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㉙ **Centrifugal abrasive throwing wheels.**

㉚ A blade for a shot blasting throwing wheel comprising a pair of parallel side plates having radial slots or grooves within which the lateral edges of a blade are engaged for location purposes has provided at each lateral edge a compressible sealing strip which stands proud of the back, front and side faces of each of said lateral edges such that, when the blade is fitted between the side plates, the sealing strip fills the slots or grooves within its side edge are engaged to provide a barrier to the flow of abrasive and/or contaminants along the slots or grooves to the rims of the side plates thereby reducing wear of the latter. Secondly the sealing strips serve, during assembly, temporarily to retain the blades between the side plates until they are mechanically secured against radial dislodgement.

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CENTRIFUGAL ABRASIVE THROWING WHEELS

5 This invention relates to centrifugal abrasive throwing wheels such as are used in shot blasting machinery.

10 The invention relates particularly to the blades employed in such a throwing wheel and is especially but not exclusively concerned with blades which are fitted into and withdrawn from such a throwing wheel through a central opening of the throwing wheel, the blades being retained in position within the wheel by abutment of formations on the blades and the wheel per se which wheel generally consists of two side plates between which the blades are disposed, 15 generally in radial attitude, and which side plates are conjoined by spacers, each side plate having a central opening. Inward movement of the blades in the assembled throwing wheel is prevented by the presence of the customary removable centering plate or combined centering plate and vane-type impellor 20 traversing the central openings of the side plates.

25 An example of such a throwing wheel is disclosed in our United Kingdom Patent No. 1 500 092. In this Patent, the side plates of the throwing wheel are, as is customary, radially slotted or grooved to receive and locate the lateral edges of the blades, each slot at its inner end, i.e. adjacent to the central opening, being deeper than the remainder of the slot to define a ledge against which abuts a protuberance 30 or nose provided on each lateral edge or rail of the blade. Thus, in this Patent there is disclosed lateral radial location of the blades between the side plates. In this Patent both faces of the blade are identical so that the throwing wheel is 35 operationally reversible.

An alternative arrangement is known in which there is on the back face of each blade a projection which abuts against a spacer conjoining the two side plates. Here, there is back radial location and the wheel is only uni-directionally operational, i.e. it is not reversible.

With either of such blade mountings, the blades, as the throwing wheel rotates at high speed, tend to lie back, in terms of direction of rotation of the throwing wheel, in the slots in the side plates so that clearance occurs between the front faces of the lateral edges of the blades and the adjacent slot walls. As a result, fine particle abrasive and/or contaminants flow up between the front faces of the lateral edges of the blades and the adjacent slot walls which results in substantial wear on the peripheries of the side plates. This is unsatisfactory, and is not acceptable to the operator of the shot blasting machinery since while he expects to replace worn blades at fairly frequent intervals he does expect a substantially longer working life from the throwing wheel per se.

It is therefore an object of the present invention to obviate or mitigate such side plate wear.

According to the present invention there is provided a blade for a throwing wheel for use in shot blasting machinery, the blade at each lateral edge outboard of its inner end, i.e. that end nearer the centre of the throwing wheel when the blade is fitted in a throwing wheel, having a sealing strip of natural or synthetic polymeric or elastomeric material which stands proud of the front, back and side faces of said lateral edge.

When such a blade is fitted between the side plates of the throwing wheel the sealing strips are

compressed between the blade lateral edges and the front, back and side walls of the slots thus providing a barrier to the flow of fine abrasive and/or contaminants up the front of the lateral edges of the blade.

When inserting blades through the central opening of a throwing wheel considerable difficulty is encountered when fitting the last two blades, i.e. the upper two blades, since, not unexpectedly, they tend to gravitate towards the central opening and assembly of a throwing wheel is therefore difficult and awkward since it is not until the centering plate, with or without a combined vane-type impellor, is in position within the central opening that the blades are stabilised in position between the side plates.

An additional advantage of these sealing strips, therefore, is that they serve frictionally to hold the blades in position between the side plates, after insertion through the central opening of the throwing wheel, while the remainder of the wheel assembly, i.e. the centering plate with or without a combined vane-type impellor and control cage are being fitted within the central opening of throwing wheel.

The cross-section of the sealing strip and its accommodating retention groove in the lateral edge of a blade may be, for example, round or square but a preferred cross-section is dovetail which will prevent any inadvertent lateral egress of a sealing strip when a blade is being pushed into position between the side plates, i.e. it will not roll out.

The sealing strips may conveniently be formed of, for example, natural or synthetic rubber or polyurethane.

Each sealing strip retention groove, when viewed

from the side of the blade, has a central parallel region which diverges towards the front and back faces of the blade. This divergence assists insertion (or removal) of the sealing strip, from either face, into (or out of) its retention groove.

Also according to the present invention there is provided an abrasive throwing wheel for use in shot blasting machinery, the wheel incorporating a plurality of blades as defined in the seven immediately preceding paragraphs.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawing, in which :-

Fig. 1 is a perspective view of a blade for an abrasive throwing wheel in accordance with the present invention;

Fig. 2 is a section on the line II-II of Fig. 1;

Fig. 3 is an end view of the blade viewed from its inner end when mounted in a throwing wheel;

Fig. 4 is a detail sectional view of a preferred sealing strip retention groove in a blade;

Fig. 5 is a sectional view of a throwing wheel incorporating blades according to the invention;

Fig. 6 is a detail part sectional view of a blade and side plate; and

Fig. 7 is a fragmentary exploded perspective view of the blade and side plate.

The throwing wheel assembly and blades are substantially as disclosed and illustrated in our aforesaid United Kingdom Patent, the content of which is included herein by reference but it is to be noted that the nylon blade retention studs and holes for accommodating same referred to in our aforesaid Patent are omitted for a reason which will become clear later.

Referring to the drawings, a blade 10 is cast in one piece and is of a substantial rectangular shape with an I-shaped transverse cross-sectional (Fig. 3) to provide lateral or side rails 11. An inner part of the blade 10 is intended to be located between side plates 12 of a throwing wheel (see Fig. 5) and an outer part of the blade 10 is intended to project beyond the rims or peripheries 13 of the side plates 12.

The two faces 14 of the blade 10 are identical. At the outer part of the blade the faces are smooth and parallel and at the inner part (see Figs. 2 and 3) the faces 14 curve slightly inwards toward each other as indicated at 15. The reason for this curvature is to save wear on the blade 10 by the abrasive as it first strikes the blade 10. The side edges of the faces 14 are radiussed (see Fig. 3) to merge with the rails 11 of the blade 10 to prevent abrasive lodging in the blade 10 itself.

The flanges 11 of the blade 10 are also identical. On the outer surface 16 of each of the rails 11, adjacent the blade's inner end, is a protuberance 17. The end 18 of the protuberance 17 is angled and formed into a blunted nose 19 pointing towards the outer end of the blade 10 and the outer surface 16 of the rails 11 are cut away at 20 so that the nose 19 of the protuberances 17 stands out in relief. Both of these features (angled faces and relief configuration), assist in preventing abrasive lodging between the blade 10 and the side plates 12 of the throwing wheel which would make the blade 10 difficult to remove from the wheel.

The throwing wheel is of generally known construction (see our aforesaid Patent). It comprises two side plates 12 between which, say, six

or eight of the blades 10 are located, there being a central opening 21 in the side plates 12 and in which a vane-type impellor 22 with integral centering plate 23 are located and through which the abrasive is fed to the blades 10 from a feed spout 24 and a stationary control cage 25 which has the customary inner return flange omitted and which surrounds the impellor 22 and which is also located in the central opening 20 of the two side plates 12. This construction of integral impellor 22 and centering plate 23 without the customary intervening control cage return flange permits a longer impellor and thus larger slots 26 in the impellor 22 to be employed so allowing more abrasive to flow through the wheel. The blades 10 are retained in the side plates 12 in six or eight pairs of equi-angularly-spaced radial slots 27 machined in the side plates 12 of the wheel and which extend from the inner diameter of the wheel to the outside diameter or rim.

The inner ends 28 of each of the slots 27 are cut deeper than the rest of the slot 27 so that there is a part-circular ledge 29 against which the nose 19 of a protuberance 17 on a blade 10 will abut. There is clearance between the ledges 29 and the protuberances 17 in the assembled wheel to prevent the abrasive lodging between them and causing wear.

The side plates 12 are conjoined by equi-angular spacers 30.

The length of the blades 10 and the dimensions of the central opening 21 in the side plates 12 are such that the blades 10 can be fitted into the wheel through the central opening 21. The blades 10 slide into the pairs of slots 27 and the inner parts of the blades 10 abut the integral centering plate 23.

In use, the side plates 12, impellor 22 and

integral centering plate 23 and blades 10 are rotated
via a wheel hub 34 bolted as indicated at 34A to one
of the side plates 12 and a shaft 34B bolted as
indicated at 37 to the centering plate 23. Abrasive,
5 is fed down the feed spout 24, through the impellor
22 and out, via the control cage 25, onto the faces
of the blades 10 to be accelerated and directed onto
the workpiece to be blasted. The blades 10 are such
that the blast impellor wheel can be used to direct
10 abrasive in each of the two directions of rotation of
the wheel, as required, by merely reversing the
direction of rotation of the wheel.

It is to be noted that the centering plate 23
extends radially outwardly of the impellor 22
15 completely to clock the central opening 21 of the
adjacent side plate 12, thus presenting an impediment
to the passage of any abrasive through the opening 21
into the region of the wheel hub 34 and shaft 34B.

When the throwing wheel is rotating, the blades
20 10 are retained in position by the abutment of the
protuberances 17 of the blades 10 against the ledges
29 of the slots 27 in the side plates 12, which is
brought about by centrifugal force.

So far we have described the abrasive throwing
25 wheel of our aforesaid United Kingdom Patent.

With this and other throwing wheels, the blades
10 tend to lie back against the back walls 27A of
their locating slots 27. Thus, a blade 10 will tend
to lie back so that the back surface 11A of the rails
30 11 will lie against slot wall 27A thus creating a
clearance between the front surfaces 11B of the rails
11 and slot walls 27B. Also, for obvious reasons,
the blade 10 is not a frictional fit in the slots 27
so that clearance exists between the lateral faces 16
35 of the rails 11 and the lateral faces 27C of the

slots 27.

Consequently during rotation of the throwing wheel fine abrasive and/or contaminants can flow up the clearances between the lateral faces 16 and 27C of the blades 10 and slots 27 and the front faces 11B of the rails 11 and slot walls 27B.

This results in substantial and fairly rapid wear of the periphery or rim 13 of the side plates 12 of the throwing wheel which necessitates replacement of the throwing wheel per se as opposed to, say, only the blades 10.

To avoid or decelerate this wear of the side plates, each rail 11 of each blade 10, according to this invention, is formed outboard of its inner end and inboard of the protuberance or nose 19 with a retention groove 35 into which is fitted a sealing strip 36 of natural or synthetic rubber or a plastics material. This sealing strip 36 stands proud of the front, back and outer side surfaces of each rail as can be seen in Figs. 4, 6 and 7.

When a blade 10 is fitted between two side plates 12 the sealing strips 36 are compressed between the side rails 11 and the walls 27A, 27B and 27C of the slots 27 thus providing a barrier to the flow of fine abrasive and/or contaminants along the space between the rails 11 and slots 27 to the side plate rims 13.

A preferred retention groove 35 configuration is dovetail as indicated in Figs. 6 and 7, the sealing strips 36 being correspondingly shaped. The sealing strips, in this instance, would be inserted endways into the grooves 35.

The retention grooves 35 (see Fig. 2), when viewed from the side of the blade, have a central parallel portion merging with outwardly flared or

diverging portions, the latter facilitating insertion (or withdrawal) of a sealing strip 36 into the groove 35.

5 The sealing strips 36 are, in fact, preferably force fitted into the retention grooves 35 but they may be retained by any convenient method, for example keying or adhesive.

10 These sealing strips 25 also assist location and retention of the blades 10 between the side plates 12 during throwing wheel assembly in that they frictionally hold the blades 10 in position between the side plates 12 until the central assembly of impellor 22 and centering plate 23 are in position.

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CLAIMS:

1. A blade for a throwing wheel for use in shot
blasting machinery, the blade at each lateral edge
5 outboard of its inner end, i.e. that end nearer the
centre of the throwing wheel when the blade is fitted
in a throwing wheel, having a sealing strip of
natural or synthetic polymeric or elastomeric
material which stands proud of the front, back and
10 side faces of said lateral edge.
2. A blade as claimed in claim 1 comprising at
each lateral edge a retention groove extending
between opposed faces of the groove for receiving the
sealing strip.
- 15 3. A blade as claimed in claim 2, in which each
retention groove and its corresponding sealing strip
are of dovetail cross-section.
4. A blade as claimed in claim 2 or 3, in which
each retention groove, when viewed from the side of
20 the blade, has a central parallel portion merging
with flared or diverging portions extending to the
blade faces to facilitate sealing strip insertion (or
withdrawal).
5. A blade as claimed in any one of claims 2 to
25 4, in which the sealing strips are force fitted into
the retention grooves.
6. A blade as claimed in any one of claims 2 to
5, in which the opposed faces of the blade are
identical with the lateral edges of the blade having
30 formations for assisting radial securement of the
blade between side plates of a throwing wheel.
7. A blade as claimed in any one of claims 2 to
5 in which one face of the blade serves as a throwing
face while the other faces has a projection for
35 cooperating with a spacer joining side plates of a

throwing wheel for assisting radial securement of the blade between the side plates.

5 8. A blade as claimed in any one of claims 1 to 7, adapted to be fitted between side plates of a throwing wheel with the lateral edges of the blade engageable in slots or grooves in the side plates, the sealing strips being compressed by such fittment to provide a barrier against abrasive and/or contaminant flow towards the rims of the side plates and to provide a temporary retention of the blade 10 between the side plates until the blade is secured in position by a centering plate.

15 9. A blade for a throwing wheel for use in shot blasting machinery, substantially as hereinbefore described with reference to the accompanying drawings.

20 10. An abrasive throwing wheel for use in shot blasting machinery, the throwing wheel comprising a pair of side plates joined in parallel relationship by spacers and having slots or grooves provided on the inner faces thereof to receive and locate lateral edges of blades as claimed in any one of claims 1 to 9.

25 11. An abrasive throwing wheel assembly comprising an abrasive throwing wheel as claimed in claim 10 with a centering plate, a vane-type impellor integral with or separate relative to the centering plate, a control cage surrounding the imepllor and a feed spout for delivering abrasive into the impellor.

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