AMENDED

623891

AUSTRALIA

Patents Act 1990

AUSTRALIAN PATENT OFFICE SEC. 104

29

PATENT REQUEST: STANDARD PATENT

I, being the person identified below as the Applicant, request the grant of a patent to the person identified below as the Nominated Person, for an invention described in the accompanying standard complete specification

Full application details follow.

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Address: 7/210 The Esplanade, Scarborough, in the State of Western Australia, Commonwealth of Australia

[54] Invention Title: "Means for Reducing Passageway Wear"

[72] Name(s) of actual inventor(s): NICHOLAS SUBOTSCH

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Attorney code: WR

ASSOCIATED PROVISIONAL APPLICATION(S) DETAILS

[60] Application Number(s) and Date(s):

PI8543 31st May 1988

NICHOLAS SUBOTSCH,
By his Patent Attorney,

27th September 1991
(Date)

COMMONWEALTH OF AUSTRALIA
Patents Act 1952

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT

In support of the Application made by NICHOLAS SUBOTSCH for a patent for an invention entitled "MEANS FOR REDUCING PASSAGEWAY WEAR".

I, NICHOLAS SUBOTSCH, of 151A Melville Parade, Como, in the State of Western Australia, Commonwealth of Australia, do solemnly and sincerely declare as follows:-

1. I am the applicant for the patent.

2. I am the actual inventor of the invention.

Declared at Perth this 23 day of May 1991

N Subotsch
.....
(Signature of Declarant)
NICHOLAS SUBOTSCH

To the Commissioner of Patents,
Commonwealth of Australia

(12) PATENT ABRIDGMENT (11) Document No. AU-B-35853/89
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 623891

(54) Title
MEANS FOR REDUCING PASSAGEWAY WEAR

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(56) Prior Art Documents
AU 578278 41417/85 F04D 29/44

(57) Claim

1. In a passageway for causing deviation of a fluid flow therein, means disposed along said passageway for reducing wear along an opposing portion of the passageway wall disposed to confront said fluid flow during said deviation, said means comprising a contoured outer surface along a portion of said passageway wall opposite to said opposing portion to define a bore of said passageway expanding in the direction of said fluid flow proximate to said opposing portion so as to create a low pressure region acting upon said fluid flow prior to and directly opposite to said opposing portion thereby biasing fluid flow away from said opposing portion to reduce wear thereof and increase flow efficiency.

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COMPLETE SPECIFICATION
(Original)

FOR OFFICE USE

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Related Art: P 001978 310589

TO BE COMPLETED BY APPLICANT

Name of Applicant:

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Actual Inventor: NICHOLAS SUBOTSCH

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AUSTRALIAN PATENT OFFICE SEC. 104

Complete Specification for the invention entitled:

"Means for Reducing Passageway Wear"

The following statement is a full description of this invention, including the best method of performing it known to me:-

THIS INVENTION relates to means for reducing passageway wear in passageways for causing deviation of a fluid flow which has particular utility in the passage of erosive or abrasive fluids.

In the passage of erosive or abrasive fluids such as slurries in mining operations, a major difficulty which is tolerated in the industry is the replacement of various components such as pumps and bends in pipelines which cause a deviation in the flow of the slurry or the like. Consequently, these components comprise surfaces which are opposed to the general direction of fluid flow and so are subject to wear due to the abrasive, or erosive nature of the fluid more so than other surfaces of the component which do not confront the fluid flow to the same degree.

One particular example of this wear arises in the use of centrifical slurry pumps, whereby slurry is directed centrifugally by an impeller within a circular chamber and is discharged tangentially from the chamber through an outlet port for conveyance down a pipeline. At the junction of the outlet port and the circular chamber, a cut water point is defined which essentially divides the slurry flow into two paths, the principal path being along the outlet port, and the other path being of a proportionally much smaller size to impede the slurry returning to the impeller chamber.

As a result of the deviation in flow of the slurry, the cut water point directly confronts oncoming slurry to divide the same, depending upon its spatial relationship with respect to the point, along one or the other paths. As a result of the highly abrasive nature of the slurry, the cutwater point is subject to extreme wear. Therefore, it is usual in the design of slurry pumps of this nature that the cutwater point is reinforced by the provision of additional material to increase the time

taken for the cutwater point to inevitably wear away to a point where the efficiency of the pump is inadequate and/or a hole is formed in the wall of the pump in the region of the cutwater point.

It is an object of the present invention to provide means for reducing the rate of wear upon opposing portions of a wall of a passageway which cause a deviation in fluid flow, and which confront the fluid flow to achieve the deviation.

In accordance with one aspect of the present invention, there is provided in a passageway for causing deviation of a fluid flow therein, means disposed along said passageway for reducing wear along an opposing portion of the passageway wall disposed to confront said fluid flow during said deviation, said means comprising a contoured outer surface along a portion of said passageway wall opposite to said opposing portion to define a bore of said passageway expanding in the direction of said fluid flow proximate to said opposing portion so as to create low pressure region acting upon said fluid flow prior to and directly opposite to said opposing portion thereby biasing fluid flow away from said opposing portion to reduce wear thereof.

The invention will be better understood in the light of the following description of two specific embodiments. The description is made with reference to the accompanying drawings wherein:-

Figure 1 is a sectional view of a centrifugal slurry pump incorporating the means of the invention in accordance with the first embodiment; and

Figure 2 is a sectional view of an elbow in a pipeline

showing the means of the invention in accordance with the second embodiment.

The first embodiment is directed to a centrifugal slurry pump 11 comprising a circular chamber 13 which houses an impeller generally identified at 15, a tangential outlet port 17 and means 19 for reducing wear.

As shown on the drawings, the outlet port 17 is formed contiguously with the outside of the chamber 13 to define an inner cutwater point 21 at the junction between the outer wall of the chamber and the inner wall of the outlet port. An inlet port (not shown) is disposed centrally of the chamber 13 for introducing slurry into the pump which is subsequently directed centrifugally by the impeller 15.

The outlet port 17 forms a passageway from the chamber 13 for discharge of slurry and the cutwater point 21 defines an opposing portion of the passageway wall which is disposed to confront the slurry flow and divide the same into two paths. The main path indicated by arrow 23 directs slurry flow tangentially from the chamber 13 out through the outlet port 17. The other path indicated by arrow 25 returns a very small portion of the centrifical slurry flow back to the chamber 13. Consequently, the cutwater point 21 is subjected to extreme wear as a result of the abrasive erosive effect of the slurry.

The means 19 is disposed upon a portion 27 of the passageway wall opposite to the opposing portion or cutwater point 21 of the passageway wall. The means 19 comprises a contoured outer surface 29 and projects inwardly of the portion 27 of the passageway wall to define a bore 31 of the passageway which widens in cross-section progressively in the direction of the slurry flow proximate to the opposing portion or cutwater point 21 of

the passageway wall. Thus, as shown in the drawings, the contoured surface 29 of the means initially projects inwardly of the passageway from a point upstream of the cutwater point 21 to define a peak 33 also disposed upstream of the cutwater point 21, and which subsequently tapers outwardly of the passageway to return to the portion 27 of the passageway wall toward the region of the outlet port 17. In this manner, slurry flow proceeding along the path 23 is subject to a semi venturi effect by the creation of a low pressure region subsequent to passing the peak 33 in the expanding bore 31 proximate to the portion 27 of the passageway wall so causing slurry flow to be biased towards the outer portion 27 of the wall in preference to the cutwater point 21. Consequently, this biasing effect upon the slurry flow reduces the pressure of slurry flow confronting the cutwater point and hence reduces wear of the same.

The second embodiment is directed towards a passageway within an elbow 35 of a pipeline for conveying an abrasive or erosive fluid, which similarly causes a deviation of the fluid from its inertial direction.

As shown at Figure 2 of the drawings, the elbow 35 comprises a passageway wall 37 having an opposing portion 37a along its outer side with respect to the passageway which is disposed to confront the fluid flow during its deviation along the elbow, a portion 37b of the passageway wall opposite to the opposing portion 37a, and means 39 projecting inwardly from the portion 37b.

In this arrangement, the means 39 defines an expanding bore 41 of the passageway immediately after the peak 43 of the contoured outer surface thereof which is proximate to the opposing wall 37a of the passageway. Consequently, the semi venturi effect created by the expanding bore

41 causes a reduction in pressure in the region of the bore adjacent to the portion 37b of the passageway to bias fluid flow away from the opposing portion 37a of the passageway wall, and so reducing wear which would otherwise proliferate therealong.

It should be appreciated that the scope of the present invention is not limited to the particular embodiments hereindescribed. In particular, the means 19 for reducing wear along the opposing portion of the passageway wall can be formed either integrally with the wall during its formation or alternatively, the means may be formed discretely for subsequent insertion into the passageway and affixture to the passageway wall by welding or bonding.

THE CLAIMS defining the invention are as follows:-

1. In a passageway for causing deviation of a fluid flow therein, means disposed along said passageway for reducing wear along an opposing portion of the passageway wall disposed to confront said fluid flow during said deviation, said means comprising a contoured outer surface along a portion of said passageway wall opposite to said opposing portion to define a bore of said passageway expanding in the direction of said fluid flow proximate to said opposing portion so as to create a low pressure region acting upon said fluid flow prior to and directly opposite to said opposing portion thereby biasing fluid flow away from said opposing portion to reduce wear thereof and increase flow efficiency.

2. In an outlet passageway for a centrifugal pump casing, means disposed along said passageway for reducing wear of the cut water disposed to confront output fluid flow at the junction between said outlet passageway and said casing, said means comprising a contoured outer surface along a portion of said passageway wall approximately opposite to said cutwater to define a bore of said passageway expanding in the direction of said fluid flow proximate to said cutwater so as to create a low pressure region acting upon said fluid flow prior to and directly opposite to said cutwater thereby biasing fluid flow away from said cutwater to reduce wear thereof and increase flow efficiency of the centrifugal pump.

3. Means disposed in a passageway substantially as herein described with reference to the accompanying drawings.

DATED this TENTH day of JULY 1991.

NICHOLAS SUBOTSCH
Applicant.

WRAY & ASSOCIATES
Perth, Western Australia,
Patent Attorneys for the Applicant.

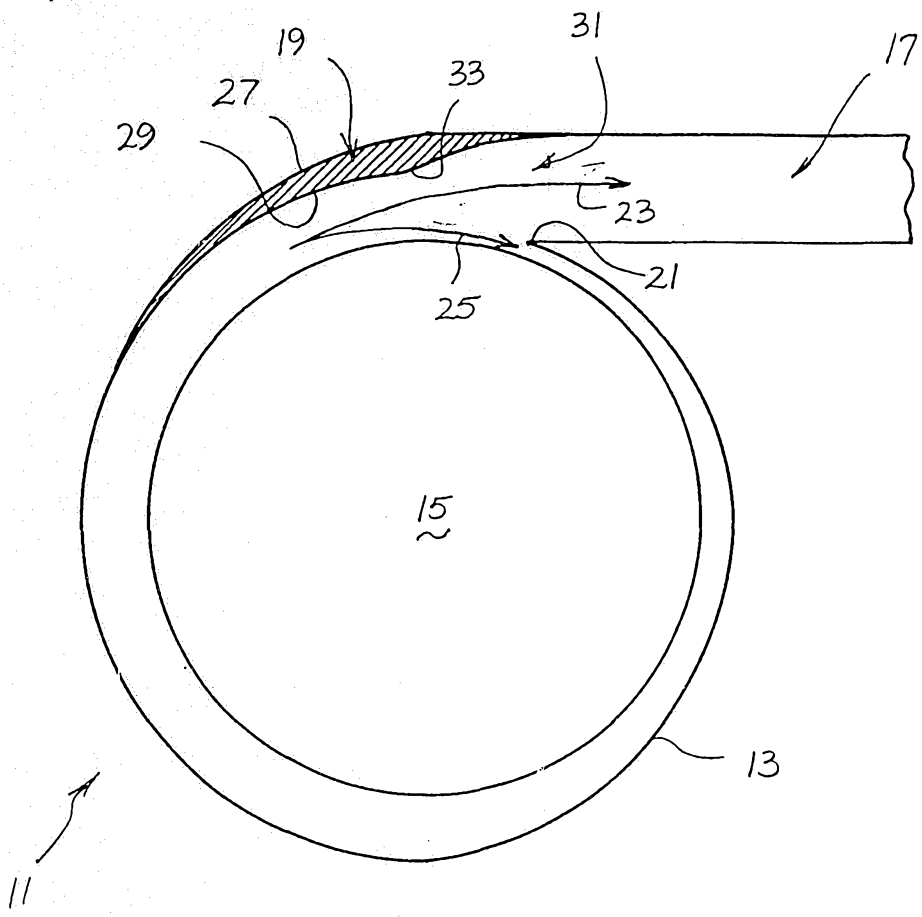

Fig. 1

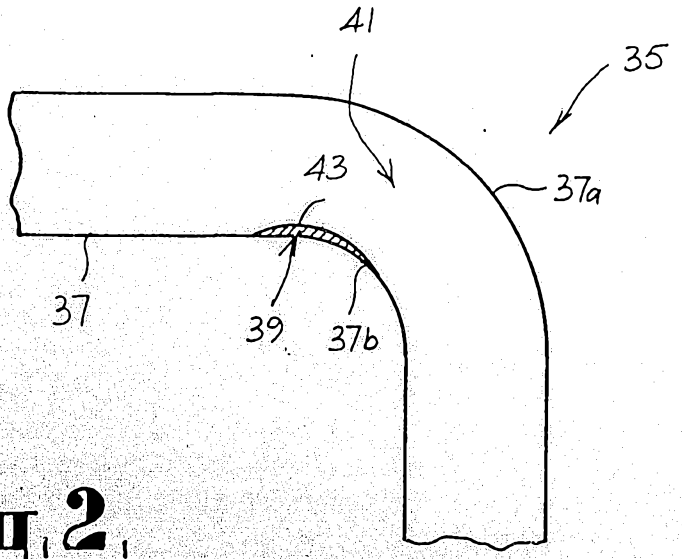

Fig. 2