-like construction and a series of radially extending blades 18 secured on a blade mounting side plate 20 as hereinafter described. A control cage 22 surrounds the impeller 16 and is angularly adjustably mounted on an external housing 24 enclosing the wheel 10. The control cage 22 is provided with a peripheral opening the position of which relative to the impeller wheel 16 determines the direction of which the abrasive



cleaning medium is directed out of the apparatus during operation. The abrasive medium is introduced into the impeller wheel 10 by means of a feed chute assembly 26 mounted on a supporting bracket 28.

The side plate 20 (Figs. 2 and 3) is of circular configuration having a centrally located through aperture 30. On one side face 32 of the plate 20, i.e. the face on which the blades 18 are mounted, there are provided a plurality of radially extending slots 34 which are arranged in diametrically opposed pairs. Each slot 34 opens at its top on to the face 32 and also opens at a radially inner end on to the central aperture 30. The cross section of each slot 34 is substantially of dovetail shape such that side walls 36 extend in converging paths from a base 38 of the slot with the width of the base 38 being greater than the width of the open top. Each slot 34 terminates at its radially outermost end short of the peripheral edge of the plate 20 and is provided in its base 38 with a substantially rectangular recess 40 for receiving a compression spring (not shown) for a purpose hereinafter described.

On the opposed face 42 the plate 20 is formed as a circular recess 44 for receiving a respective part of the hub assembly 14, the plate 20 being secured to the hub assembly 14 by means of screws 46 (Fig. 1) extending through the hub assembly 14 into fixing holes 48 on the plates 20.

Each of the blades 18 (Figs. 4 and 5) is of substantially rectangular shape formed of a wear resistant material, and has its opposed side faces identical. At one side edge, each of the blades 18 has a mounting lug 50 extending along the length of the blade 18 over

a distance corresponding to the length of the slots 34. The lug 50 has a cross section complementary to that of the slots 34 such that the lug 50 can enter a respective one of the slots 34 from the aperture 30ⁱⁿ to the open end of the slot 34, and be held against removal from the slot 34 in a direction parallel to the axis of the plate 20. When a spring is located in the recess 40 of the slot 34, the blade 18 is biased into intimate contact with the inner faces of the walls 36 of the slot 34 to be frictionally retained against movement out of the slot 34 in a radial direction.

As the blade 18 is longer than the lug 50, the blade 18 overlies a peripheral rim of the plate 20 when the lug 50 is moved wholly within the slot 34. The blade 18 at said one side edge is provided with a laterally extending lip 52 on each face, each lip 52 being angled from the radially innermost end of the blade 18 to terminate in a maximum height at the radially outermost end of the blade 18. The lips 52 enable a radiused surface to be formed at each face of the blade 18 for increased wear resistance at the junction between the blade 18 and the plate 20. The other side edge of the blade 18 has a cross section defining laterally extending lips 54 to assist in the directing of the abrasive medium.

This embodiment is suitable for impeller wheels of diameters up to 15 inches where the length of the blades is less than the diameter of the central aperture, such that, with the control cage removed, worn blades can be removed and replacement blades provided by sliding of the blades in the slots via the central aperture. For impeller wheels which are over 15 inches in diameter the length of the blade is greater than the diameter of the central aperture and



therefore such removal and replacement of blades is not possible. The second embodiment as shown in Figs. 6 to 9 is provided to achieve this possibility.

In the second embodiment, the blade mounting plate 20' is of circular configuration having a central through aperture 60. One face 62 of the plate 20', i.e. that face on which the blades 18 are mounted, is provided with a plurality of radially extending slots 64 which are of identical configuration to the slot 34 of the first embodiment but of different dimensions, resulting from the different sizes of wheel being used. Like references have therefore been used to denote other like features. Each slot 64 is arranged to be diametrically opposed to a location intermediate of two other adjacent slots 64 for a purpose hereinafter described.

The plate 20' has a cross section which, in an area 65 over which the slots 64 extend, is of truncated conical section terminating in an edge of the aperture 60 raised above the peripheral rim. As in the first embodiment the slots 64 terminate at their radially outermost ends short of the peripheral edge of the plate.

Each of the blades 18' (Figs. 8 and 9), provided for the second embodiment, is of substantially rectangular configuration having its opposed faces identical. One side edge, i.e., that edge to be mounted on the plate 20 - is provided with a mounting lug 70 which is complementary in cross section to the slots 64 and which extends at an angle relative to the side edge of the blade 18' corresponding to the cone angle of the area 65 of the face 62. That end of the lug 70 which is radially outermost in use is provided with a flat 72 extending parallel to the edge of the blade 18' for a purpose hereinafter described. A lip 74 is provided on each face of the blade 18'

at said one edge to extend from a location along the lug 70 to the end of the blade 18' which overlies the peripheral rim of the plate 20' in use. The lips 74 enable radiused surfaces to be provided at the connection of the blades 18' and the plate 20'. The other side edge of the blade 18' is of similar configuration to the corresponding side edge of the blade 18 of the first embodiment.

In use, a blade 18', although of longer length than the diameter of the aperture 60, can enter the open end of a respective one of the slots 64 via the aperture 60. The raised edge of the aperture 60 and the corresponding angles of the slot 64 and the lug 70 enable the respective end of the lug 70 to enter the slot 64 while the other end of the lug 70 remains clear of the edge of the aperture 60 at the diametrically opposed location. Also the flat 72 facilitates the entry of the lug 70 into the slot 64. As each slot 64 is not diametrically opposed to any other slot 64, a blade 18' can be removed and replaced even when blades are already positioned in the other slots.

The plate 20' also has a circular recess in its other side face and mounting holes for attachment of the plate to the hub assembly. Again these features are similar to those of the first embodiment and like numerals therefore refer to like parts.

An arrangement according to the invention is advantageous in that a single sided impeller wheel is easier and cheaper to manufacture than the conventional double sided wheels. Also the rotating mass is reduced and therefore less power is required at start-up of the machine. Further renewal and replacement of blades is possible for impeller wheels of any diameter and this is particularly advantageous



in that dismantling of housings or hoods for the impeller wheels is not required when replacement of the blades becomes necessary. The blades are conveniently retained in their slots against both axial and radial movement in use and the impeller wheels can be adapted to fit any existing blast cleaning machine with a suitable arrangement of mounting holes. It is envisaged that different arrangements of mounting holes are provided on each blade mounting plate for this purpose.

It is also to be appreciated that the components are made of a wear resistant material where appropriate and all connecting edges are rounded off where possible.

Various modifications may be made without departing from the invention. For example the means for retaining the blades in the slots by friction may be other than that described, while the blades and slots may be of a configuration other than that shown.

BAD ORIGINAL



Claims:-

1. Apparatus for use in a rotary impeller wheel, said apparatus comprising a plate member having a centrally located through aperture, characterised in that, in one side face (32, 62) of the plate member (20, 20'), and opening on to said one side face (32, 62), a plurality of radially extending slots (34, 64), are provided each of which opens at one end into the aperture (30, 60), and has such a cross section that the side face opening has a lateral dimension less than a corresponding internal dimension, whereby a blade member (18, 18'), at least part (50, 70) of one side edge of which has a cross section substantially complementary to that of the slots (34, 64), can be retained in a respective slot when said part (50, 70) of said one side edge of the blade member (18, 18') is entered from the central aperture (30, 60) through the open end of the slot (34, 64).
2. Apparatus according to claim 1, characterised in that means are provided for biasing the blade members (18, 18') in a direction parallel to the axis of the plate member (20, 20') into intimate engagement with internal walls of the slot (34, 64).
3. Apparatus according to claim 1 or 2, characterised in that the slots (34) are arranged in diametrically opposed pairs on said one side face (32) of the plate member (20).
4. Apparatus according to claim 1 or 2, characterised in that the slots (64) are arranged such that each is diametrically opposed to a location intermediate another pair of slots.

5. Apparatus according to claim 4, characterised in that, on said one side face (62) of the plate member (20'), the slots (64) extend over an area which has a substantially truncated conical cross section, terminating in a raised edge at the central aperture (60).

6. Apparatus for use in a rotary impeller wheel, said apparatus comprising a blade member, characterised in that at least part (50, 70) of one side edge of the blade member (18, 18') has a cross section wherein an inner portion has a lateral dimension less than an outer portion, whereby the blade member (18, 18') can be retained in a respective one of a plurality of radially extending slots (34, 64) each formed in one side face (32, 62) of a plate member (20, 20') and having a cross section substantially complementary to that of said one side edge part of the blade member.

7. Apparatus according to claim 6, characterised in that said part (70) of said one side edge extends at an angle relative to the longitudinal dimension of the blade member (18').

8. Apparatus according to claim 7, characterised in that one end of said part (70) of said one side edge has a flat (72) extending parallel to the longitudinal dimension of the blade member (18').

9. Apparatus according to claim 6, characterised in that said part (50) of said one side edge extends substantially parallel to the longitudinal dimension of the blade member (18).

10. A rotary impeller wheel characterised by a plate member (20, 20') according to any of claims 1 to 5, and at least one blade member (18, 18') according to any of claims 6 to 9, each of the slots (34, 64) in the plate member (20, 20') having a cross section substantially complementary to the cross section of said part (50, 70) of said one side edge of the blade member (18, 18').

SWINDELL & PEARSON
Chartered Patent Agents
44 Friar Gate
Derby
DE1 1DA

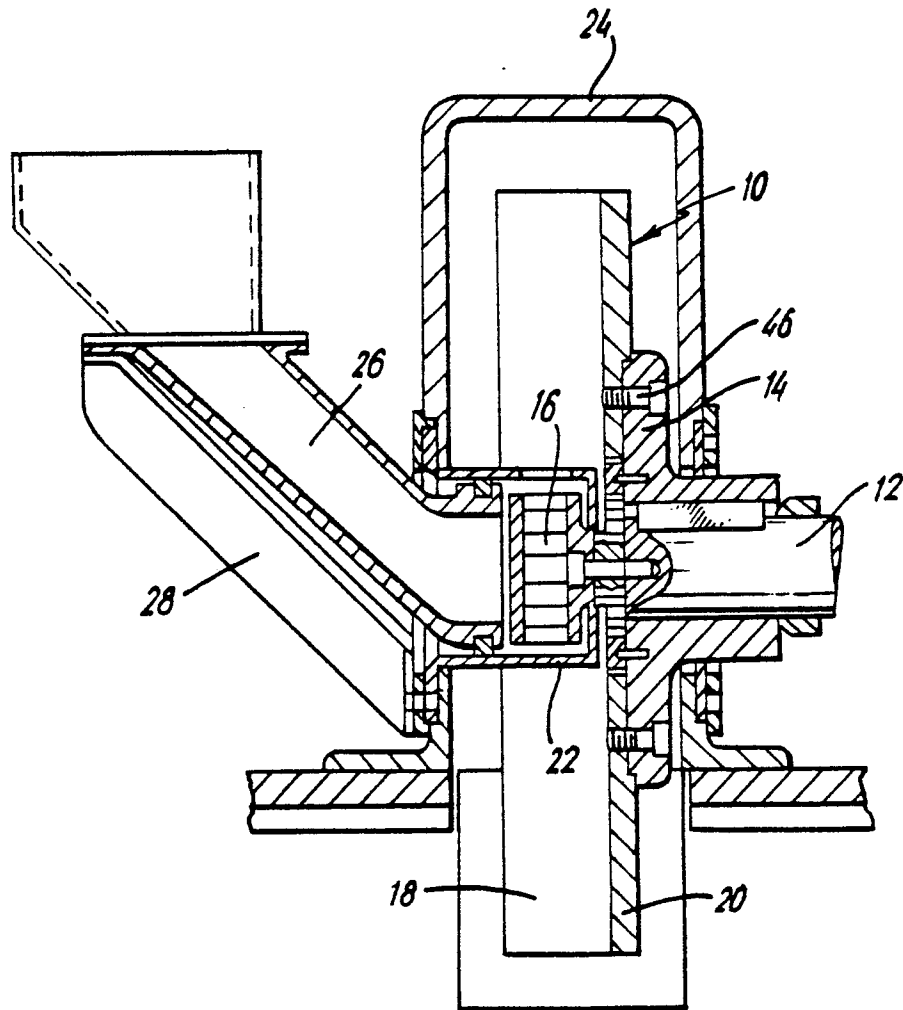
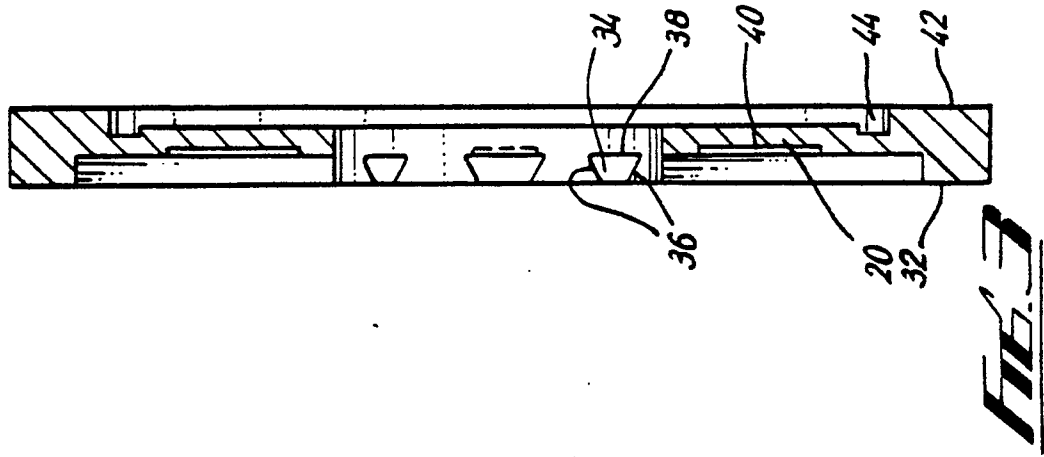
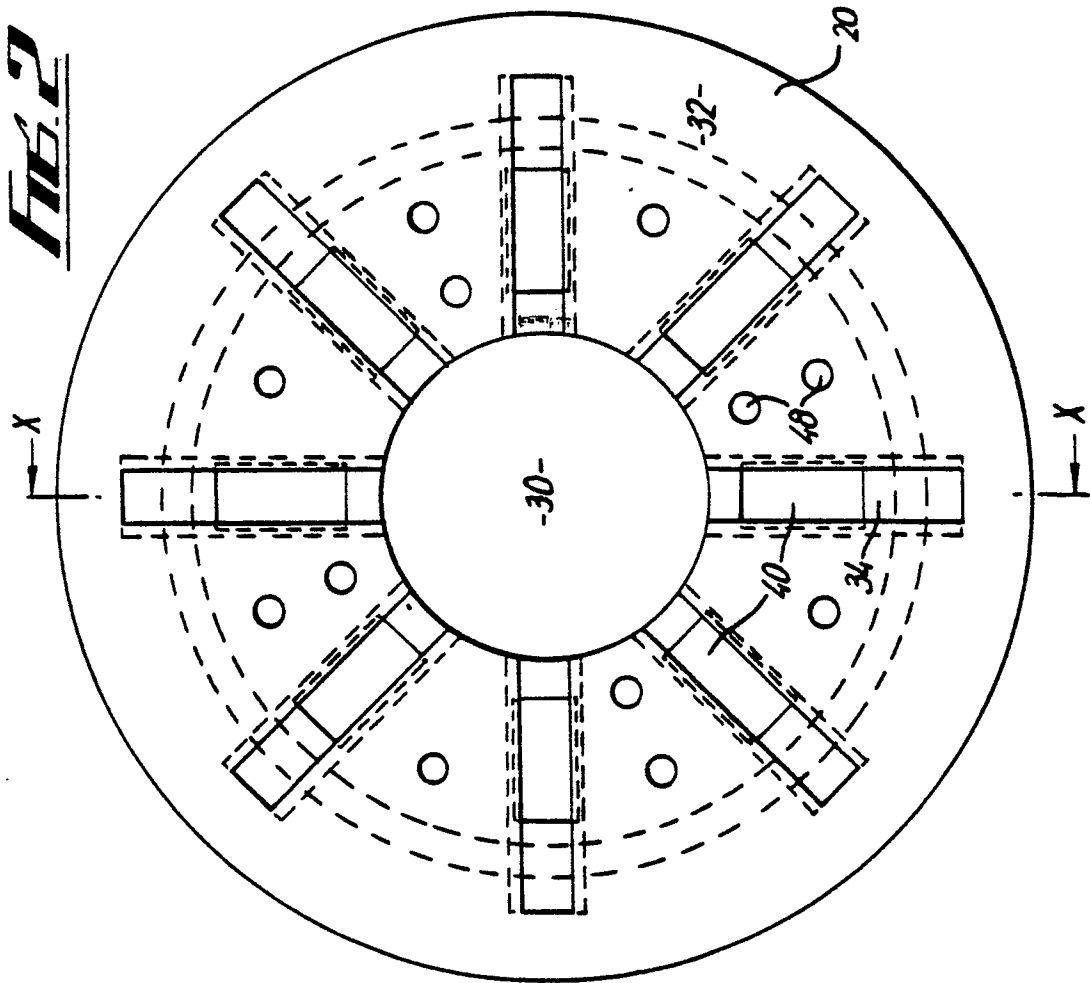
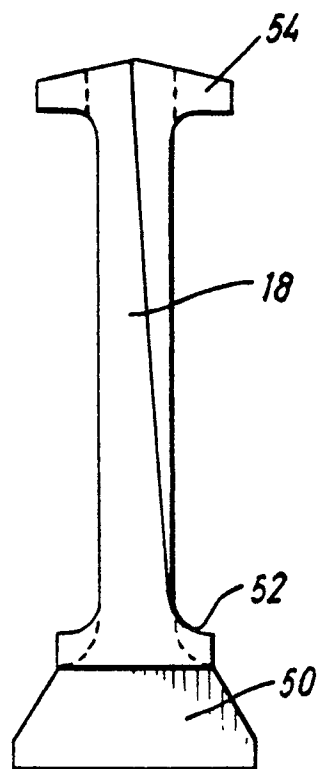
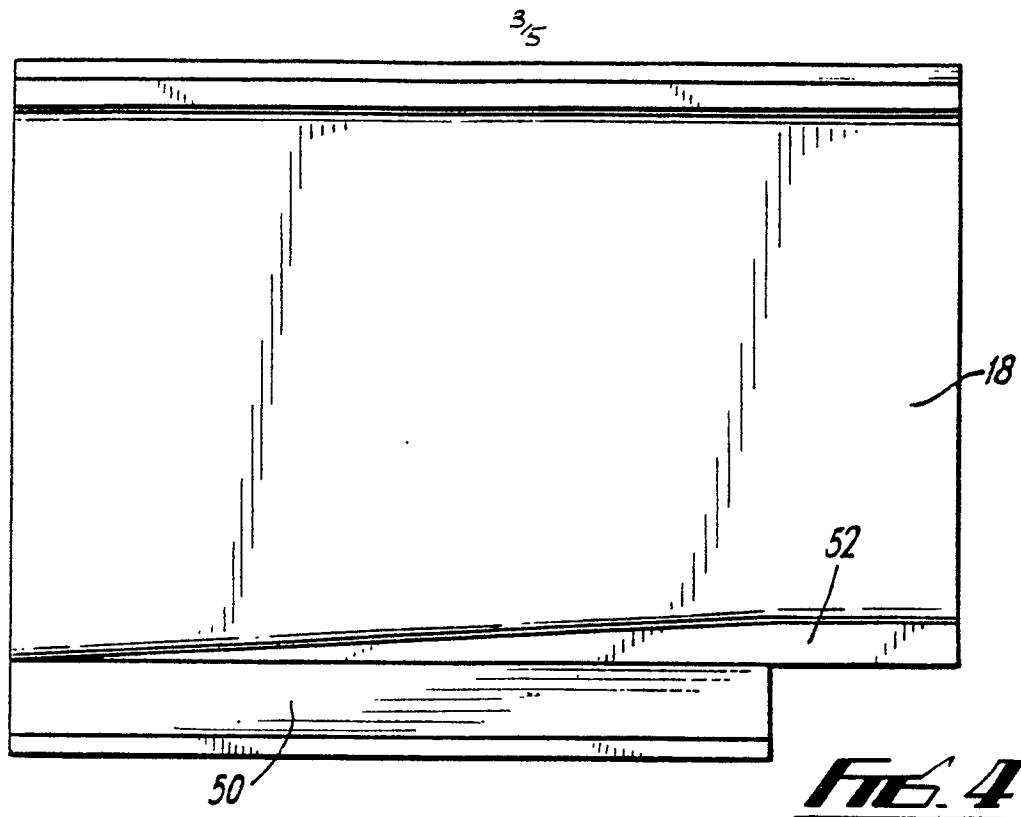
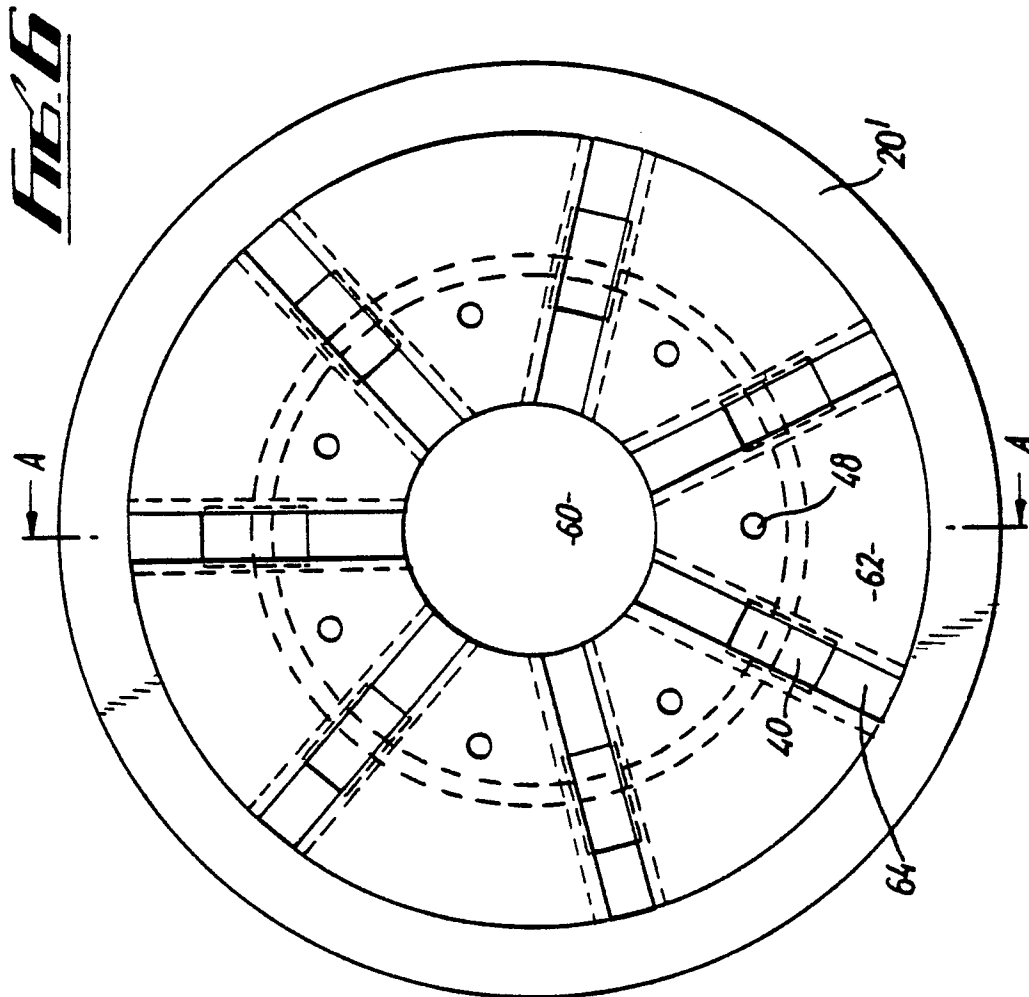
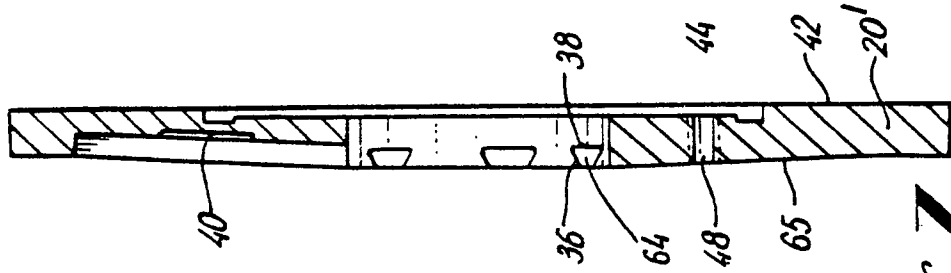


Fig. 1





4/5



271181

0029346

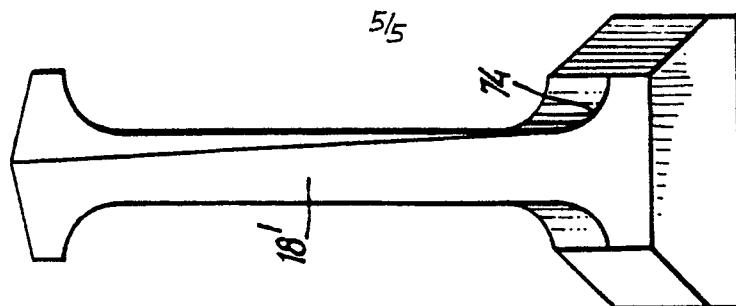


FIG. 9

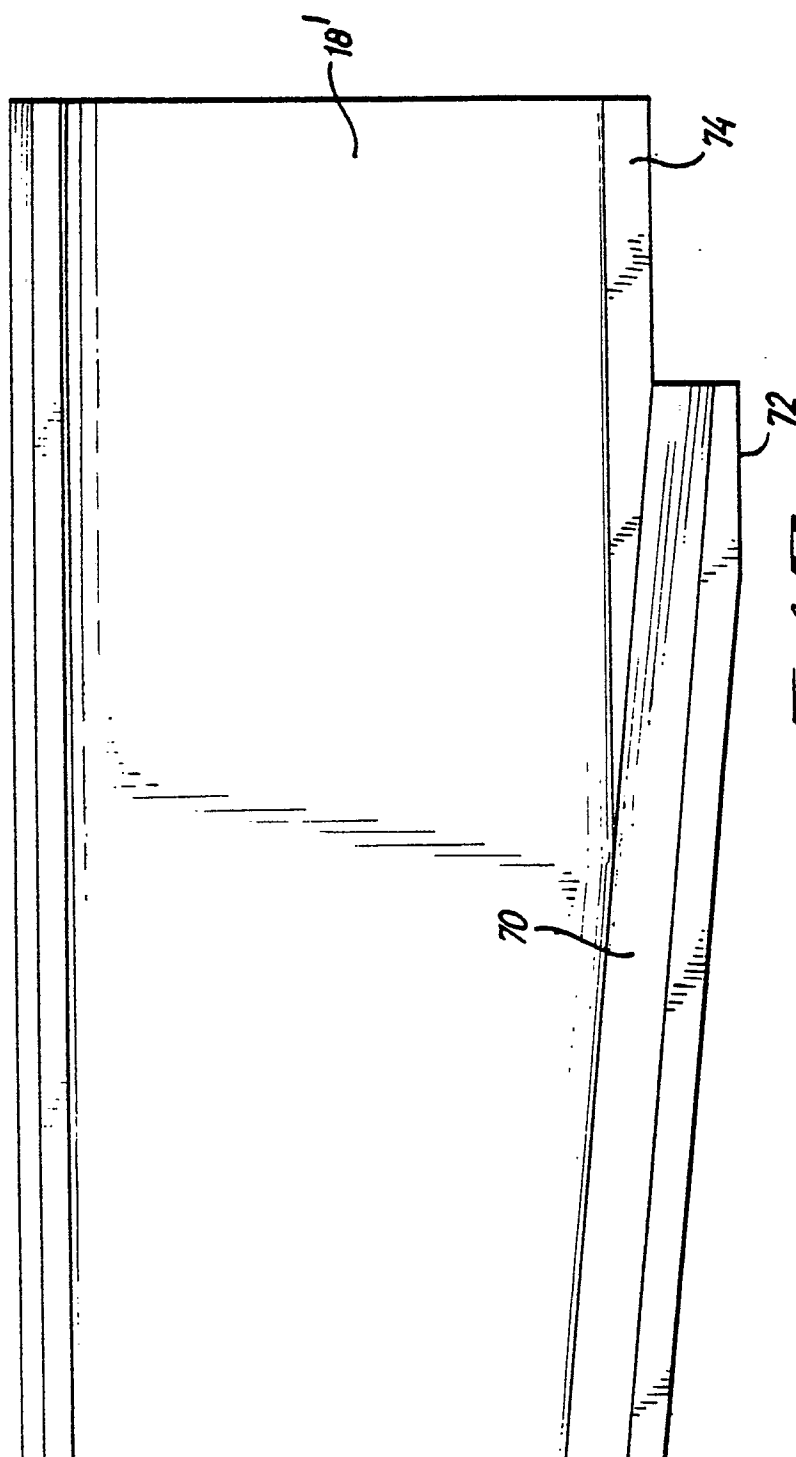


FIG. 8



European Patent
Office

EUROPEAN SEARCH REPORT

0029346
Application number

EP 80 30 4063.3

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>US - A - 2 108 211</u> (ROSENBERGER et al.) * claims 1 to 3; page 1, left column, lines 14 to 40 and right column, line 47 to page 2, left column, line 21; fig. 1 to 4 *	1-3,6, 9,10	B 24 C 5/06
X	<u>US - A - 2 590 576</u> (ROSENBERGER et al.) * column 2, lines 23 to 29; column 4, lines 22 to 44; fig. 3 to 6 *	1-3,6, 9,10	TECHNICAL FIELDS SEARCHED (Int. Cl.3) B 24 C 5/06
	<u>US - A - 3 160 992</u> (MOORE) * column 3, lines 6 to 30 and 67 to 75 *	1,3,10	
A	<u>US - A - 2 341 559</u> (KEEFER)		
A	<u>US - A - 2 246 522</u> (KEEFER)		CATEGORY OF CITED DOCUMENTS
A	<u>US - A - 3 444 651</u> (GEISSELER)		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
A	<u>US - A - 2 869 289</u> (GOSSARD)		
A	<u>US - A - 3 197 920</u> (MOORE et al.)		
X	The present search report has been drawn up for all claims		&: member of the same patent family, corresponding document
Place of search Berlin		Date of completion of the search 26-02-1981	Examiner MARTIN