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SUPERINTENDENCIA

PCT

DELEGATURA DE PROPIEDAD INDUSTRIAL

DIVISION DE NUEVAS CREACIONES

09-133052

SOLICITUD DE PATENTE DE
INVENCION

TITULO TAMIZ SECADOR CENTRIFUGO DE PELLETS CON TIRAS
DEFLECTORAS INTEGRALES REPUJADAS

SOLICITANTE GALA INDUSTRIES INC

DIRECCION 181 Pauley Street, Eagle Rock, VA 24085 Estados Unidos de
America

APODERADO J IAN RAISBECK

BOGOTA 23 de Noviembre de 2009

OLARTE RAISBECK

OLARTE RAISBECK MOURE &



Industria y Comercio
SUPERINTENDENCIA

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No 09 133052 00000 0000

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Tra 11 PATENTEIYII Evg 379 FASENACIONALII
Act 411 PRESENTACION Folios 74

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PATENTE PCT

ENTRADA EN FASE NACIONAL

P2009/000181

SOLICITUD DE

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Patente de Invencion

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Patente de Modelo de Utilidad

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Capitulo I

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Capitulo II

2

SOLICITANTE
(71)

Nombre GALA INDUSTRIES, INC

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Virginia 24085

Nacionalidad o Domicilio Estadounidense
Lugar de Constitucion Estados Unidos

Telefono _____ Fax _____

E-mail _____

IDENTIFICACION

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Otro

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Cual _____

Numero _____

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Numero 79 376 996 Bta
TP 135.799

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6

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Prioridad

SI

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Comprobante de pago No 09- 85,997

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ANEXOS



Comprobante de pago de la tasa de presentacion de la solicitud



Documento que acredita la existencia y representacion legal cuando el solicitante sea persona juridica



Poderes si fuere el caso Adjunto copia simple ver Expediente No 07-125 003



Documento de cesion del inventor al solicitante o a su causante



Declaraciones



Copia de la solicitud internacional (Resumen, descripcion, reivindicaciones dibujos)



Traduccion de la solicitud internacional al castellano (Resumen, descripcion, reivindicaciones, dibujos)



Copia del examen preliminar internacional efectuado por la Autoridad Internacional de Examen Preliminar (IPEA)



Traduccion del examen preliminar internacional efectuado por la IPEA



De ser el caso, copia del contrato de acceso



De ser el caso documento que acredite la licencia o autorizacion de uso de conocimientos tradicionales de las comunidades indigenas



De ser el caso certificado de deposito del material biologico



Arte final 12 x 12



De ser el caso, informacion sobre otras solicitudes de patente o titulos obtenidos en el extranjero por el mismo titular o su causante, relacionadas parcial o totalmente con la invencion de esta solicitud



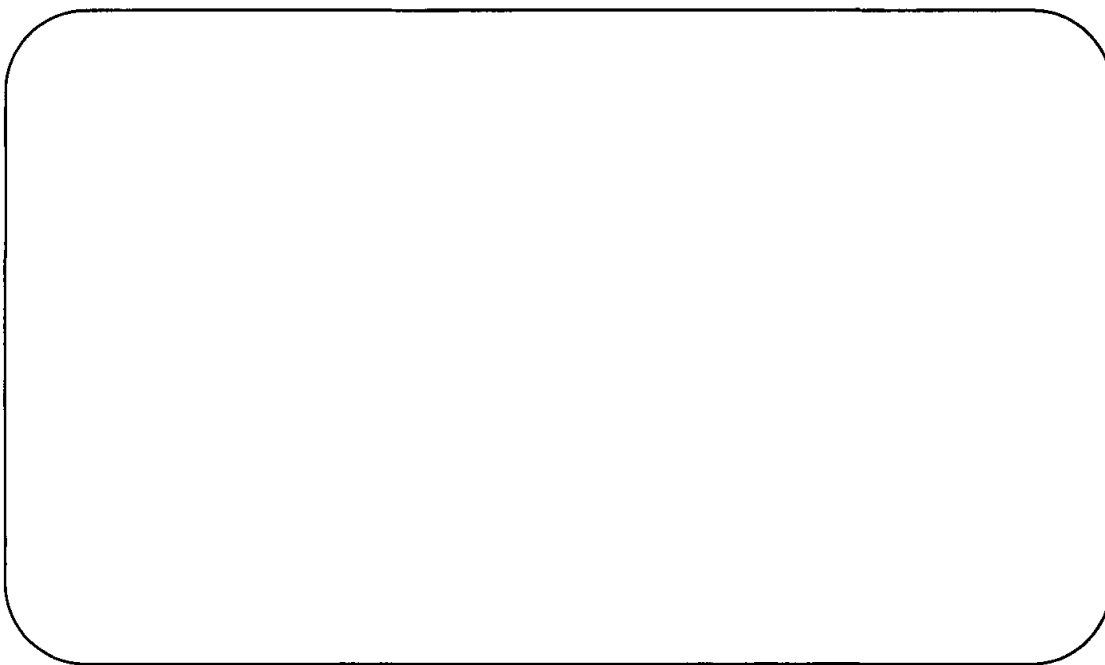
De ser el caso modificaciones efectuadas a la solicitud internacional



Otros Busqueda Internacional



FIGURA CARACTERISTICA



Solicito la concesion de la patente,

NOMBRE J IAN RAISBECK

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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

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DEPOSITANTE	TITO PAGO	BANCO	CUENTA	No PAGO	FECHA PAGO	Vr PAGO
OLARIE RAISBEK	CONSIGNACION	BANCO DE BOGOTA	062754387	174351564	17/11/2009	1,266,000 00

***** CONCEPTO *****

CANT	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-01	SOLICITUDES	
1		TRAMITES DE SOL DE PATENTE DE IN	540,000 00
		TOTAL	540 000 00

SON QUINIENTOS CUARENTA MIL PESOS

RESPONSABLE _____

RECIBO DE CAJA APLICADO AL EXPEDIENTE No _____

09/18/



BOGOTA D C FEBRERO 08 2008

TRADUCCION APOSTILLA

APOSTILLE

(Convencion de la Haya Octubre 5 1961)

1 PAIS **ESTADOS UNIDOS DE AMERICA**

ESTE DOCUMENTO PUBLICO VER DOCUMENTO ANEXO

2 HA SIDO FIRMADO POR **LUTHER C HUFFMAN**

3 ACTUANDO EN SU CALIDAD DE NOTARIO PUBLICO

4 LLEVA EL SELLO/ESTAMPILLA DE LUTHER HUFFMAN, NOTARIO PUBLICO
COMUNIDAD DE VIRGINIA

CERTIFICADO

5 EN RICHMOND VIRGINIA

6 EL DIA **FEBRERO 01, 2008**

7 POR EL SECRETARIO DE LA COMUNIDAD DE VIRGINIA

8 NR **2236035-1**

9 SELLO/ESTAMPILLA (HAY SELLO)

10 FIRMA (HAY FIRMA)

SECRETARIO DE LA COMUNIDAD

CERTIFICADO DE AUTENTICIDAD El suscrito Traductor e Interprete Oficial juramentado debidamente registrado ante el Ministerio de Relaciones Exteriores de Colombia con el presente certifica que esta es una traduccion autentica verdadera y precisa al Idioma Castellano del documento en Ingles **anexo para verificación**

FIDEL ANTONIO MURCIA MURCIA
Traductor e Interprete Oficial
Resolucion No 488/94 Ministerio de Justicia

Fidel Murcia



APOSTILLE

(Convention de la Haye du 5 Octobre 1961)

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1 Country United States of America

This public document

2 Has been signed by Luther C. Huffman

3 acting in the capacity of A Notary Public

4 Bears the seal/stamp of Luther C. Huffman
Commonwealth of Virginia

Certified

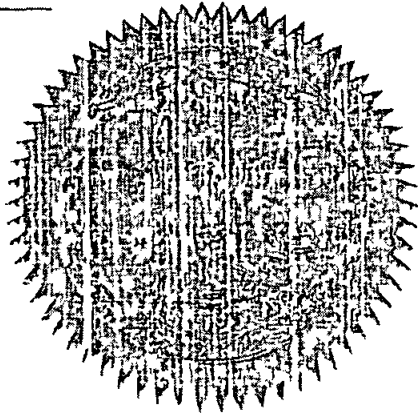
5 at Richmond Virginia

6 On February 1, 2008

7 by The Secretary of the Commonwealth

8 No 2236035-1

9 Seal/Stamp



10 Signature

Katherine F. Henley

Secretary of the Commonwealth

Podet

MODEL OF NOTARIAL CERTIFICATION

Notarial Certification

Certificación Notarial

On this date

En esta fecha

X January 23, 2008 -
The undersigned Notary Public certifies.

el Notario Público suscrito certifica.

1 That,

1 Que

David E. Bryan
of legal age and domiciled in

mayor de edad y domiciliado

P.O. Box 792, Buchanan, Virginia 24066
signed the foregoing document.

suscribió el documento que antecede

2 That the grantor has executed the foregoing
document as President
of

2 Que el otorgante ha suscrito el referido
documento en su carácter de
de

GALA INDUSTRIES, INC.

4 Que

3 That, GALA INDUSTRIES, INC.
having its principal place of business located in

con sede principal ubicada en

181 Pauley Street, Eagle Rock,
is duly incorporated, is currently in existence, and
that the purposes for which the Power of Attorney is
granted are within the scope of its corporate
purposes.

Virginia 24085, USA
esta legítimamente constituida, que tiene existencia
legal vigente y que los propósitos para los cuales
se otorga el poder se encuentran dentro de los que
comprenden su objeto social.

4 That the grantor has the authority to execute the
Power of Attorney and that his/her representation is
legal

4 Que el otorgante tiene la representación para
suscribir el poder y que esta es legítima.

5 The foundation for my certifications contained in
points 2, 3 and 4 was the exhibition of the following
authentic document(s) MINUTES FROM THE

5 El fundamento de mis certificaciones
contenidas en los puntos 2, 3 y 4 fue la exhibición
de los (del) siguiente(s) documento(s) autenticado(s)

X MAR 18, 2007 MEETING OF THE BOARD OF
DIRECTORS OF GALA INDUSTRIES, INC.

NOTARY PUBLIC (Signature) X

NOTARIAL CERTIFICATION

X THE COMMONWEALTH OF VIRGINIA
COUNTY
CITY OF BOJETOURT

Subscribed and sworn to before me, a Notary Public, this
23rd day of JANUARY, 2008

My Commission Expires AUGUST 31, 2011

ID # 107314

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International Bureau



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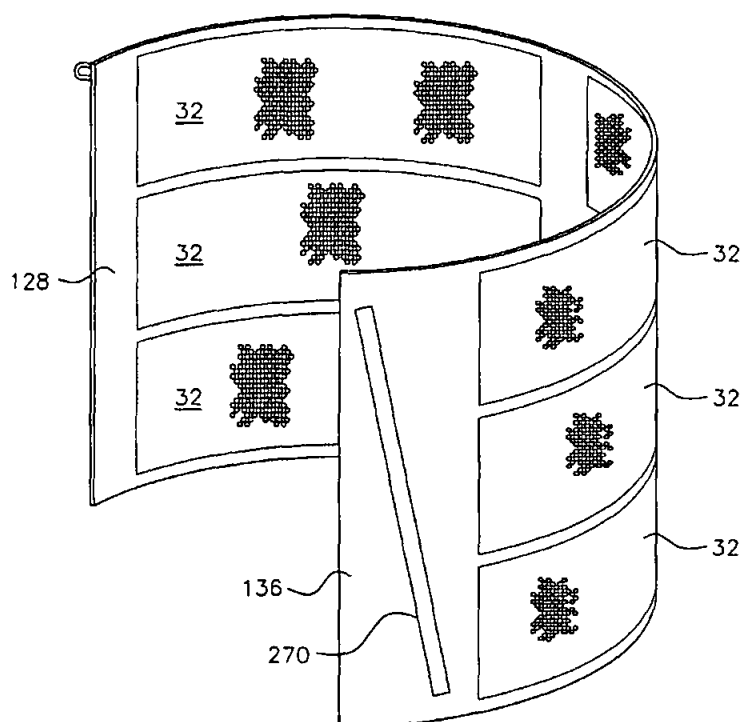
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[Continued on next page]

(54) Title CENTRIFUGAL PELLET DRYER SCREEN WITH INTEGRAL EMBOSSED DEFLECTOR STRIPS

FIG 13



(57) Abstract An embossed screen having raised deflector elements on the internal surface is provided for a centrifugal pellet dryer. The deflector screen is formed as an integral structure eliminating the need for separate deflector components secured by fastening elements along with the associated risks such as loosening or separation of the strip and contaminate build up between the strip and the screen. The embossed deflector screen effectively deflects the pellets back toward the rotor where the pellets are reengaged with rotor energy resulting in increased dryer efficiency and flow rate. The embossed deflector screen also enhances the overall structural strength of the screen, reduces manufacturing costs and prevents pellet entrapment that can lead to contamination in future runs.

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Published

— with international search report

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CENTRIFUGAL PELLET DRYER SCREEN
WITH INTEGRAL EMBOSSED DEFLECTOR STRIPS

This application is entitled to and hereby claims the priority of co-pending U S Provisional application, Serial No 60/924,627 filed May 23, 2007

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention generally relates to a centrifugal pellet dryer of the type which utilizes a bladed lift rotor conveying moisture laden plastic pellets or other solid particles upwardly within a cylindrical screen. The centrifugal force imparted to the particles by rotation of the lift rotor causes the particles to engage the interior surface of the screen, and moisture on the particles is discharged through the screen in a manner well known in the art. More specifically, the present invention relates to a product flow modifying deflector associated with the internal surface of the cylindrical screen.

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Description of the Related Art

Centrifugal pellet dryers are well known in the art for separating water or moisture from plastic pellets and other solid particles, such as a slurry of water and plastic pellets produced by underwater pelletizers. Centrifugal pellet dryers of the prior art include a vertically disposed outer housing, a cylindrical screen oriented in the housing and a driven bladed rotor positioned centrally inside the screen. The rotor moves water laden pellets or other solid particles upwardly within the screen with centrifugal forces imparted to the particles by radial air flow from the rotor (see Figure 1) causing the particles to move radially outwardly into engagement with the screen for discharge of water through the screen. The dried particles are discharged from the upper end of the screen and housing, and water is discharged from the lower end of the housing.

Centrifugal pellet dryers of this type are disclosed in U S Patent Nos 7,171,762, 7,024,794, 6,807,748, and 6,237,244, commonly owned by the assignee of this application. In the operation of such dryers, the pellets or other particles being moved vertically and radially by the bladed rotor engage the cylindrical screen with substantial velocity and usually bounce off the screen back toward the rotor for imparting further vertical and centrifugal forces to the particles as they are moved upwardly inside the screen. This is depicted by the "good" flow

characteristic illustrated in Figure 2 As further shown in Figure 3, the "best" flow of both product and air occurs when the radial air flow from the rotor does not just push the pellets but actually flows around them

5 However, conventional centrifugal dryers used in the market today all have a common problem relating to the air flow created by the normal rotation of the rotor The combination of rotor blade geometry and other physical factors creates an air flow that can greatly affect the flow of the product through the dryer
10 as it bounces between the rotor and the screen

Furthermore, with the advent of newer plastic materials which form softer pellets, or pellets with flat or lentoid geometries, and the making of very small pellets, or so-called micropellets, using underwater pelletizers, difficulties have been
15 encountered in conveying and subsequently drying such pellets in known centrifugal dryers In addition, known centrifugal dryers have encountered difficulty in conveying and subsequently drying ground flake plastic materials which are formed from recycled soda bottles, milk containers and the like, as well as certain other
20 plastic particles such as ground battery casings

More specifically, and as depicted by the "poor" flow characteristics in Figure 2, softer and smaller pellets, pellets with flat or lentoid geometries, and plastic flakes, as well as certain other plastic and similar particles, tend to collect and

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circulate in the clearance band "X" (see Figure 2) between the outer edges of the rotor blades and the inner surface of the screen. Rather than bouncing around in the manner of harder and larger pellets or particles, these particles become trapped against the screen by the ⁶air flow. This undesirable circular flow and resultant entrapment of the softer and smaller pellets, pellets with flat or lentoid geometries, and plastic flakes and particles along the inner surface of the screen is sometimes referred to as "banding". This banding reduces product flow through the rotor area of the dryer and increases power requirements for maintaining rotational speed of the rotor. Further, it has been found that banding also reduces the efficiency of moisture separation from the solid particles, can cause high amperage requirements within the dryer, and reduces overall efficiency of the centrifugal dryer. These problems often result in fines and fiber-like "hair" production (often referred to as angel hair in the industry).

The problem of banding is particularly evident with pellets having a flat or lentoid geometry as the relatively large planar surface area of this shape most naturally causes the pellets to adhere to the inner surface of the screen and, because of the associated low profile of such pellets, makes them difficult to dislodge. As illustrated by the "worst" flow in Figure 3, the larger the product's surface area in one dimension, or the more flake-like or lentoid the product, the greater the opportunity for

the outward air flow of the rotor to trap the product against the screen. This phenomenon greatly reduces the necessary bounce required to reengage the product with the outward and upward action of the dryer rotor.

5 One solution for overcoming this problem of banding is set forth in U S Patent No 6,739,457 ("the '457 patent"), which is commonly owned by the assignee of this invention. The disclosure of the '457 patent is hereby expressly incorporated herein by reference as if fully set forth in its entirety.

10 In the '457 patent, deflector strips are fastened to the inside of the dryer screen using multiple fasteners fitted within countersunk holes machined within the strips. This method of fastening results in the deflector strips being relatively expensive to manufacture and also necessitates that the screen also
15 be provided with dedicated holes which can create undesirable stress concentrations within the screen. In addition, should the fasteners become loosened, either through vibration, aging or other cause, there is the risk that the deflector strips could extend into the moving rotor with resulting damage. Further, any spacing
20 between the deflector strip and the screen may collect portions of the pellets or other foreign matter, particularly with pellets having a flat or lentoid geometry, thus leading to possible contamination in future product runs.

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SUMMARY OF THE INVENTION

The present invention is used with a centrifugal pellet dryer of the vertical type having a vertical cylindrical screen associated with a vertical housing and a bladed rotor oriented inside the cylindrical screen for conveying a slurry of water and polymer resin particles upwardly in the dryer. Centrifugal forces imparted to the solid particles by the rotor cause the particles to impact the screen to discharge water outwardly through the screen, while dried particles are discharged from an upper end of the dryer and water is discharged from the lower end of the housing in a manner well known in this art. Cylindrical screens for centrifugal pellet dryers are typically made from several screen sections which are vertically aligned and interconnected together.

In order to overcome the problems of such centrifugal dryers when separating water from soft and/or small pellets or plastic flakes, and certain other plastic particles with difficult to convey geometries such as lentoid-shaped pellets, as well as the problems associated with the fastened-on deflector strips of the '457 patent, the inside of the cylindrical screen is provided with one or more embossed regions, each of which effectively forms an integral deflector protruding from the inside surface of the screen. As with the fastened-on deflector strips of the '457 patent, the embossed screen of the present invention disrupts the circular flow of the particles to improve particle flow through the

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rotor area of the dryer by aiding in the rotor's vertical lift of the particles and by eliminating particle banding. Unlike the prior art, however, the embossed deflector screen eliminates the risks of contamination and of a loose deflector strip extending into the moving rotor, while also reducing manufacturing costs. In addition, because the embossed regions are preferably integrated into a non-perforated area of the screen, the embossed regions actually strengthen the overall screen structure.

It is therefore an object of the present invention to provide a deflector element on the interior of a cylindrical screen of a centrifugal pellet dryer in the form of one or more elongated deflector strips which are formed by embossing a perforated or non-perforated area of the screen.

Another object of the present invention is to form one or more deflector elements or regions through embossing at locations that are circumferentially spaced around the interior surface of the screen with the number of deflector elements or regions being varied depending upon the diameter of the screen, with there preferably being one to four deflector elements or regions in most cases.

A further object of the present invention is to integrally form one or more deflector elements in the form of vertical or acutely angled elongated deflector strips on the interior surface of the cylindrical screen in a cylindrical pellet

dryer in accordance with the preceding objects such that the embossed strips enhance the overall strength of the screen

A still further of the present invention is to form one or more embossed deflector elements in the form of elongated strips on the dryer screen having smoothly ramped edges formed integrally with the screen which prevent pellets from being lodged against the strips and ensure redirection of the pellets back into the rotor where the pellets are reengaged with rotor energy for reenergized upward movement

Yet another object of the present invention is an embossed deflector screen that provides a retrofitable solution to the known problems of flat and lentoid-shaped products becoming trapped against the screen in a centrifugal pellet dryer

A further object of the present invention is an embossed deflector screen that allows a centrifugal pellet dryer of a given size to run higher product flow rates which expands the scope of production achievable without obtaining a larger dryer

A still further object of the present invention is to provide a deflector element or region for the cylindrical screen of centrifugal pellet dryers in accordance with the preceding objects and which will conform to conventional forms of manufacture, be of simple construction and easy to use so as to provide a deflector screen that will be economically feasible, long lasting and relatively trouble free in operation

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 generally depicts the radial air flow of a conventional rotor in a centrifugal pellet dryer

Figure 2 illustrates the effects of air flow from the rotor of Figure 1 and the resulting flow characteristics of various different shaped pellets

Figure 3 is a further illustration of best and worst air and pellet flow characteristics associated with the various shaped pellets of Figure 2

Figure 4 is a schematic elevational view of a prior art centrifugal pellet dryer illustrating a sectional cylindrical screen and bladed lift rotor assembly associated with a dryer housing

Figure 5 is a perspective view of one of the dryer sections of Figure 4, having two deflector strips mounted on the interior surface with fastening elements in accordance with the prior art

19

Figure 6 is a schematic partial sectional view of the screen section and one of the conventional deflector strip shown in Figure 5

5 Figure 7 is a plan view of a screen section with two embossed deflector elements each in the form of an elongated vertical strip in accordance with the present invention

Figure 8 is a photograph of the center embossed deflector strip of Figure 7

10 Figure 9 is a photograph of the end embossed deflector strip on Figure 7

Figure 10 is a schematic partial sectional view of the screen section and one of the embossed deflector strips shown in Figure 7

15 Figure 11 is an enlarged photograph of a portion of an embossed deflector strip formed in a non-perforated area of a screen section according to the present invention, adjacent to which a portion of a deflector strip according to the '457 patent is shown placed onto the screen section for comparison

20 Figure 12 is a plan view of a screen section with two embossed deflector elements in the form of vertical and angled deflector strips in accordance with the present invention

Figure 13 is a perspective view of the screen section of Figure 12

Figures 14A-14D are illustrations of alternative

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configurations for the embossed regions of the embossed deflector screen according to the present invention

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In describing preferred embodiments of the invention
5 illustrated in the drawings, specific terminology will be resorted
to for the sake of clarity. However, the invention is not intended
to be limited to the specific terms so selected, and it is to be
understood that each specific term includes all technical
equivalents which operate in a similar manner to accomplish a
10 similar purpose

Although only certain embodiments of the invention are
explained in detail, it is to be understood that the invention is
not limited in its scope to the details of construction and
arrangement of components set forth in the following description or
15 illustrated in the drawings. The invention is capable of other
embodiments and of being practiced or carried out in various ways
Also, in describing the various embodiments, specific terminology
will be resorted to for the sake of clarity. It is to be understood
that each specific term includes all technical equivalents which
20 operate in a similar manner to accomplish a similar purpose

Referring to Figure 4, a conventional centrifugal pellet

21

dryer of the vertical type is generally designated by reference numeral 10 and includes a dryer housing 12 having a sectional screen 14 mounted vertically therein. The sectional screen 14 is shown having four approximately equal screen sections 15 aligned vertically and interconnected at 17. The screen 14 encloses and is concentric to a bladed rotor, generally designated by reference numeral 16, which includes inclined blades 18. The blades 18 include outer edges adjacent the interior surface of the screen sections 15 supported in a manner well known in the art.

The dryer 10 includes an inlet 20 for receiving a slurry of water and pellets from an underwater pelletizer, or other type water slurry containing solid particles, such as plastic flakes, from recycled soda bottles, milk containers, etc., or other solid plastic particles such as ground battery casings. The inlet 20 typically, although not in all centrifugal dryers, discharges the slurry into a dewaterer 22 for initial separation of water from the pellets or other solid particles for discharge of water through an outlet 24 and discharge of moisture laden particles into the bottom section of the sectional screen 14. The solid particles move upwardly through the screen sections 15 by the action of the rotor 16 to an outlet 26 at the upper end of upper screen section 15 in the direction indicated by the arrow 126. The rotor imparts lift and centrifugal forces to the particles to impact the particles against the screen for separating water from the particles with the

separated water passing through the screen into the housing and out through outlet 24 in a manner well known in the art as exemplified by the previously mentioned prior patents

Each of the screen sections 15 includes a plate 28, typically of stainless steel with 20 or 18 gauge thickness and 0 075 inch diameter holes 30 punched therethrough from the surface facing inwardly of screen section 15. Other hole shapes and diameters such as 0 038 inch, 0 085 inch, 0 0625 inch are also commonly used. As shown in Figure 5, the holes 30 have staggered centers and are oriented in discrete areas 32 thereby defining intersecting solid sections 34 and 36. Each of the screen sections 15 is initially formed as a flat plate 28, which is retained in a cylindrical configuration by connecting outwardly extending vertical side edge flanges 38 and 40 on the respective vertical solid edges of the screen section. Further description of the connecting mechanisms is set forth in the '457 patent.

The two deflector strips shown in Figure 5, and generally designated by reference numeral 70, are mounted on the inside surface of the cylindrical screen section 15. As can be seen in Figures 5 and 6, the deflector strips 70 are attached by bolts which protrude through matching holes in the cylindrical screen section 15 on which appropriate locking nuts 74 can be installed to affix each deflector strip 70 in place on the inside of the screen section. Once in place, the deflector strip 70 redirects pellet

23

flow as indicated by the solid arrowed line 75 in Figure 6, when the rotor 16 turns as indicated by the inner arrow 77

Attachment of the deflector strips as shown in Figures 5 and 6 is subject to loosening of the fastening elements 74 and possible separation of the deflector strip 70 as previously described. In addition, because the deflector strips are a separate component, the interface between the strips and the screen also provides an area in which pellets, particularly those having a low profile and a flat or lentoid shape, may become lodged or trapped. As with bolted on deflector strips 70, the area 69 of the screen just in front of the bevel (see Figure 6), as viewed with respect to the direction of rotor rotation, is subject to greater wear and resulting erosion.

In view of the foregoing, a screen section 115 in accordance with the present invention, having an embossed region in the form of a vertical or substantially vertical embossed deflector strip generally designated by the reference numeral 170 is shown in Figure 7. The embossed deflector strip 170 is typically formed in a non-perforated solid section 136 of the screen that runs between the discrete areas 32 having holes therein of the plate, generally designated by the reference numeral 128. The screen section 115 may be provided with only a single embossed deflector or multiple deflectors such as, for example, the two embossed deflectors 170 shown in the center and end portions of the screen section 115 of



Figure 7 These center and end portion embossed deflectors are depicted photographically in Figures 8 and 9, respectively

Alternatively, the embossed deflector strip could be formed in the perforated areas 32, although this is not preferred as structural strength may be impacted. As a further alternative, if produced at an acutely angled orientation relative to the vertical, the embossed deflector strips may be made to extend across or into portions of both the perforated and non-perforated sections of the screen

As illustrated in Figure 10, and like the conventional deflector strip in Figure 6, the embossed deflector strip 170 effectively redirects pellet flow as indicated by the solid arrow 171 when the rotor 16 turns in the direction indicated by the inner arrow 173. Unlike the deflector strip of the '457 patent, however, the embossed deflector strip eliminates the risk of loosened fasteners as well as loose and/or detached deflector strips

Forming the deflector regions by embossing, whether the regions are embodied in strips or other configurations, also creates a smoothly ramped edge that offers no opportunity for pellet entrapment between the strip and the screen, thus eliminating the associated risk of contamination in future runs. Particularly when used with flat or lentoid shaped pellets, the smooth continuous embossed edge is more effective at ensuring consistent pellet redirection off the screen and into the rotor

than earlier designs. Once redirected, the rotor can then impart continual energy to the pellets which facilitates their upward movement and overall efficiency of the dryer by decreasing the tendency for the rotor to act as an auger when pellets are the type that resist current methods of centrifugal drying. In addition, the embossed deflector strips actually reduce screen wear in the area of the screen just in front of the embossed strip. By providing increased wear resistance in the area of the screen where the pellets are deflected, an area that had previously been subject to wear and resulting screen erosion, the embossed deflector strips increase the life of the screen.

Further, as can be seen by the photograph of Figure 11, the embossed deflector strip 170 strengthens the solid section 136 of the screen section 115 against bending and flexing. The deflector strip 70 of the '457 patent, by contrast, with its bolted fasteners which necessitate that dedicated holes be located in the perforated or non-perforated areas of the screen, can create stress concentrations within the screen such that the addition of the strip 70 may not offer additional screen structure integrity.

The number, angle and spatial relation of the embossed deflector regions may vary depending on the diameter of the screen sections 115 and the particular application of the dryer. Usually one to four embossed deflector strips 170 are adequate in most screen sections up to about 64 inches in diameter, greater numbers

26

of deflector strips may, of course, be included as desired. Also in dryers having multiple screen sections 115, the lowest screen section 116 (see Figure 4), where the water and solid particle slurry enter the screen, may be constructed without deflector strips as the pellets have a lot of energy upon entry from the feed chute. In the upper sections having the deflector strips, the strips are preferably aligned vertically, although such alignment is not always necessary.

The embossed deflector strips can be implemented with conventional unitary screens of screen sections, as of stainless steel with 20 or 18 gauge thickness and holes having commonly used diameters of 0.038 inch, 0.075, 0.085 inch, or 0.0625 inch. The screens or screen sections can also be made with lasered holes or by other methods of manufacture as would be understood by persons of ordinary skill in the art. Multi-layered screens such as those set forth in co-pending application, Serial No. 11/017,216, which is commonly owned by the assignee of this application, can also be modified to include the embossed deflector strips in accordance with the present invention.

While in a preferred embodiment the embossed deflector strips are vertical or substantially vertical, the embossed deflector strips may be formed at an acute angle relative to the vertical so as to lean away, moving from the bottom of the screen plate 128 to the top thereof, from the direction of the rotor

Such an angled embossed deflector strip 270, as illustrated in Figures 12 and 13, may be used to create a more upward trajectory in the movement of the pellets as they impact against and are redirected toward the rotor by the upwardly inclined edges of the embossed deflectors. Vertical and angled deflector strips may also be combined within the same screen as shown in Figure 12 in which the arrow 175 indicates rotor direction.

The embossed deflector strips 170 of the present invention are typically U-shaped in cross section (see Figure 10) and protrude inwardly, relative to the non-embossed inner surface of the screen section 115, by about 0.10 inches to about 0.25 inches, and most preferably about 0.14 inches, and have a width of about 0.25 inches to about 0.80 inches, and most preferably about 0.62 inches. Other dimensions can, of course, be provided and, unlike the mounted deflector strips, do not impact the overall weight of the screen section. For example, in the arrangement of Figures 4-6, adding a deflector strip having a larger thickness or larger width will add to the weight of the screen section and place greater demands upon the fastening elements in larger dryer applications. With the embossed deflector regions of the present invention, however, the dimensions of the embossed strip simply alter the percentage of the solid section 136 that projects inwardly but do not change the overall weight of the screen section 115.



The length of the embossed deflector strips 170 depends upon the height of the cylindrical screen section 115, or cylindrical screen if one piece, and are preferably of a length so as to leave a space of about one inch from the top and bottom ends of the deflector strip to the upper and lower edges of the screen section (or screen) so as to not interfere with sealing, although this spacing can be varied as desired

While the embossed deflector strips 170 are preferably continuous raised strips, they could be discontinuous and of smaller length so as to facilitate the required wrapping of the screen around the support rings to obtain the cylindrical configuration. Continuous raised strips are preferred because they tend to provide a continuous length of deflection and to offer a great degree of added stiffening to the cylindrical screen or screen section. As such, it is possible that the embossed strips may allow for a thinner screen plate 128

If the embossed strips 170 are discontinuous, they might preferably be arranged in a vertical staggered array from adjacent the bottom edge of the screen plate 128 to adjacent the top edge of the screen plate 128. In such a manner, banding solid particles which miss one raised strip in a circumferential pass around the clearance band would encounter another raised strip in its path. This staggered arrangement could be similarly embodied with angled embossed deflector strips



The embossed regions can also be produced in shapes other than elongated strips. Without being limited thereto, examples of alternate embossed region configurations are shown by the horizontally and vertically staggered rectangles 201 shown in Figure 14A, the vertically spaced circles 203 shown in Figure 14B, the vertically spaced arrowheads 205 shown in Figures 14C and the vertically spaced rectangles 207 in sloped alignment shown in Figure 14D.

Whatever the specific configuration of the embossed regions, the embossed deflector screen in accordance with the present invention increases the overall efficiency of the pellet dryer and results in considerable savings in terms of capital investment. More particularly, for a dryer of a given size, greater product flow rates can be achieved with the embossed deflector screen than with conventional dryer screens. As a result, a smaller dryer can be used to effectively meet production requirements that would otherwise have required the purchase of a larger dryer. By avoiding the need for this purchase, cost savings on the order of tens and even hundreds of thousands of dollars can be realized.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and

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operation shown and described, and, accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention

91

WHAT IS CLAIMED IS

1 A screen for a centrifugal pellet dryer comprising a substantially cylindrical screen having one or more embossed regions, each embossed region forming an integral deflector that protrudes from an inside surface of the screen to disrupt a circular flow of particles being dried to improve particle flow through a rotor area of the dryer

2 The screen as set forth in claim 1, wherein each embossed region forms a substantially vertical embossed deflector strip

3 The screen as set forth in claim 2, wherein said screen includes a plurality of embossed regions formed as substantially vertical strips spaced from one another around the inside surface of the screen

4 The screen as set forth in claim 3, wherein said strips are arranged in a staggered array from adjacent a bottom edge of the screen to adjacent a top edge of the screen

5 The screen as set forth in claim 1, wherein said screen includes perforated and non-perforated areas, said embossed regions being formed in said non-perforated areas

32

6 The screen as set forth in claim 1, wherein each embossed region forms a deflector strip having a smoothly continuous ramped edge

7 The screen as set forth in claim 1, wherein said embossed deflector strips protrude inwardly, relative to non-embossed portions of said inner surface, about 0 10 inches to about 0 25 inches

8 The screen as set forth in claim 7, wherein said embossed deflector strips have a width of about 0 25 inches to about 0 80 inches

9 The screen as set forth in claim 1, wherein said embossed deflector strips protrude inwardly, relative to non-embossed portions of said inner surface, about 0 14 inches and have a width of about 0 62 inches

10 The screen as set forth in claim 1, wherein said embossed deflector strips extend substantially from a top of the screen to a bottom thereof

11 A centrifugal pellet dryer comprising a dryer housing having a cylindrical screen mounted vertically therein, generally

93

concentric with a bladed rotor, an inlet for receiving a slurry of water and solid particles from an underwater pelletizer into a bottom section of the screen, said solid particles being moved upwardly in a circular flow through the screen by the rotor to an outlet at an upper end of the screen, said screen having an embossed region forming an integral deflector that protrudes from an inside surface of the screen to disrupt the circular flow of particles being dried to improve particle flow through the dryer

12 The dryer as set forth in claim 11, wherein each embossed region forms a substantially vertical embossed deflector strip

13 The dryer as set forth in claim 12, wherein said screen includes a plurality of embossed regions formed as substantially vertical deflector strips spaced from one another around the inside surface of the screen

14 The dryer as set forth in claim 13, wherein said deflector strips are arranged in a staggered array from adjacent a bottom edge of the screen to adjacent a top edge thereof

15 The dryer as set forth in claim 11, wherein said screen includes perforated and non-perforated areas, said deflector strip being formed in a non-perforated area

381-

16 The dryer as set forth in claim 11, wherein said screen includes perforated and non-perforated areas, said deflector strip being formed in a perforated area

17 The dryer as set forth in claim 13, wherein each deflector strip has a smoothly continuous ramped edge

18 The dryer as set forth in claim 13, wherein said embossed deflector strips have a width of from about 0.25 inches to about 0.80 inches and protrude inwardly, relative to non-embossed portions of said inner surface, about 0.10 inches to about 0.25 inches

19 The dryer as set forth in claim 11, wherein said embossed deflector strips have a width of about 0.62 inches and protrude inwardly, relative to non-embossed portions of said inner surface, about 0.14 inches

20 The dryer as set forth in claim 11, wherein said screen includes a plurality of interconnected, vertically aligned screen sections

21 The dryer as set forth in claim 20, wherein each of said screen sections has an embossed deflector strip such that said

39

embossed deflector strips extend in a substantially continuous arrangement from a top of the dryer to a bottom thereof

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FIG. 1
(PRIOR ART)

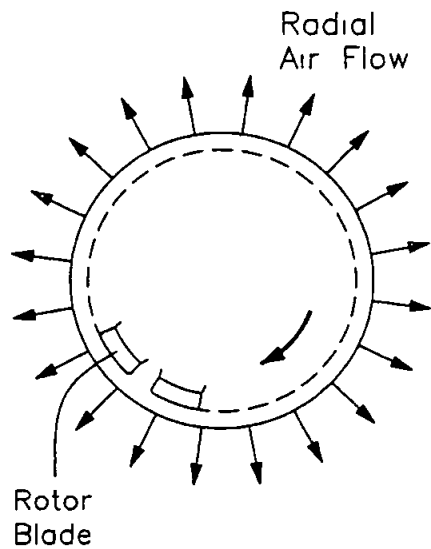
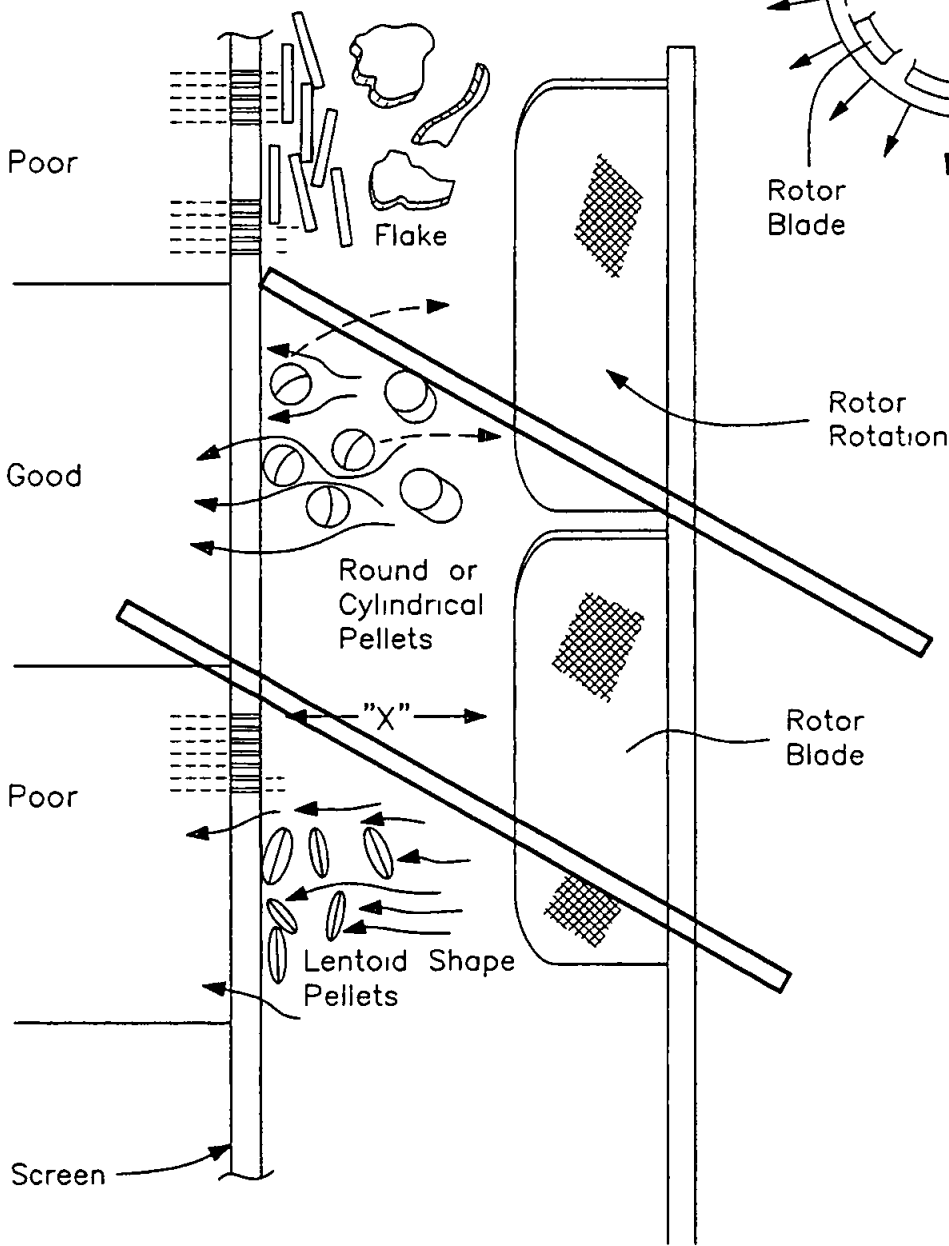


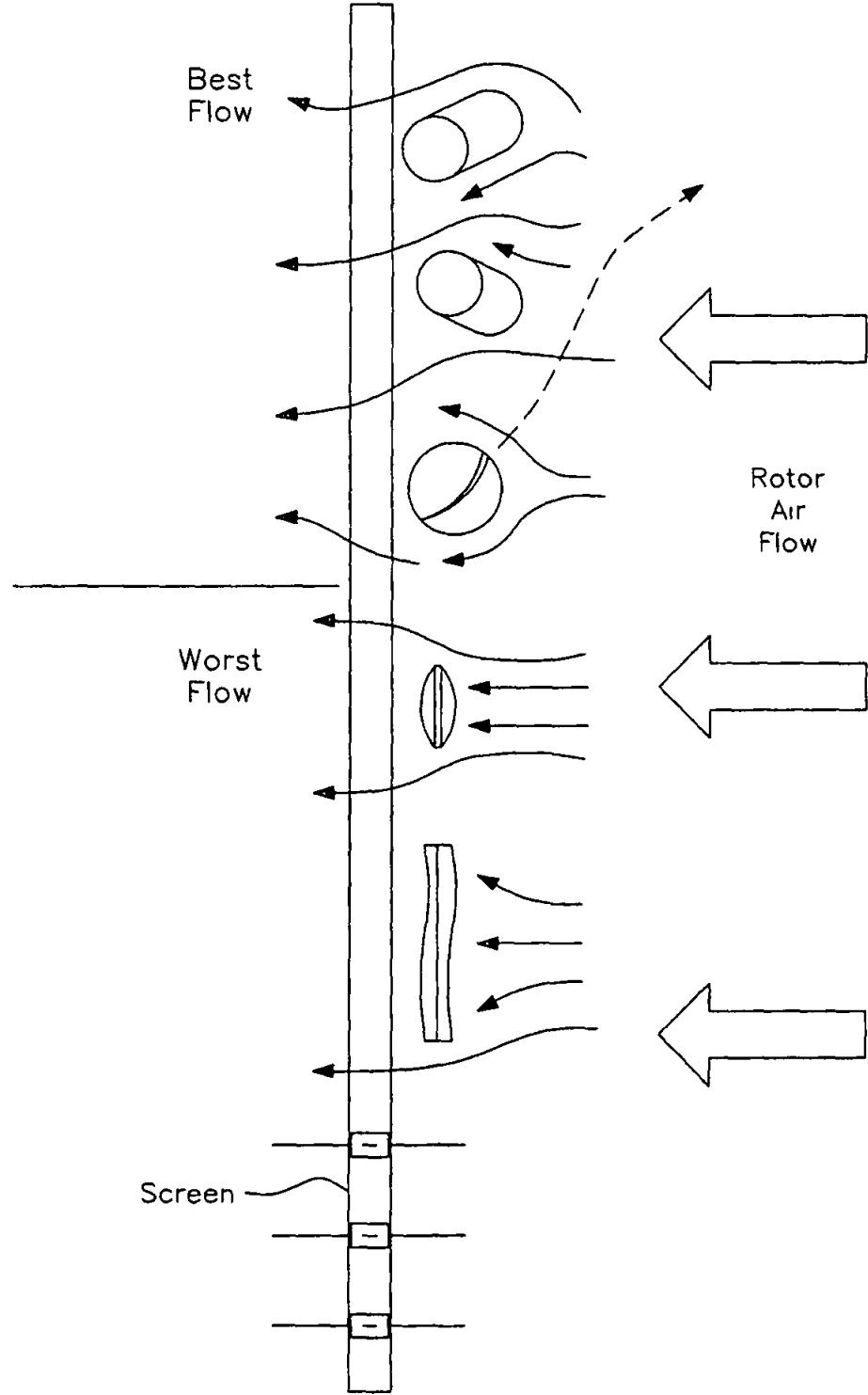
FIG. 2
(PRIOR ART)

Flow Characteristics



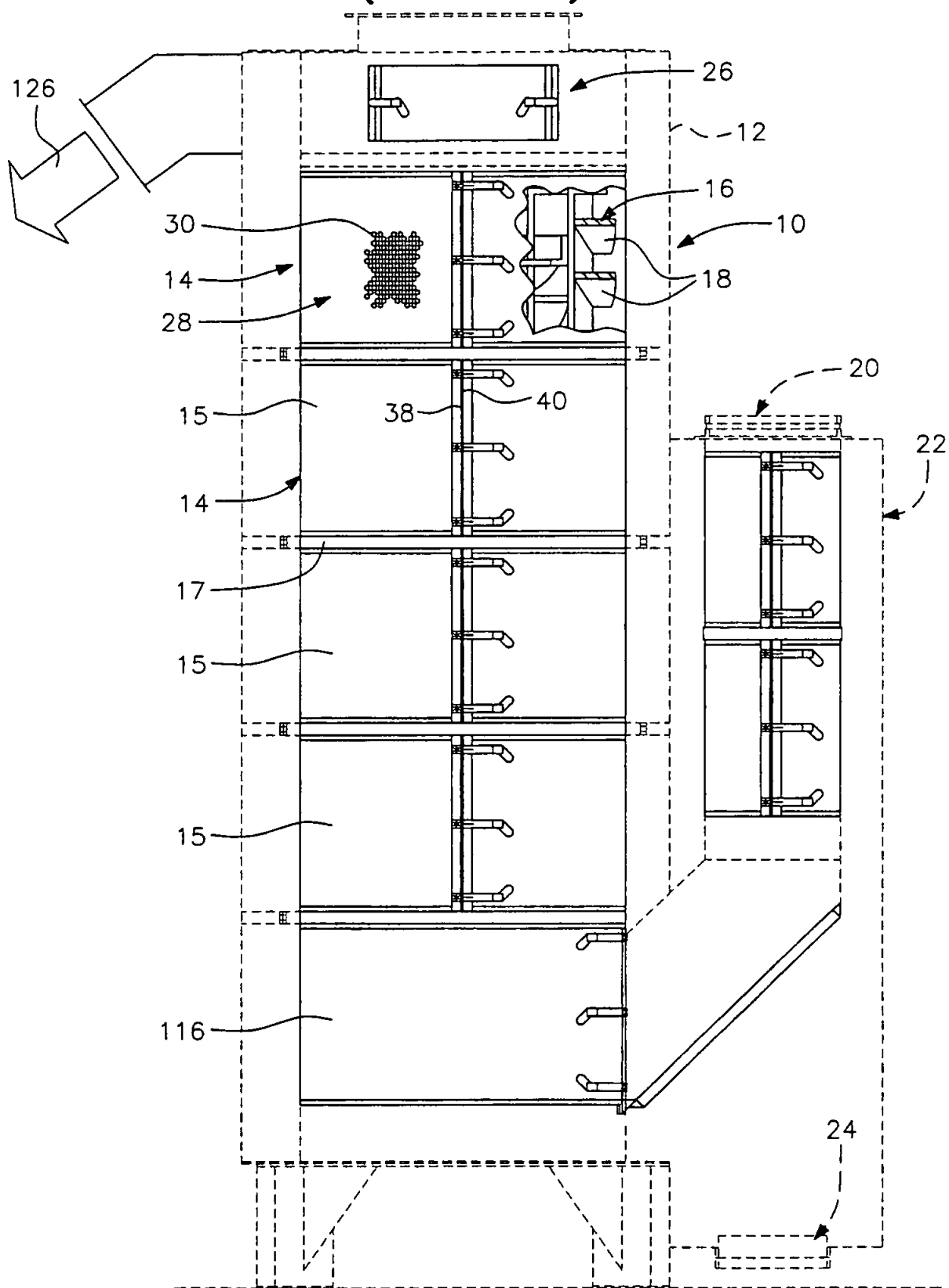
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FIG. 3
(PRIOR ART)



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FIG. 4
(PRIOR ART)



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FIG. 5
(PRIOR ART)

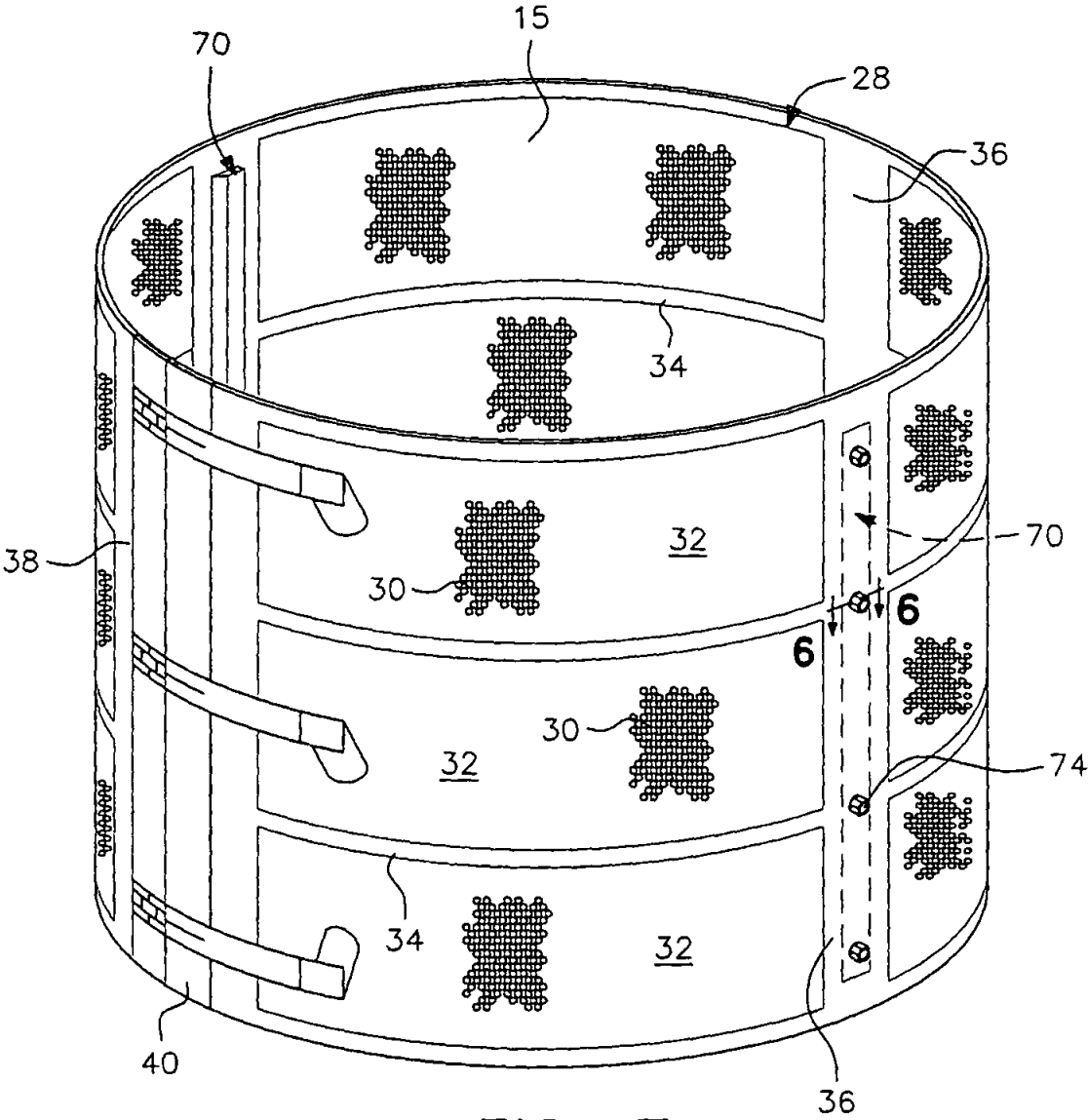
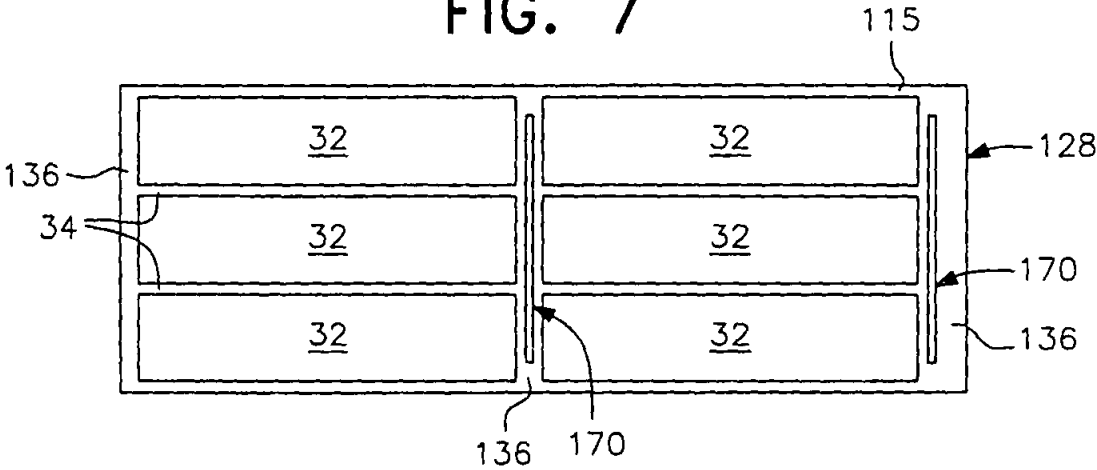


FIG. 7



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FIG. 8

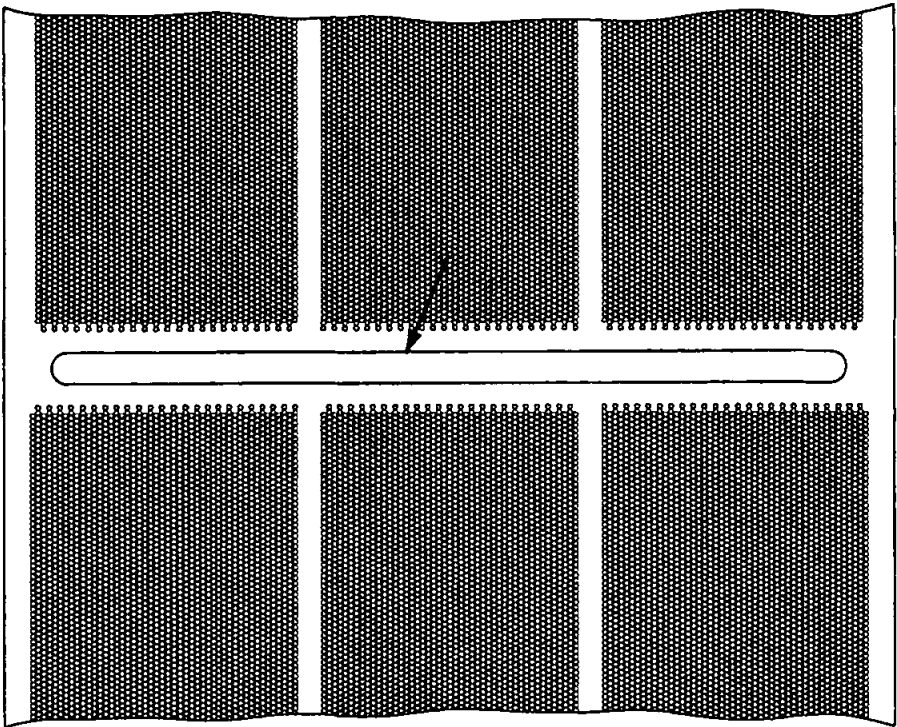
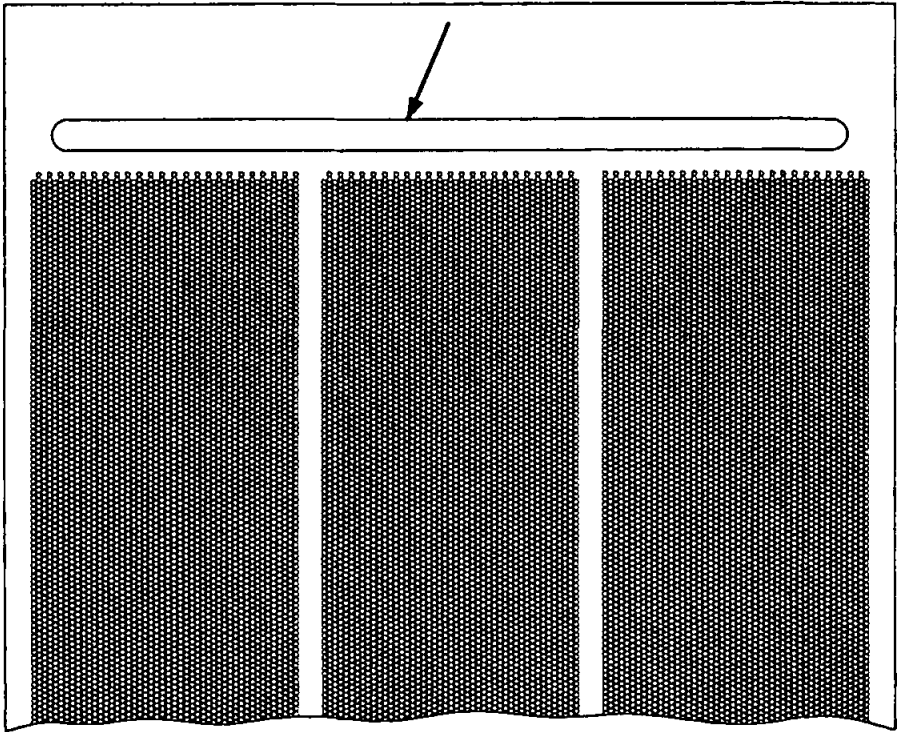


FIG. 9



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FIG. 6
(PRIOR ART)

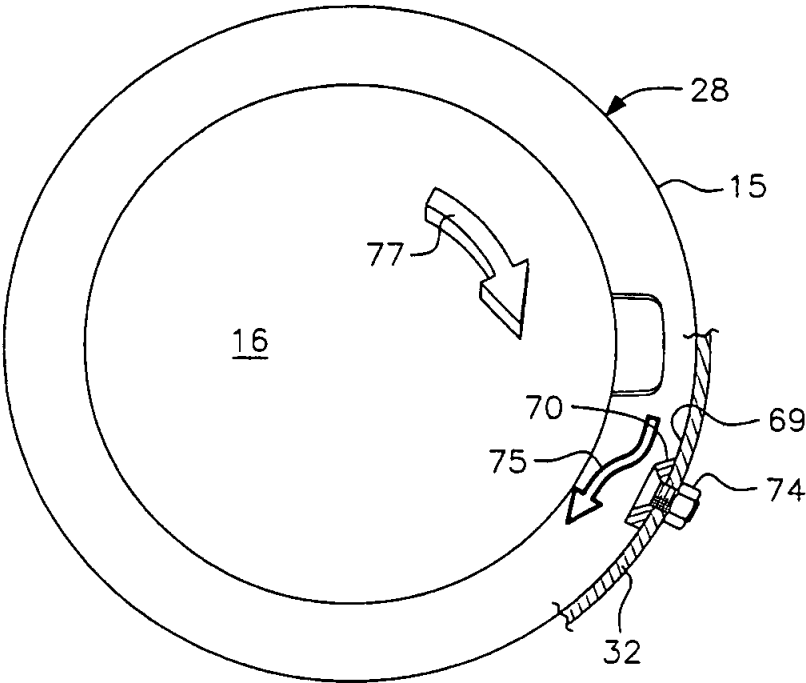
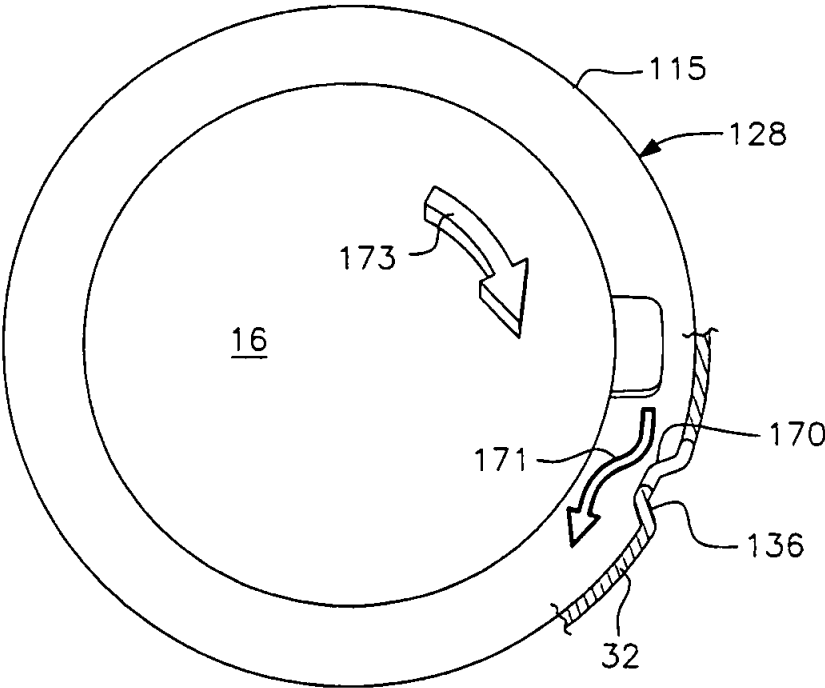
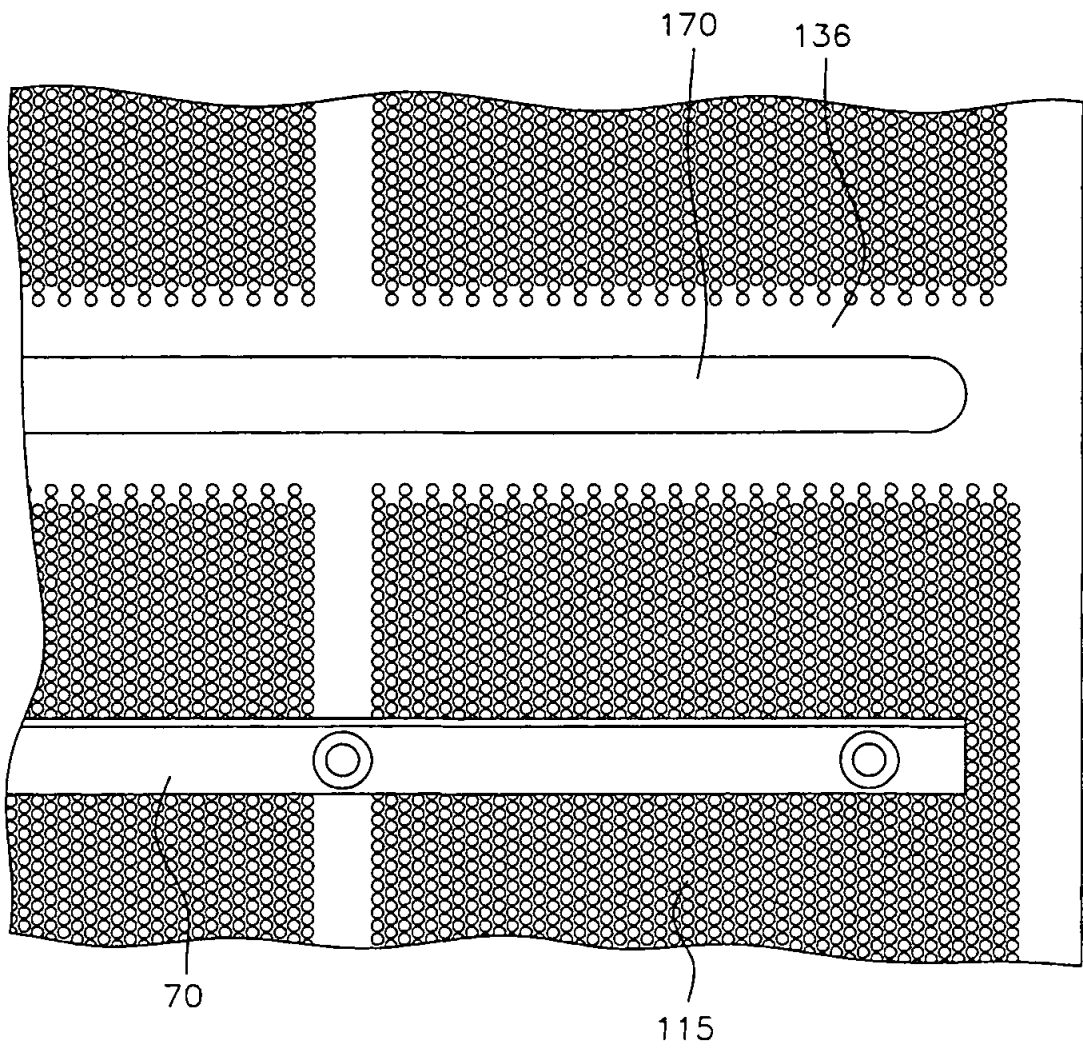


FIG. 10



Handwritten signature or initials.

FIG. 11



VB

FIG. 12

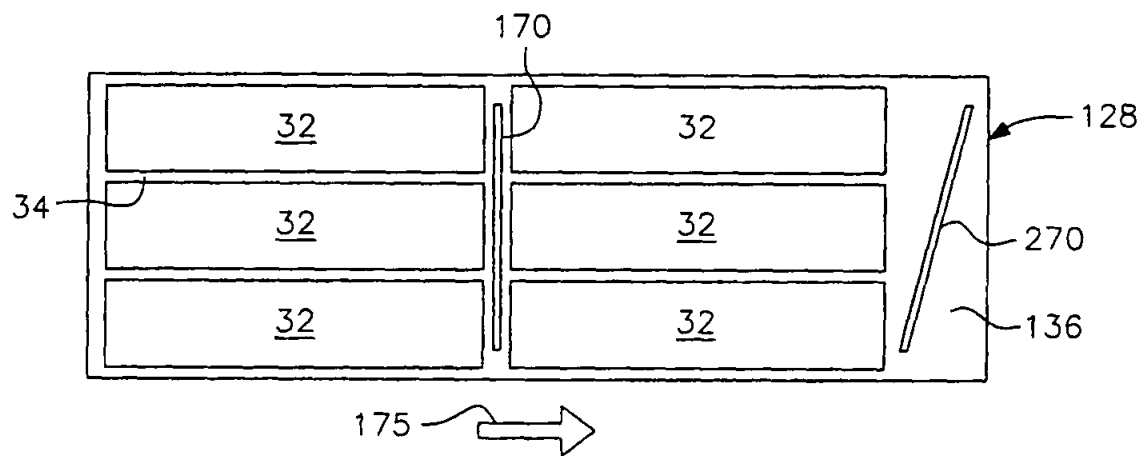
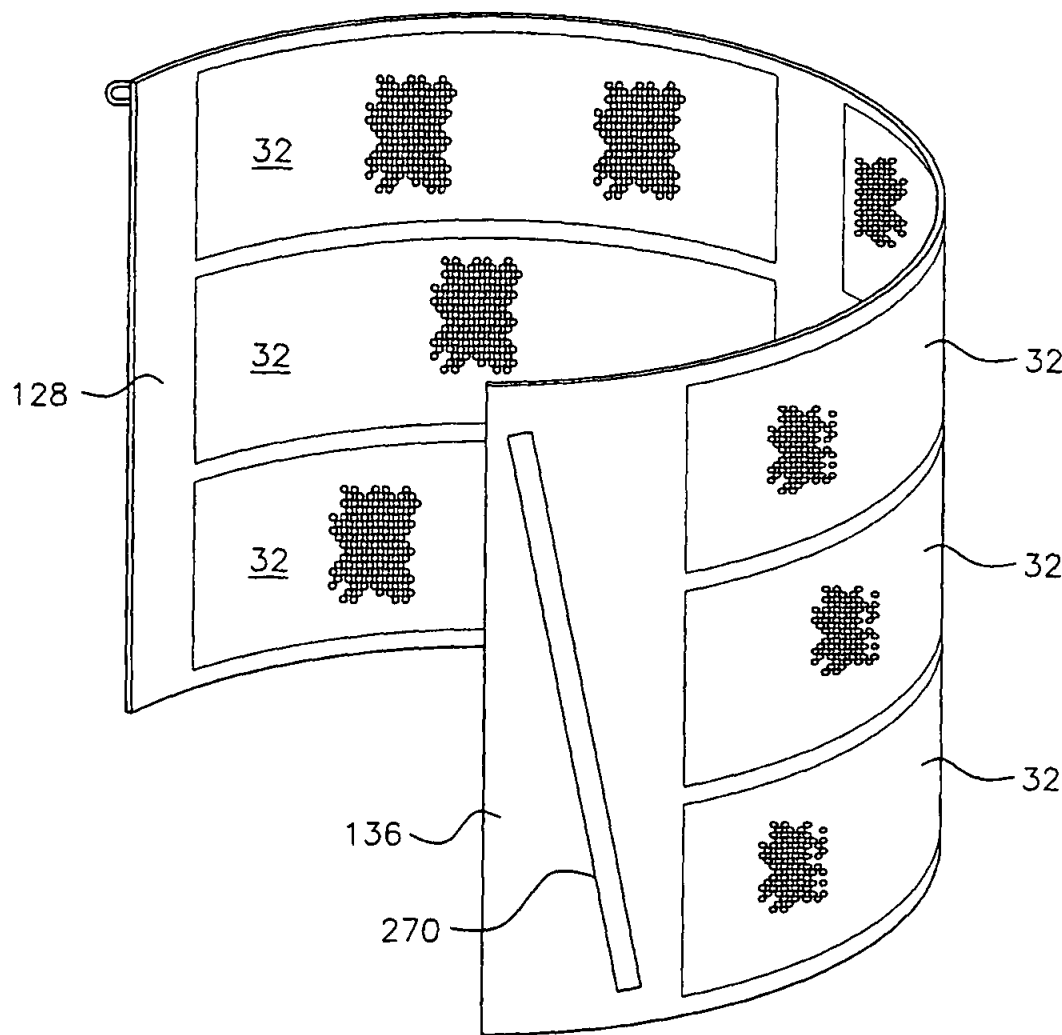


FIG. 13



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FIG. 14A

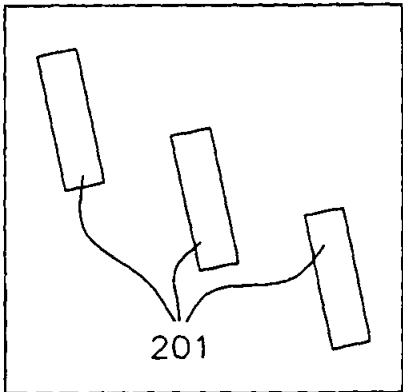


FIG. 14B

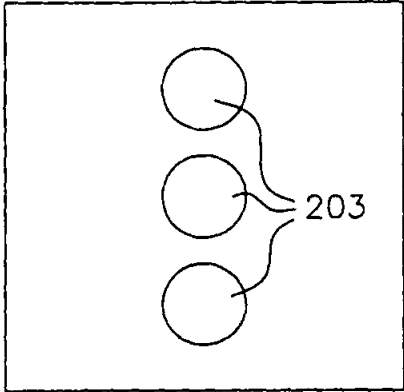


FIG. 14C

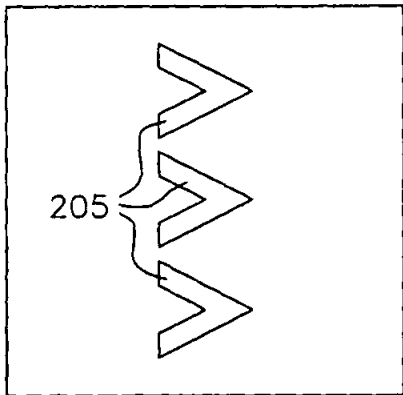
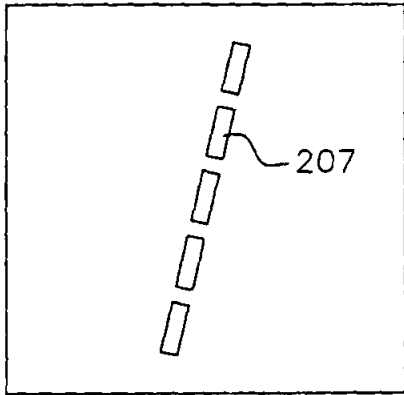


FIG. 14D



MS

TAMIZ SECADOR CENTRIFUGO DE PELLETS CON TIRAS DEFLECTORAS INTEGRALES REPUJADAS

Esta solicitud tiene derecho y por tanto reivindica prioridad sobre la solicitud provisional estadounidense No 60/924 627 presentada el 23 de mayo de 2007

ANTECEDENTES DEL INVENTO

Campo del invento

El presente invento generalmente se relaciona con un secador centrifugo de pellets del tipo que usa un rotor de elevacion con aspas el cual trasporta pellets plasticos cargados de humedad u otras particulas solidas hacia arriba dentro de un tamiz cilindrico. La fuerza centrifuga impartida a las particulas mediante la rotacion del rotor de elevacion obliga a que las particulas se acoplen con la superficie interior del tamiz, y la humedad sobre las particulas se descarga a traves del tamiz de una manera bastante conocida en el estado de la tecnica. De manera mas especifica, el presente invento se relaciona con deflector modificador de flujo de producto asociado con la superficie interior del tamiz cilindrico.

Descripcion del Estado de la Tecnica Relacionado

Los secadores centrifugos de pellets son bastante conocidos en el estado de la tecnica para la separacion de agua o humedad de pellets plasticos u otras particulas solidas, como lo es una pasta aguada y pellets plasticos producidos por peletizadores subacuaticos. Los secadores centrifugos de pellets del estado de la tecnica anterior incluyen un armazon externo dispuesto verticalmente, un tamiz cilindrico orientado dentro del armazon y un rotor con aspas impulsado posicionado de manera central dentro del tamiz. El rotor impulsa pellets cargados de humedad u otras particulas solidas hacia arriba dentro del tamiz con fuerzas centrifugas impartidas sobre las particulas por flujo de aire radial desde el rotor (ver la figura 1) causando que las particulas se muevan radialmente hacia fuera y asi acoplándose con el tamiz para la descarga de agua a traves del tamiz. Las particulas secas son descargadas desde el extremo superior del tamiz y del armazon, y el agua es descargada desde el extremo inferior del armazon.

Los secadores centrifugos de pellets de este tipo estan divulgados en las Patentes U S Nos 7 171 762, 7 024 794, 6 807 748, y 6 237 244 todas de propiedad del cesionario de esta solicitud. En la operacion de tales secadores, los pellets u otras particulas que esten siendo impulsadas de manera vertical y radial por el rotor con aspas se acoplan con el tamiz cilindrico a una velocidad sustancial y usualmente rebotan del tamiz nuevamente hacia el rotor para asi impartir aun mas fuerzas centrifugas y verticales a las particulas al ser estas impulsadas hacia arriba dentro del tamiz. Esto es mostrado como la caracteristica de flujo "bueno" en la Figura 2. Tal como se ilustra adicionalmente en la Figura 3, el "mejor" flujo tanto de producto como de aire ocurre cuando el flujo de aire radial del rotor no solamente impulsa los pellets sino que realmente fluye alrededor de ellos.

Sin embargo, todos los secadores centrifugos convencionales usados en el mercado hoy en dia tienen un problema comun con relacion al flujo de aire creado por la rotacion normal del rotor. La combinacion de la geometria de las aspas del rotor y otros factores fisicos crea un flujo

de aire que puede afectar en gran medida el flujo del producto a través del secador cuando este rebota entre el rotor y el tamiz

Wb

Adicionalmente, con la llegada de materiales plásticos mas nuevos los cuales forman pellets mas suaves, o pellets con geometrias planas o lentiformes, y la fabricacion de pellets muy pequeños, los llamados micro-pellets, o el uso de peletizadores subacuáticos, se han encontrado dificultades con el transporte y el posterior secado de tales pellets en secadores centrifugos conocidos. Adicionalmente, los secadores centrifugos conocidos han encontrado dificultades en transportar y subsecuentemente secar materiales plásticos de escamas de suelo, formados a partir de botellas de gaseosa recicladas, recipientes de leche y similares, como tambien ciertas otras particulas plasticas como por ejemplo los revestimientos de baterias de suelo

De manera mas especifica, y tal como lo ilustra las características de flujo "pobre" en la Figura 2, aquellos pellets mas suaves y mas pequeños, pellets con geometrias planas o lentiformes, y escamas plasticas, como tambien ciertas otras particulas plasticas o similares tienden a recoger y circular en la banda de tolerancia "X" (ver la Figura 2) entre los bordes externos de las aspas del rotor y la superficie interna del tamiz. En vez de rebotar como lo hacen los pellets o particulas mas duras y mas grandes, estas particulas quedan atrapadas contra el tamiz por el flujo de aire. Este flujo circular no deseado y el resultante atrapado de los pellets mas suaves y pequeños, pellets con geometrias planas o lentiformes, y escamas plasticas y particulas a lo largo de la superficie interna del tamiz a veces se refiere como "bando" Este bando reduce el flujo del producto a través del area del rotor del secador y aumenta los requisitos de potencia para mantener la velocidad rotacional del rotor. Adicionalmente, se ha encontrado que el bando tambien reduce la eficiencia de la separacion de la humedad de las particulas solidas, puede requerir altos niveles de amperaje dentro del secador, y reducir la eficiencia general del secador centrifugo. Estos problemas usualmente resultan en produccion de "cabello" tipo fibra o muy fino (llamado comunmente en la industria como cabello de angel)

El problema con el bando es particularmente evidente con aquellos pellets con una geometria plana o lentiforme puesto que el area de superficie plana relativamente grande de esta forma causa de manera natural que los pellets se adhieran a la superficie interna del tamiz y, debido al bajo perfil asociado con tales pellets, los hace dificiles de desadherirse. Tal como lo ilustra el "peor" flujo en la Figura 3, a mayor area de superficie del producto en una dimension, o con mayor forma tipo escama o lentiforme del producto, mayor la oportunidad para que el flujo de aire hacia afuera del rotor atrape el producto contra el tamiz. Este fenomeno reduce bastante el rebote necesario requerido para un reacople del producto con la accion hacia afuera y hacia arriba del rotor del secador

Una solucion para superar este problema de bando esta expuesta en la patente US No 6 739 457 ("la patente 457"), de propiedad del cesionario de este invento. La divulgacion de la patente 457 es por medio de la presente incorporada en su totalidad como referencia

En la patente 457, tiras deflectoras son ajustadas al interior del tamiz secador usando multiples sujetadores colocados dentro de agujeros avellanados maquinados en las tiras. Este metodo de sujecion resulta en la manufactura relativamente costosa de las tiras deflectoras y tambien necesita que el tamiz este provisto de agujeros dedicados los cuales pueden crear concentraciones de estres no deseadas dentro del tamiz. Adicionalmente, si los sujetadores se desajustaran, bien sea por vibracion, envejecimiento u otra causa, existe el riesgo que las tiras deflectoras podrian extenderse dentro del rotor en movimiento resultando en un daño. Ademas, cualquier espacio entre la tira deflector y el tamiz podria recoger porciones de los pellets u otro material foraneo, particularmente pellets con geometria plana o lentiforme, y por lo tanto conllevando a posibles contaminaciones en corridas de producto posteriores

RESUMEN DEL INVENTO

5 El presente invento es usado con un secador centrifugo de pellets del tipo vertical con un tamiz cilindrico vertical asociado con un armazon vertical y un rotor con aspas orientado dentro del tamiz cilindrico para transportar una pasta aguada y particulas de resina polimerica hacia arriba dentro del secador. Las fuerzas centrifugas impartidas en las particulas solidas por el rotor causan que las particulas impacten el tamiz y descarguen agua hacia fuera a traves del tamiz, mientras que las particulas secas son descargadas desde un extremo superior del secador y el agua es descargada desde el extremo inferior del armazon de una manera bastante conocida en el estado de la tecnica. Los tamices cilindricos para secadores centrifugos de pellets tipicamente son fabricados de varias secciones de tamiz las cuales estan verticalmente alineadas e interconectadas entre si.

15 Con el fin de superar los problemas de tales secadores centrifugos al separar agua de los pellets suaves y/o pequeños o escamas plasticas, y varias otras particulas plasticas con geometrias dificiles de transportar como los pellets lentiformes, como tambien aquellos problemas asociados con las tiras deflectoras sujetadas de la patente 457, el interior del tamiz cilindrico esta provisto con una o mas regiones repujadas, cada una formando de manera efectiva un deflector integral el cual sobresale desde la superficie interior del tamiz. Al igual como sucede con las tiras deflectoras sujetadas en la patente 457, el tamiz repujado del presente invento irrumpe el flujo circular de las particulas para asi mejorar el flujo de particulas a traves del area del rotor del secador y asi ayudar en la elevacion vertical del rotor de las particulas y eliminar el bandedo de particulas. Sin embargo, a diferencia con el estado de la tecnica anterior, el tamiz deflector repujado elimina los riesgos de contaminacion y de una tira deflectora suelta extendiendose dentro del rotor en movimiento, y al mismo tiempo reduciendo costos de fabricacion.

25 Adicionalmente, puesto que las regiones repujadas estan preferiblemente integradas dentro de un area no perforada del tamiz, las regiones repujadas realmente fortalecen la estructura del tamiz en general.

30 Es por tanto un objeto del presente invento proveer un elemento deflector al interior de un tamiz cilindrico de un secador centrifugo de pellets en la forma de uno o mas tiras deflectoras elongadas las cuales son formadas al repujar un area perforada o no perforada del tamiz.

Otro objeto del presente invento es formar uno o mas elementos o regiones deflectores a traves de repujados en ubicaciones localizadas de manera circunferencialmente espaciadas alrededor de la superficie interior del tamiz variando el numero de elementos o regiones deflectores dependiendo del diametro del tamiz, habiendo de manera preferible entre uno y cuatro elementos o regiones deflectores en la mayoria de los casos.

35 Otro objeto del presente invento es el de formar de manera integral uno o mas elementos deflectores en la forma de tiras deflectoras elongadas verticales o en angulo muy agudo sobre la superficie interior del tamiz cilindrico en un secador centrifugo de pellets de acuerdo con los objetos precedentes de tal manera que las tiras repujadas mejoren la resistencia general del tamiz.

40 Aun otro objeto del presente invento es el de formar uno o mas elementos deflectores repujados en forma de tiras elongadas sobre el tamiz secador con bordes con leves pendientes formados de manera integral con el tamiz el cual previene que los pellets sean introducidos en las tiras y asi asegurar el redireccionamiento de los pellets devuelta al rotor en donde los pellets son reacoplados con la energia del rotor para su movimiento re-energizado hacia arriba.

45 Aun otro objeto del presente invento es un tamiz deflector repujado el cual provee una solucion mejorable a los problemas conocidos de productos de forma plana y lentiforme atrapados contra el tamiz en un secador centrifugo de pellets.

Aun otro objeto del presente invento es un tamiz deflector repujado que permite que un secador centrifugo de pellets de un tamaño específico corra tasas de flujo de producto mas altos lo cual aumenta el alcance de la produccion que se puede lograr sin obtener un secador mas grande

Aun otro objeto del presente invento es el de proveer un elemento o region deflector para el tamiz cilindrico de secadores centrifugos de pellets segun los objetos anteriores y el cual se conformaria con formas convencionales de fabricacion, de fabricacion sencilla y facil de usar para asi suministrar un tamiz deflector economicamente factible, de larga duracion y relativamente libre de problemas en su operacion

Estos objetos juntos con otros objetos y ventajas los cuales se haran aparentes luego, residen en los detalles de construccion y operacion segun se describe y reivindica de manera mas completa mas adelante, haciendo referencia a los dibujos acompañantes formando parte del mismo, en donde los numerales hacen referencia a partes iguales en todo el documento

BREVE DESCRIPCION DE LOS DIBUJOS

La Figura 1 ilustra de manera general el flujo de aire radial de un rotor convencional en un secador centrifugo de pellets

La Figura 2 ilustra los efectos del flujo de aire a partir del rotor de la Figura 1 y las características de flujo resultante de varios pellets de formas distintas

La Figura 3 es una ilustracion adicional de mejores y peores características de flujo de aire y de pellets usando las diferentes formas de pellets de la Figura 2

La Figura 4 es una vista esquematica de elevacion de un secador centrifugo de pellets ilustrando un tamiz cilindrico seccional y un ensamblaje de rotor de elevacion con aspas asociado con un armazon del secador

La Figura 5 es una vista en perspectiva de una de las secciones del secador de la Figura 4, el cual tiene dos tiras deflectoras montadas sobre la superficie interior con elementos sujetadores segun el estado de la tecnica anterior

La Figura 6 es una vista seccional parcial esquematica de la seccion de tamiz y una de la tira deflector convencional en la Figura 5

La Figura 7 es una vista de boceto horizontal de una seccion de tamiz con dos elementos deflectores repujados cada uno en forma de una tira vertical elongada segun el presente invento

La Figura 8 es una fotografia de la tira deflector repujada central de la Figura 7

La Figura 9 es una fotografia de la tira deflector repujada de extremo de la Figura 7

La Figura 10 es una vista seccional parcial esquematica de la seccion de tamiz de una de las tiras deflectoras repujadas mostradas en la Figura 7

La Figura 11 es una fotografia agrandada de una porcion de una tira deflector repujada formada sobre un area no perforada de una seccion de tamiz segun el presente invento, adyacente una porcion de una tira deflector segun la patente 457 en donde se muestra colocada sobre la seccion de tamiz con el fin de comparar

La Figura 12 es una vista de boceto horizontal de una seccion de tamiz con dos elementos deflectores repujados en forma de tiras deflectoras verticales y anguladas segun el presente invento

La Figura 13 es una vista en perspectiva de la seccion de tamiz de la Figura 12

Las Figuras 14A-14D son ilustraciones de configuraciones alternas para las regiones repujadas del tamiz deflector repujado segun el presente invento

DESCRIPCION DETALLADA DE LAS REALIZACIONES PREFERIDAS

ud →

Al describir las realizaciones preferidas del invento ilustradas en las figuras, se hará uso de terminología específica por cuestión de claridad. Sin embargo, el invento no pretende ser limitado a los términos específicos así seleccionados, y se debe entender que cada término específico incluye todos los equivalentes técnicos que operan en una forma similar para lograr un propósito similar.

Aunque solo ciertas realizaciones del invento son explicadas en detalle, se debe entender que el invento no es limitado en su alcance a los detalles de construcción y configuración de los componentes divulgados en la siguiente descripción o ilustrados en las figuras. El invento es factible de otras realizaciones y de ser practicado o realizado en varias formas. También, al describir las diferentes realizaciones, se utilizará terminología específica por cuestiones de claridad. Se debe entender que cada término específico incluye todos los equivalentes técnicos que operan en una forma similar para lograr un propósito similar.

Con referencia a la Figura 4, un secador de pellets centrífugo convencional del tipo vertical generalmente es designado por el numeral de referencia 10 e incluye un armazón de secador 12 con un tamiz seccional 14 montado de manera vertical en el mismo. El tamiz seccional 14 es mostrado con cuatro secciones de tamiz aproximadamente iguales 15 alineadas verticalmente e interconectadas en 17. El tamiz 14 circunda y es concéntrico a un rotor con aspas, generalmente designado por el numeral de referencia 16, el cual incluye aspas inclinadas 18. Las aspas 18 incluyen bordes externos adyacentes a la superficie interior de las secciones de tamiz 15 soportadas en una forma bien conocida en el estado de la técnica.

El secador 10 incluye una entrada 20 para recibir una pasta aguada y pellets desde un pelletizador subacuático, y otra pasta aguada conteniendo partículas sólidas, tales como escamas plásticas, desde botellas de gaseosa recicladas, recipientes de leche, etc., u otras partículas plásticas sólidas tales como revestimientos de baterías de suelo. La entrada 20 típicamente, aunque no en todos los secadores centrífugos, descarga la pasta aguada en un desagüador 22 para separación inicial de agua desde los pellets u otras partículas sólidas para descarga de agua a través de una salida 24 y descarga de partículas cargadas de humedad en la sección inferior del tamiz seccional 14. Las partículas sólidas se mueven hacia arriba a través de las secciones de tamiz 15 por la acción del rotor 16 hacia una salida 26 en el extremo superior de la sección de tamiz superior 15 en la dirección indicada por la flecha 126. El rotor imparte levantamiento y fuerzas centrífugas a las partículas para impactar las partículas contra el tamiz y así separar el agua de las partículas, con el agua separada pasando a través del tamiz hacia el armazón y hacia fuera a través de la salida 24 en una forma bien conocida en el estado de la técnica como se ejemplifica por las patentes anteriormente mencionadas.

Cada una de las secciones de tamiz 15 incluye una placa 28, típicamente de acero inoxidable con espesor calibre 20 o 18 y orificios con diámetro de 0.075 pulgadas 30 perforados en la misma desde la superficie que enfrenta internamente la sección de tamiz 15. Otras formas de orificios y diámetros tales como 0.038 pulgadas, 0.085 pulgadas, 0.0625 pulgadas también se utilizan comúnmente. Como se muestra en la Figura 5, los orificios 30 tienen centros escalonados y están orientados en áreas discretas 32 definiendo así secciones sólidas de intersección 34 y 36. Cada una de las secciones de tamiz 15 inicialmente es formada como una placa plana 28, la cual es retenida en una configuración cilíndrica al conectar pestañas laterales verticales que se extienden hacia fuera 38 y 40 sobre los respectivos bordes sólidos verticales de la sección de tamiz. La descripción adicional de los mecanismos conectores es divulgada en la patente 457.

3

Las dos tiras deflectoras mostradas en la Figura 5, y generalmente designadas por el numeral de referencia 70, son montadas sobre la superficie interior de la seccion cilindrica de tamiz 15. Como se puede observar en las Figuras 5 y 6, las tiras deflectoras 70 son fijadas por tornillos los cuales sobresalen a traves de orificios apareados en la seccion cilindrica de tamiz 15 sobre los cuales se pueden instalar tuercas de seguridad 74 para fijar cada tira deflectora 70 en sitio sobre el interior de la seccion de tamiz. Una vez en sitio, la tira deflectora 70 redirige el flujo de pellets como se indica por la linea de flecha solida 75 en la Figura 6, cuando el rotor 16 gira como se indica por la flecha interna 77.

La fijacion de las tiras deflectoras como se muestra en la Figuras 5 y 6 esta sujeta a un desajuste de los elementos de sujetadores 74 y posible separacion de la tira deflectora 70 como se describio previamente. Ademas, puesto que las tiras deflectoras son un componente separado, la interface entre las tiras y el tamiz tambien proporciona un area en la cual los pellets, particularmente aquellos con un bajo perfil y una forma plana o lentiforme, pueden ser introducidos o atrapados. Tal como sucede con las tiras deflectoras atornilladas 70, el area 69 del tamiz justo en frente del bisel (ver Figura 6), como se observa con respecto a la direccion de rotacion de rotor, esta sometida a mayor desgaste y erosion resultante.

En vista de lo anterior, una seccion de tamiz 115 segun el presente invento, que tiene una region repujada en la forma de un tira deflectora repujada vertical o sustancialmente vertical generalmente designada por el numeral de referencia 170 es mostrada en la Figura 7. La tira deflectora repujada 170 tipicamente es formada en una seccion solida no perforada 136 del tamiz que corre entre las areas discretas 32 con orificios en la misma de la placa, generalmente designada por el numeral de referencia 128. A la seccion de tamiz 115 se puede proporcionar un unico deflector repujado o multiples deflectores tales como, por ejemplo, los dos deflectores repujados 170 mostrados en las porciones central y terminal de la seccion de tamiz 115 de la Figura 7. Estos deflectores repujados de porcion central y terminal son ilustrados fotograficamente en la Figuras 8 y 9, respectivamente.

Alternativamente, la tira deflectora repujada se podria formar en las areas perforadas 32, aunque esto no se prefiere pues la resistencia estructural se puede impactar. Como una alternativa adicional, si se produce a una orientacion agudamente angulada relativa a la vertical, las tiras deflectoras repujadas pueden ser hechas para extenderse a traves o hacia porciones tanto de las secciones perforadas como no perforadas del tamiz.

Como se ilustra en la Figura 10, y como la tira deflectora convencional en la Figura 6, la tira deflectora repujada 170 efectivamente redirige el flujo de pellets como lo indica la flecha solida 171 cuando el rotor 16 gira en la direccion indicada por la flecha interna 173. Diferente a la tira deflectora de la patente M57, sin embargo, la tira deflectora repujada elimina el riesgo de sujetadores sueltos asi como tambien tiras deflectoras sueltas o separadas.

La formacion de las regiones deflectoras mediante repujado, bien sea que las regiones sean incorporadas en las tiras u otras configuraciones, tambien crea un borde suavemente inclinado que no ofrece oportunidad para atrapamiento de pellets entre la tira y el tamiz, eliminando asi el riesgo asociado de contaminacion en corridas posteriores. Particularmente cuando se utiliza con pellets planos o lentiformes, el borde repujado continuo liso es mas efectivo para asegurar redireccion consistente de pellets fuera del tamiz y hacia el rotor en comparacion con los diseños anteriores. Una vez redireccionado, el rotor luego puede impartir energia continua a los pellets lo cual facilita su movimiento hacia arriba y eficiencia general del secador al disminuir la tendencia para que el rotor actue como un taladro cuando los pellets son del tipo que resisten los metodos actuales de secado centrifugo. Ademas, las tiras deflectoras repujadas actualmente reducen el desgaste en el area del tamiz justo en frente de la tira repujada. Al

proporcionar resistencia al desgaste aumentada en el area del tamiz donde los pellets son desviados, un area que previamente habia sido sometido a desgaste y erosion del tamiz resultante, las tiras deflectoras repujadas aumentan la vida del tamiz

Ademas, como se puede observar mediante la fotografia de la Figura 11, la tira deflector repujada 170 fortalece la seccion solida 136 de la seccion de tamiz 115 contra combadura y flexion. La tira deflector 70 de la patente M57, en contraste, con sus sujetadores atornillados lo cual necesita que los orificios dedicados sean localizados en las areas perforadas o no perforadas del tamiz, puede crear concentraciones de tension dentro del tamiz de tal manera que la adiccion de la tira 70 no pueda ofrecer una integridad de estructura de tamiz adicional.

El numero, angulo y relacion espacial de las regiones deflectoras repujadas puede variar dependiendo del diametro de las secciones de tamiz 115 y la aplicacion particular del secador. Usualmente, entre una a cuatro tiras deflectoras repujadas 170 son adecuadas en la mayoria de secciones de tamiz con hasta 64 pulgadas de diametro aproximadamente, numeros mayores de tiras deflectoras naturalmente se pueden incluir segun se desee. Tambien en secadores con multiples secciones de tamiz 115, la seccion mas inferior del tamiz 116 (ver Figura 4), donde el agua y la pasta aguada de particulas solidas entran al tamiz, se puede construir sin tiras deflectoras puesto que los pellets tienen gran cantidad de energia encima de la entrada desde el conducto de alimentacion. En las secciones superiores que tienen las tiras deflectoras, las tiras son preferiblemente alineadas verticalmente, aunque tal alineacion no siempre es necesaria.

Las tiras deflectoras repujadas se pueden implementar con tamices unitarios convencionales de secciones de tamiz, como de acero inoxidable con espesor de calibre 20 o 18 y orificios con diametros comunmente utilizados de 0.038 pulgadas, 0.075, 0.085 pulgadas, o 0.0625 pulgadas. Los tamices o secciones de tamiz tambien se pueden hacer con orificios hechos con laser o mediante otros metodos de fabricacion como se entenderia por personas de habilidad comun en el estado de la tecnica. Tamices multi-capa tales como aquellos divulgados en la solicitud co-pendiente, Serial No. 11/017,216, de propiedad del cesionario de esta solicitud, tambien se pueden modificar para incluir las tiras deflectoras repujadas segun el presente invento.

Mientras en una realizacion preferida las tiras deflectoras repujadas son verticales o sustancialmente verticales, las tiras deflectoras repujadas se pueden formar a un angulo agudo relativo a la vertical para alejarse del vertical, moviendose desde el fondo de la placa de tamiz 128 hasta la parte superior del mismo, desde la direccion del rotor.

Tal tira deflector repujada angulada 270, como se ilustra en las Figuras 12 y 13, se puede utilizar para crear una trayectoria mas ascendente en el movimiento de los pellets al hacer impacto y son redireccionados hacia el rotor mediante los bordes inclinados hacia arriba de los deflectores repujados. Tiras deflectoras verticales y anguladas tambien se pueden combinar dentro del mismo tamiz como se muestra en la Figura 12 en el cual la flecha 175 indica la direccion de rotor.

Las tiras deflectoras repujadas 170 del presente invento tipicamente tienen forma de U en seccion transversal (ver Figura 10) y sobresalen internamente, con relacion a la superficie interna no repujada de la seccion de tamiz 115, por entre 0.10 y 0.25 pulgadas, y mas preferiblemente 0.14 pulgadas aproximadamente, y tienen un ancho entre 0.25 y 0.80 pulgadas aproximadamente, y mas preferiblemente 0.62 pulgadas aproximadamente. Naturalmente se pueden proporcionar otras dimensiones, de una manera diferente a las tiras deflectoras montadas, que no impactan el peso total de la seccion de tamiz. Por ejemplo, en la configuracion de las Figuras 4-6, agregar una correa deflector con un mayor espesor o ancho mayor aumentara el peso de la seccion de tamiz y colocara mayores demandas sobre los elementos sujetadores en secadores grandes. Sin embargo, con las regiones deflectoras repujadas del presente invento, las dimensiones de la tira

repujada simplemente alteran el porcentaje de la seccion solida 136 que se proyecta hacia adentro pero no cambian el peso total de la seccion de tamiz 115

89

La longitud de las tiras deflectoras repujadas 170 depende de la altura de la seccion cilindrica de tamiz 115, o tamiz cilindrico si es de una pieza, y preferiblemente son de tal longitud para dejar un espacio de una pulgada aproximadamente desde el extremo superior e inferior de la tira deflector hasta los bordes superior e inferior de la seccion de tamiz (o tamiz) para no interferir con el sellamiento, aunque este espaciado se puede variar segun se desee

Mientras las tiras deflectoras repujadas 170 preferiblemente son tiras continuas elevadas, estas podrian ser discontinuas y de menor longitud para facilitar el enrollado requerido del tamiz alrededor de los anillos de soporte para obtener la configuracion cilindrica. Las tiras elevadas continuas son preferidas puesto que tienden a proporcionar una longitud continua de desviacion y ofrecer un mayor grado de endurecimiento agregado al tamiz cilindrico o seccion de tamiz. Como tal, es posible que las tiras repujadas puedan permitir una placa de tamiz mas delgada 128

Si las tiras repujadas 170 son discontinuas, estas preferiblemente se pueden disponer de manera vertical escalonado desde adyacente al borde inferior de la placa de tamiz 128 hasta adyacente al borde superior de la placa de tamiz 128. De tal forma, el bandeo de particulas solidas que saltan una tira elevada en un paso circunferencial alrededor de la banda de tolerancia encontrarian otra tira elevada en su camino. Esta configuracion escalonada se podria incorporar de manera similar con tiras deflectoras repujadas anguladas

Las regiones repujadas tambien se pueden producir en formas diferentes a las tiras elongadas. Sin ser limitados a los mismos, ejemplos de configuraciones de regiones repujadas alternas son mostradas por los rectangulos horizontal y verticalmente escalonados 201 mostrados en la Figura 14A, los circulos verticalmente espaciados 203 mostrados en la Figura 14B, las flechas verticalmente espaciadas 205 mostradas en las Figuras 14C y los rectangulos verticalmente espaciados 207 en alineacion inclinada mostrados en la Figura 14D

Cualquiera que sea la configuracion especifica de las regiones repujadas, el tamiz deflector repujado segun el presente invento aumenta la eficiencia general del secador de pellets y resulta en ahorros considerables en terminos de inversion de capital. De manera mas particular, para un secador de un tamaño dado, se pueden lograr mayores tasas de flujo de producto con el tamiz deflector repujado en comparacion con tamices secadores convencionales. Como resultado, se puede utilizar un secador mas pequeño para cumplir efectivamente con los requerimientos de produccion que de otra forma habria requerido la compra de un secador mas grande. Al evitar la necesidad de esta compra, se pueden obtener ahorros de costos en el orden de decenas y aun cientos de dolares

Lo anterior se considera como ilustrativo solamente de los principios del invento. Ademas, puesto que numerosas modificaciones y cambios se les ocurrira facilmente a aquellos con experiencia en el estado de la tecnica, no se desea limitar el invento a la construccion y operacion exactas mostradas y descritas, y, por consiguiente, se puede recurrir a todas las modificaciones y equivalentes apropiados, que esten dentro del alcance del invento

Reivindicaciones



- 1 Un tamiz para un secador centrifugo de pellets que comprende un tamiz sustancialmente cilindrico el cual tiene una o mas regiones repujadas, cada region repujada formando un deflector integral el cual sobresale a partir de una superficie interna del tamiz para irrumpir un flujo circular de particulas que esten siendo secadas para asi mejorar el flujo de particulas a traves de un area de rotor del secador
- 2 El tamiz segun la reivindicacion 1, en donde cada region repujada forma una tira deflectora repujada sustancialmente vertical
- 3 El tamiz segun la reivindicacion 2, en donde dicho tamiz incluye una pluralidad de regiones repujadas formadas como tiras sustancialmente verticales espaciadas entre si alrededor de la superficie interna del tamiz
- 4 El tamiz segun la reivindicacion 3, en donde dichas tiras estan dispuestas de manera escalonadas desde adyacente al borde inferior del tamiz hasta adyacente al borde superior del tamiz
- 5 El tamiz segun la reivindicacion 1, en donde dicho tamiz incluye areas perforadas y no perforadas, dichas regiones repujadas son formadas en dichas areas no perforadas
- 6 El tamiz segun la reivindicacion 1, en donde cada region repujada forma una tira deflectora la cual tiene un continuo borde de leve inclinacion
- 7 El tamiz segun la reivindicacion 1, en donde dichas tiras deflectoras repujadas sobresalen hacia dentro, con relacion a las porciones no repujadas de dicha superficie interior, entre 0,10 y 0,25 pulgadas (0,254 y 0,635 cm) aproximadamente
- 8 El tamiz segun la reivindicacion 7, en donde dichas tiras deflectoras repujadas tienen un ancho entre 0,25 pulgadas (0,635 cm) y 0,80 pulgadas (2,032 cm) aproximadamente
- 9 El tamiz segun la reivindicacion 1, en donde dichas tiras deflectoras repujadas sobresalen hacia dentro, con relacion a las porciones no repujadas de dicha superficie interior, aproximadamente 0,14 pulgadas (0,356 cm) y un ancho de aproximadamente 0,62 pulgadas (1,575 cm)
- 10 El tamiz segun la reivindicacion 1, en donde dichas tiras deflectoras repujadas se extienden sustancialmente desde una parte superior del tamiz hasta una parte inferior del mismo
- 11 Un secador centrifugo de pellets el cual comprende un amazon del secador el cual tiene un tamiz cilindrico montado verticalmente dentro de el, generalmente concentrico con un rotor con aspas, una entrada para recibir una pasta aguada y particulas solidas a partir de un peletizador subacuatico en una seccion inferior del tamiz, dichas particulas solidas son movidas hacia arriba en un flujo circular a traves del tamiz por el rotor hacia una salida sobre el extremo superior del tamiz, dicho tamiz tiene una region repujada la cual forma un deflector integral el

cual sobresale desde una superficie interna del tamiz para irrumpir el flujo circular de las partículas que están siendo secadas para así mejorar el flujo de partículas a través del secador

gsl

5 12 El secador según la reivindicación 11, en donde cada región repujada forma una tira deflectora repujada sustancialmente vertical

10 13 El secador según la reivindicación 12, en donde dicho tamiz incluye una pluralidad de regiones repujadas formadas como tiras deflectoras sustancialmente verticales espaciadas entre sí alrededor de la superficie interna del tamiz

14 El secador según la reivindicación 13, en donde dichas tiras deflectoras están dispuestas de manera escalonadas desde adyacente al borde inferior del tamiz hasta adyacente al borde superior del tamiz

15 15 El secador según la reivindicación 11, en donde dicho tamiz incluye áreas perforadas y no perforadas, dicha tira deflectora es formada en un área no perforada

20 16 El secador según la reivindicación 11, en donde dicho tamiz incluye áreas perforadas y no perforadas, dicha tira deflectora es formada en un área perforada

20 17 El secador según la reivindicación 13, en donde dicha tira deflectora tiene un continuo borde de leve inclinación

25 18 El secador según la reivindicación 13, en donde dichas tiras deflectoras repujadas tienen un ancho entre 0,25 pulgadas (0,635 cm) y 0,80 pulgadas (2,032 cm) y sobresalen hacia dentro, con relación a porciones no repujadas de dicha superficie interna, entre 0,10 pulgadas (0,254 cm) y 0,25 pulgadas (0,635 cm) aproximadamente

30 19 El secador según la reivindicación 11, en donde dichas tiras deflectoras repujadas tienen un ancho de aproximadamente 0,62 pulgadas (1,575 cm) y sobresalen hacia dentro, con relación a porciones no repujadas de dicha superficie interna, aproximadamente 0,14 pulgadas (0,356 cm)

35 20 El secador según la reivindicación 11, en donde dicho tamiz incluye una pluralidad de secciones de tamiz interconectadas y alineadas verticalmente

40 21 El secador según la reivindicación 20, en donde cada una de dichas secciones de tamiz tiene una tira deflectora repujada de tal manera que dichas tiras deflectoras repujadas se extienden de manera sustancialmente continua desde una parte superior del secador hasta una parte inferior del mismo

SS

FIG. 1
(estado de la técnica anterior)

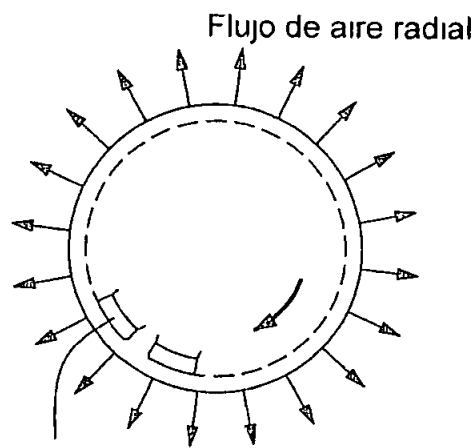
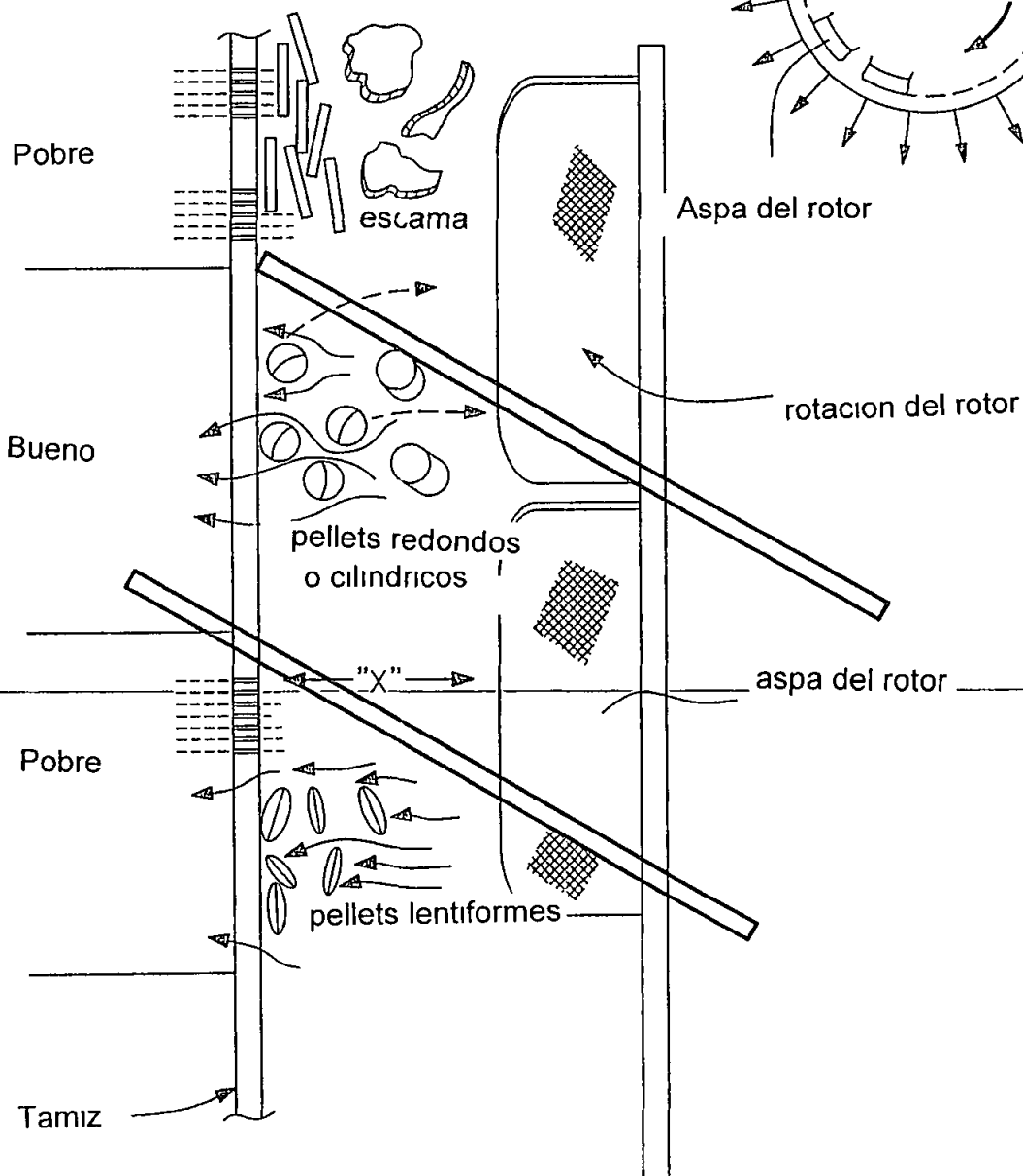


FIG. 2
(estado de la técnica anterior)

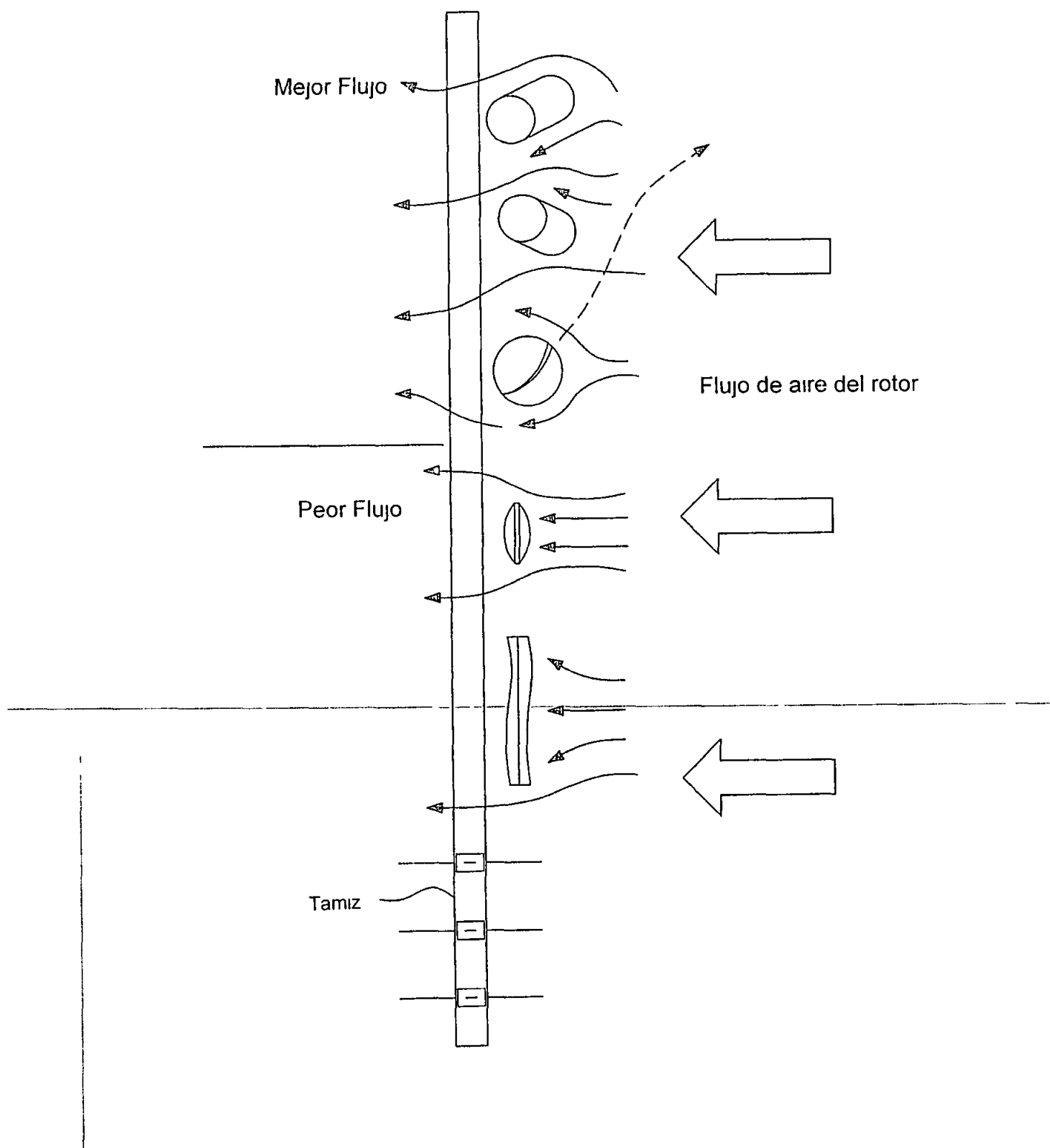
Características de Flujo



56

2/9

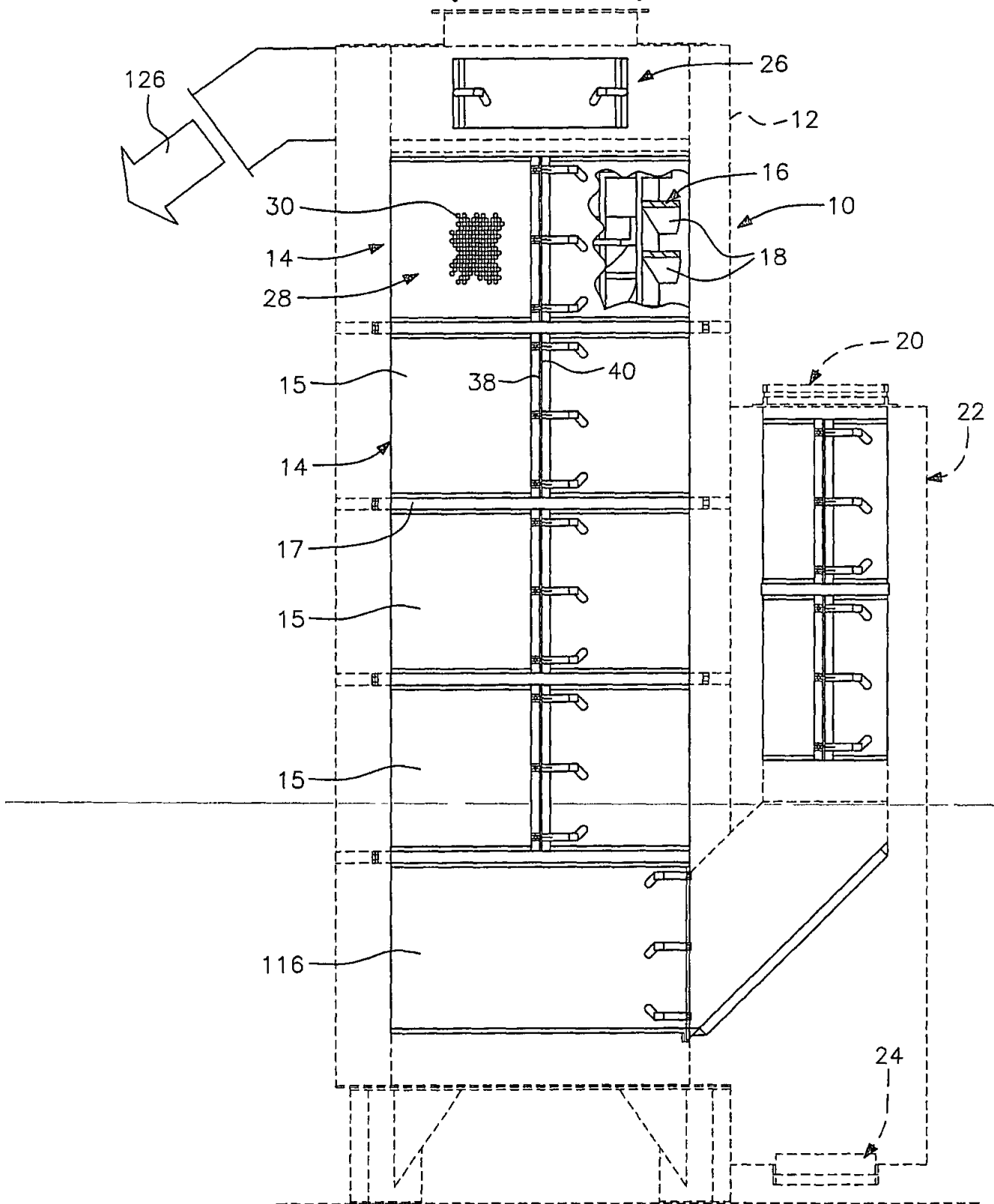
FIG. 3
(estado de la tecnica anterior)



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3/9

FIG. 4
(PRIOR ART)



58

4/9

FIG. 5
(PRIOR ART)

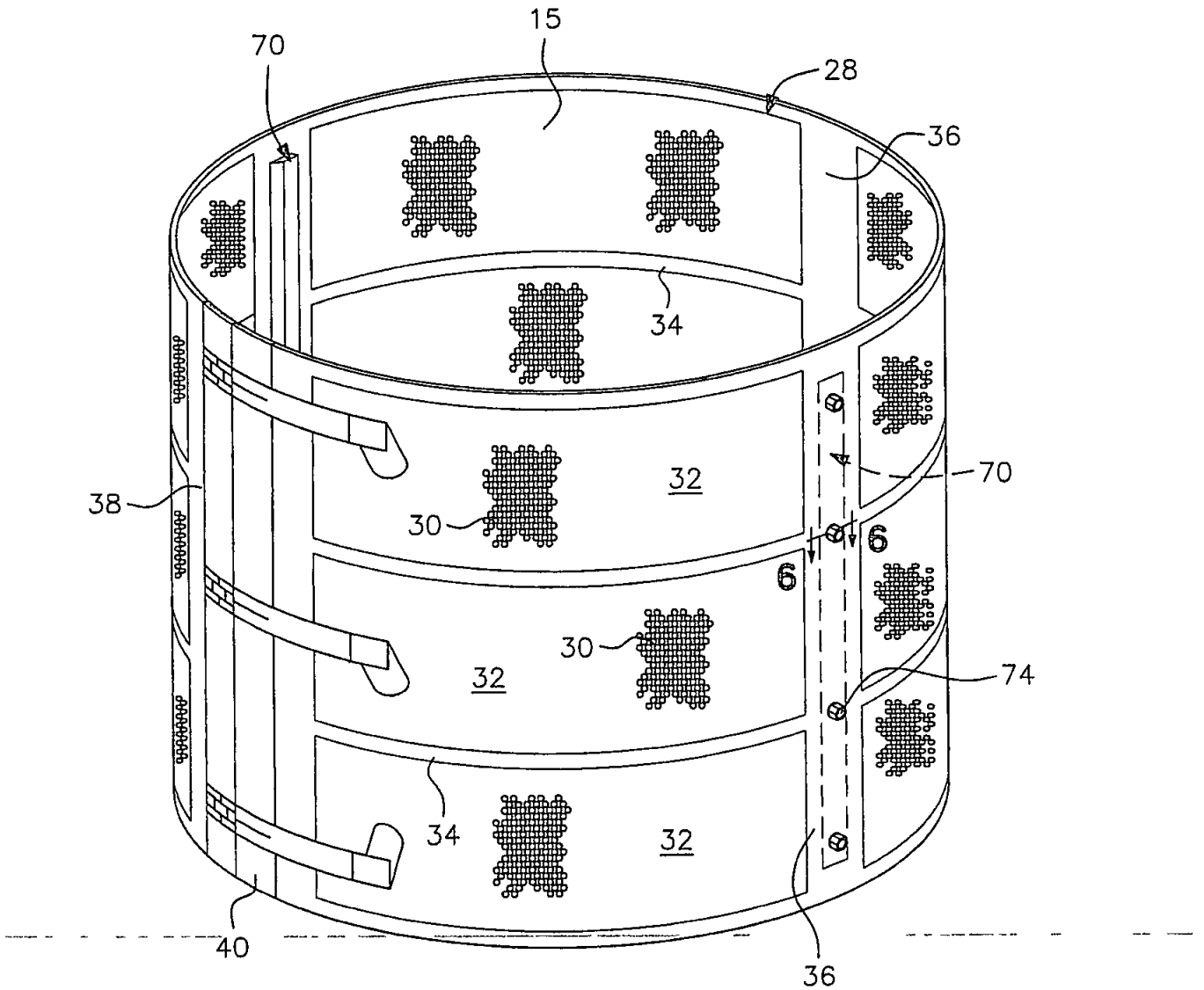
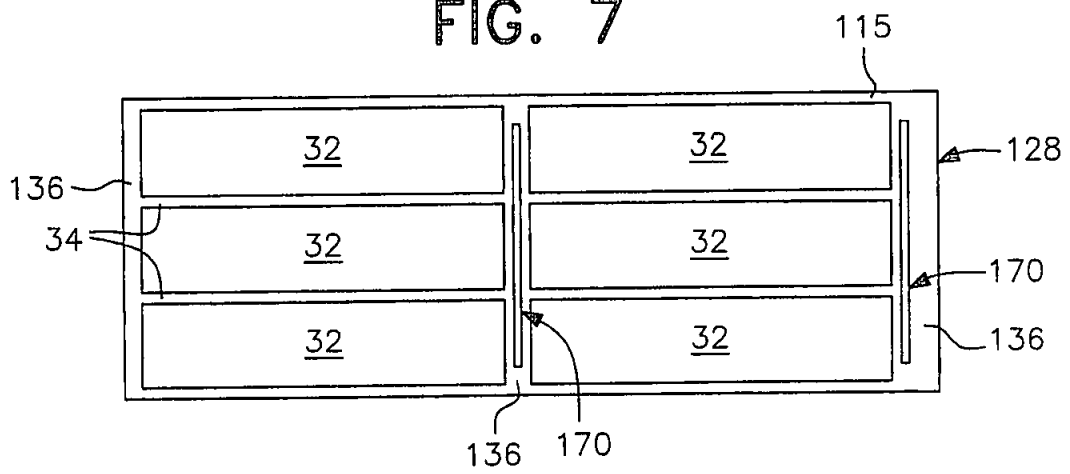


FIG. 7



81

5/9

FIG. 8

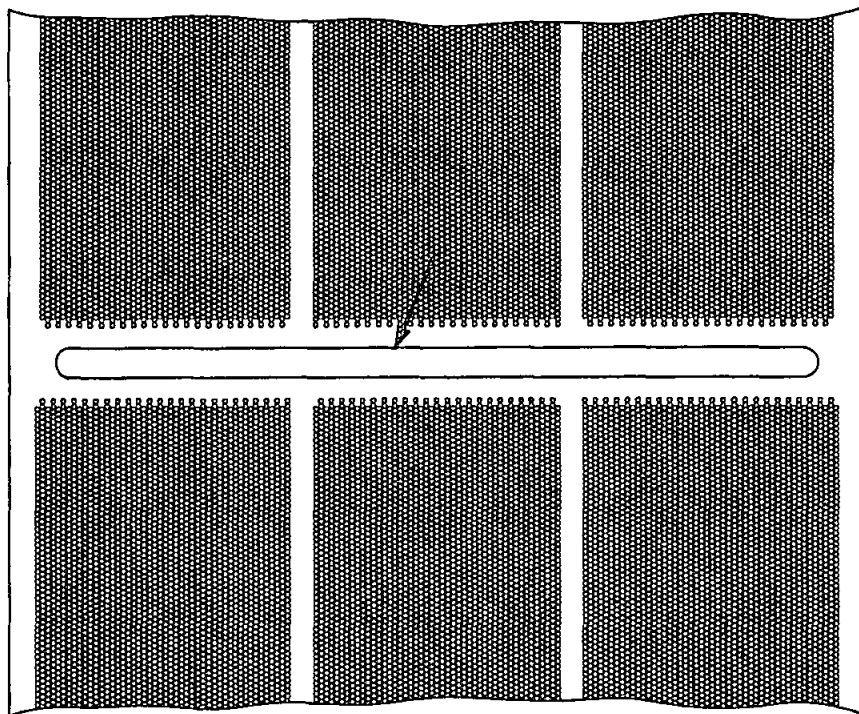
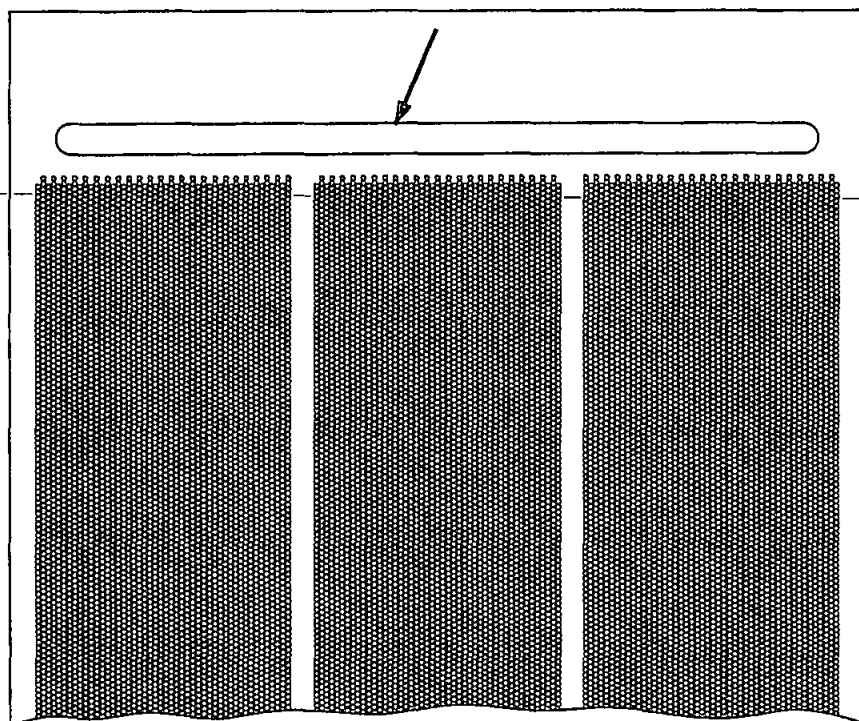


FIG. 9



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6/9

FIG. 6
(PRIOR ART)

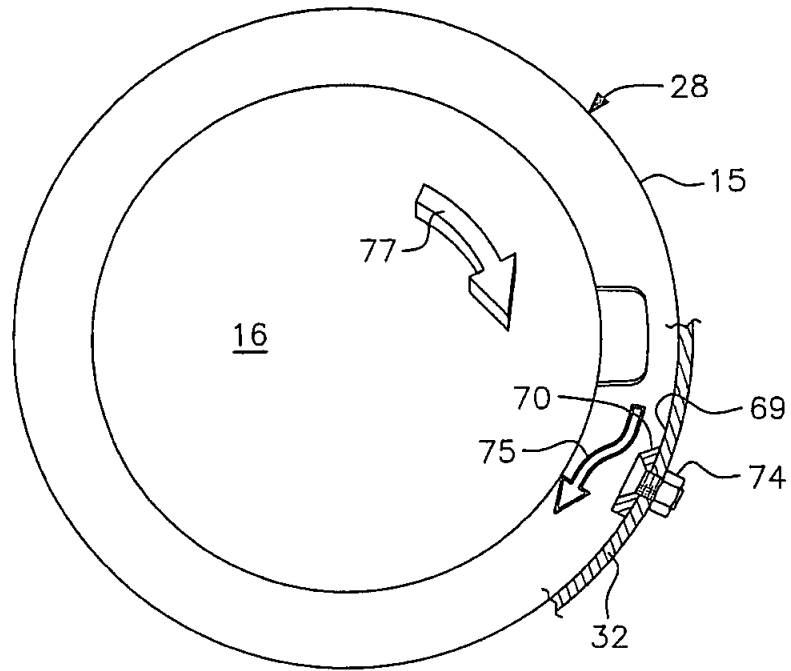
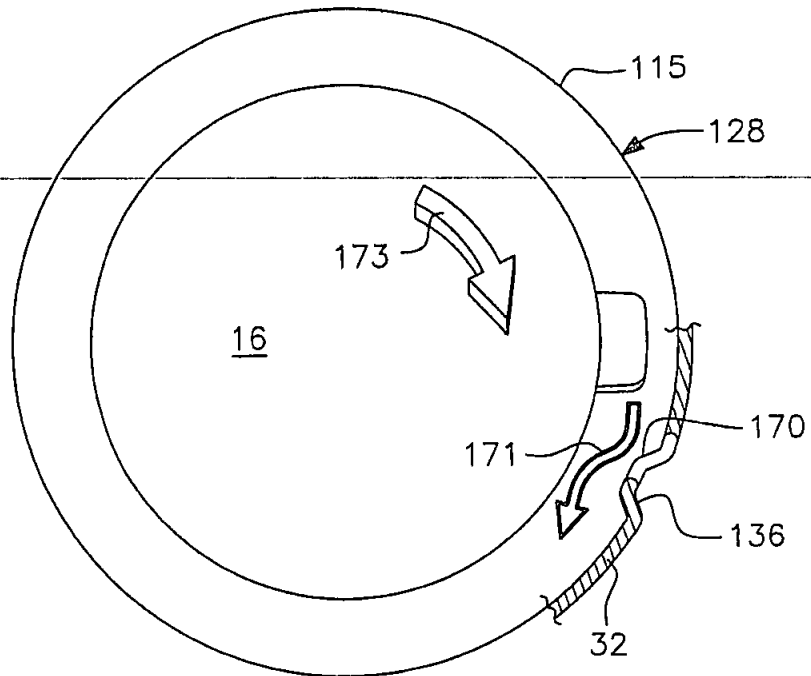


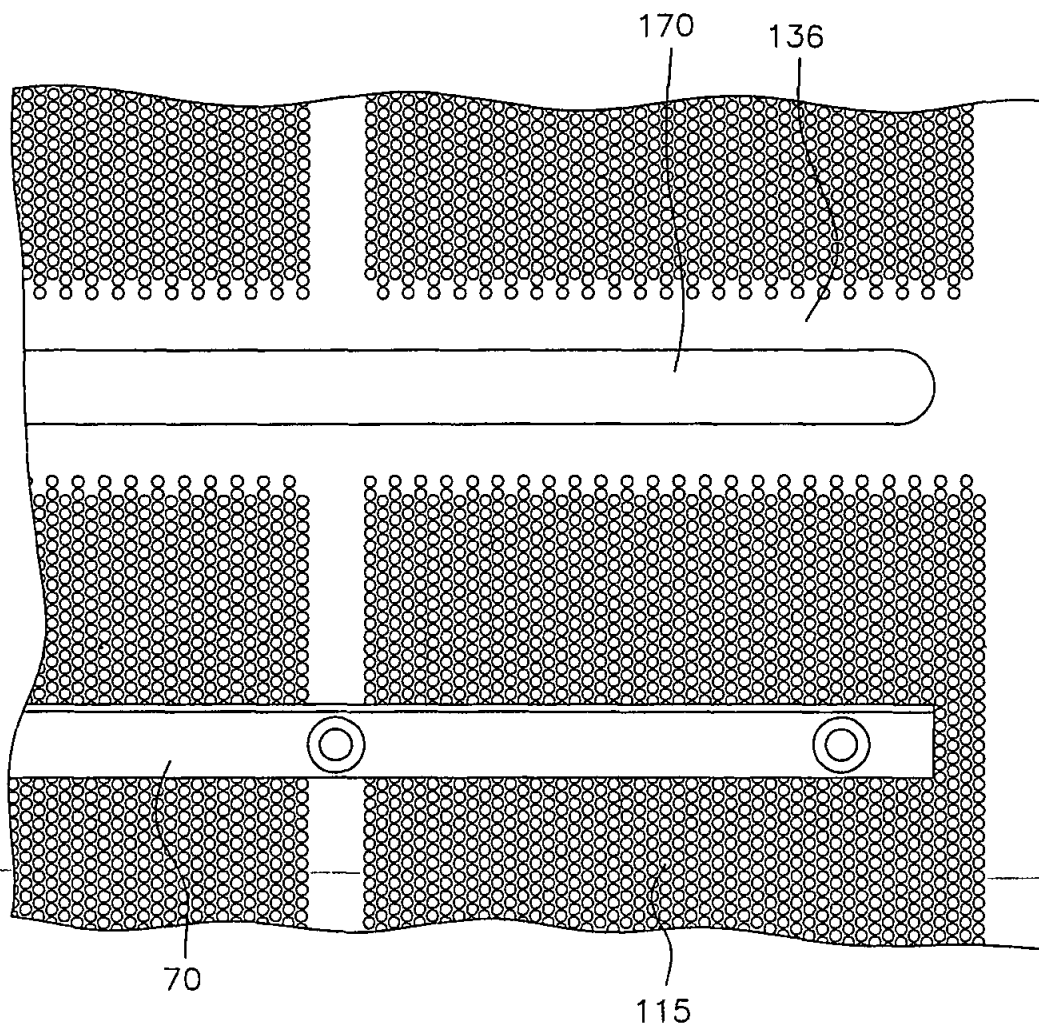
FIG. 10



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7/9

FIG. 11



62

FIG. 12

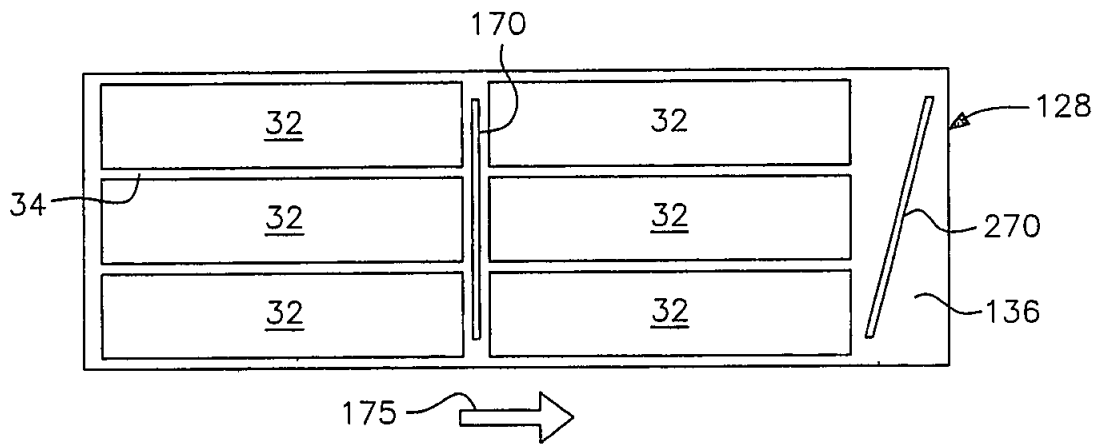
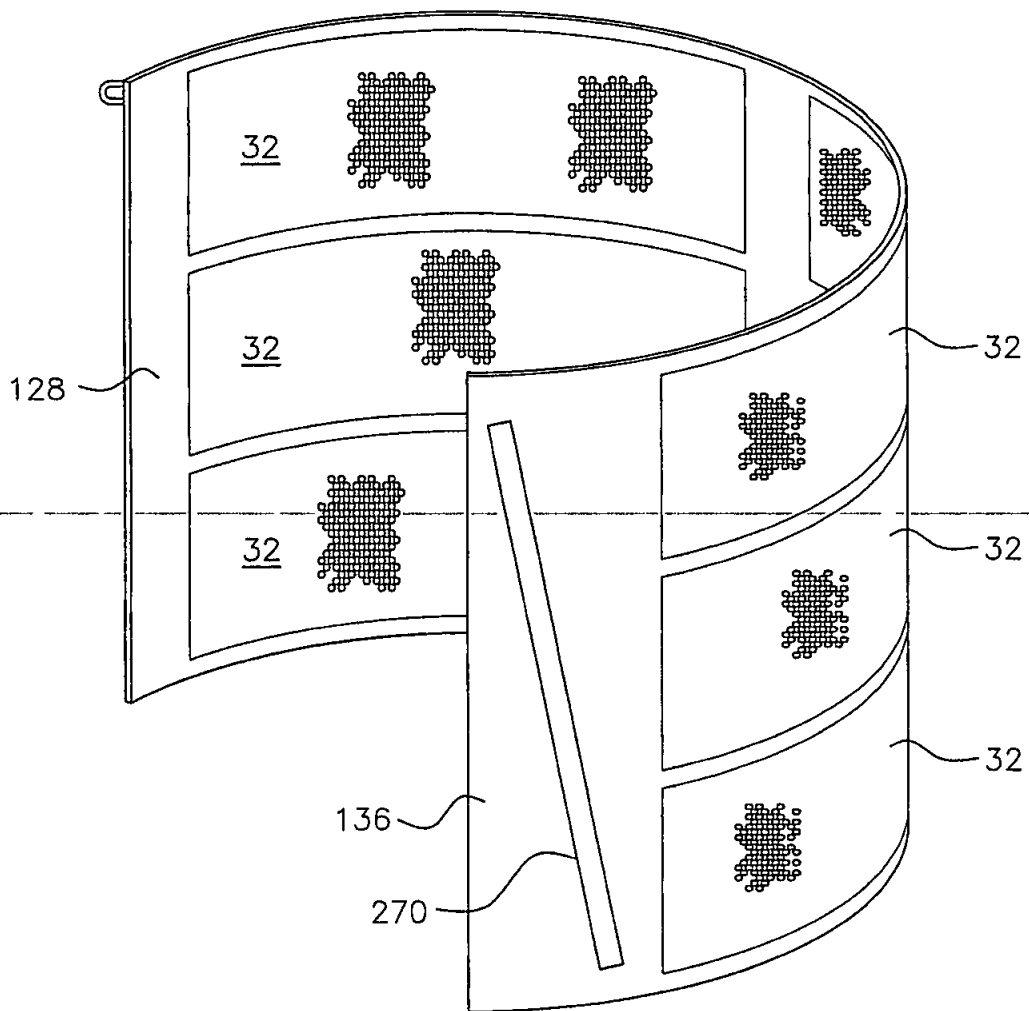


FIG. 13



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FIG. 14A

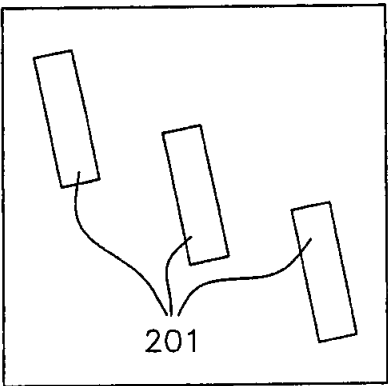


FIG. 14B

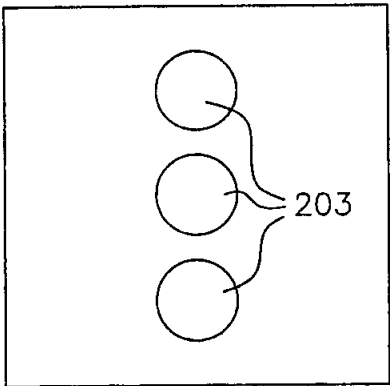


FIG. 14C

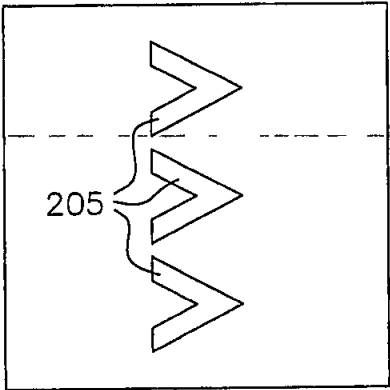
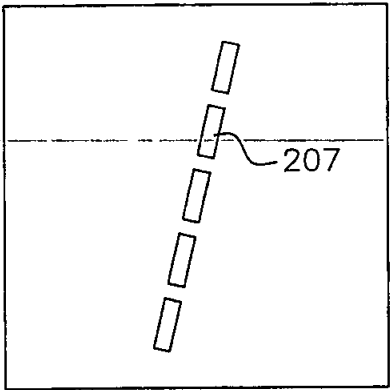


FIG. 14D



64

IN THE UNITED STATES PATENT OFFICE
AS INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

In re application of GALA INDUSTRIES, INC
Intl Appln No PCT/US2008/06522
Intl Filing Date 22 MAY 2008 (22 05 2008)
Entitled EMBOSSSED CENTRIFUGAL PELLET DRYER SCREEN
Attorney's File Ref P71933WO1

RESPONSE TO WRITTEN OPINION

Mail Stop PCT, Attn ISA/US
Commissioner for Patents
P O Box 1450
Alexandria, Virginia 22313-1450

Sir

In response to the Written Opinion, mailed from the International Searching Authority on September 12, 2008, Applicant hereby submits, in place of original pages 22-26, replacement pages 22-25 with new claims 1-21, and requests that the International Preliminary Report on Patentability be established thereon

The priority date of this application is May 23, 2007 and a Demand is being filed concurrently herewith. Accordingly, this response to the Written Opinion, being filed within 22 months of the application priority date, is timely in accordance with the time period for response set forth in PCT/ISA/237

Claim Changes

Original claims 1-21 have been replaced with new claims 1-21 which are presented herein

New independent claims 1 and 11 generally correspond with original claims 1 and 11 but have been amended to more clearly define the nature of the deflectors. As set forth in the

18

new claims, the present invention is directed to a screen for a centrifugal pellet dryer having an inside surface with one or more raised regions. While original claims 1 and 11 specified that the raised regions were embossed, raised regions in the screen could be formed by other methods without departing from the intended scope of the invention. Specifically, the raised regions, however formed, create deflectors that are *integral* with the screen. As emphasized in new claims 1 and 11, the integral nature of the deflectors means that the deflectors are not separate components from the screen, but merely raised portions formed in the screen itself. And as such, the deflectors do not impact the overall weight of the screen (see page 18 of the specification).

This structure is not suggested by or disclosed in U S Patent No. 6739,457 to Humphries, II et al. ("Humphries")

The Examiner has interpreted Humphries as disclosing one or more embossed regions that each form an integral deflector that protrudes from the inside surface of the screen, citing Humphries column 7, lines 27-29, and items 15 and 70 of Figure 5. Applicant respectfully disagrees.

Humphries discloses deflectors that are clearly neither embossed nor integral with the screen but which are separate components that are mounted to the screen such as by bolting and/or welding. The Humphries construction and the drawbacks thereof are fully discussed in the present application at pages 13-14, after which the present invention is distinguished thereover on the basis of the fact that the presently claimed raised portions, which can be formed by embossing, result in deflectors that are *integral with* the screen itself, i.e., the deflectors are formed as a single unit with the screen. Because the deflectors are not separate components, their presence has no impact on the overall weight of the screen (see page 18 of the specification). This is clearly not the case with Humphries in

which the deflectors, being separate components that are added to the screen assembly, have to add to the weight of the screen when mounted thereto

Accordingly, claims 1 and 11 demonstrate an inventive step over Humphries, either taken alone or in combination with the secondary reference of U S Patent No 5,265,347 to Woodson et al ("Woodson") as cited against claim 11. Particularly, Woodson also fails to disclose integrally formed deflectors on the inner surface of the screen as in claim 11.

New claims 2-5 correspond with original claims 2-5 with the exception that previous references to "embossed" regions have been changed to "raised" regions. Since embossing by definition means "to raise in relief from a surface" and is well known by persons of ordinary skill in the art to refer to a raised portion, these changes do not represent new matter.

New claim 6 corresponds with original claim 16, but as dependent on claim 1.

New claim 7 corresponds with original claim 6, but has been modified to clarify that the smoothly continuous ramped edge of the integral deflector is relative to adjacent non-raised portions of the screen inner surface.

New claims 8 and 9 correspond with original claims 7 and 8, respectively, with new claim 8 introducing the limitation of the deflector being embossed.

New claims 10, 12 and 13 correspond with original claims 10, 12 and 13 with the exception that previous references to "embossed" regions have been changed to "raised" regions.

New claim 14 corresponds with original claim 14.

New claims 15 and 16 generally correspond with original claims 15 and 16 while adding that the deflector strips are embossed.

New claim 17 corresponds with original claim 17, but has been modified to clarify that the smoothly continuous ramped

12

edge of the integral deflector is relative to adjacent non-raised portions of the screen inner surface

New claims 18 and 19 correspond with original claims 18 and 19 with the exception that previous references to "embossed" regions have been changed to "raised" regions

New claim 20 corresponds with original claim 20

New claims 21 corresponds with original claim 21 with the exception that previous references to "embossed" regions have been changed to "raised" regions

With the foregoing amendments and remarks, Applicant submits that the present invention, as set forth and claimed herein, fulfills the requirements of novelty, inventive step and industrial applicability. Reconsideration by the International Preliminary Examining Authority and the establishment of an affirmative International Preliminary Report on Patentability on the basis of the replacement claims set forth herein is therefore requested

Respectfully submitted,
JACOBSON HOLMAN PLLC

Date March 23, 2009

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WHAT IS CLAIMED IS

1 A screen for a centrifugal pellet dryer comprising a substantially cylindrical screen having an inside surface with one or more raised regions, each raised region protruding inwardly to form a deflector that disrupts a circular flow of particles being dried to improve particle flow through a rotor area of the dryer, said deflector being integral with said screen such that said deflector is not a separate component from the screen and does not impact an overall weight of the screen

2 The screen as set forth in claim 1, wherein each raised region forms a substantially vertical raised deflector strip

3 The screen as set forth in claim 2, wherein said screen includes a plurality of raised regions formed as substantially vertical strips spaced from one another around the inside surface of the screen

4 The screen as set forth in claim 3, wherein said strips are arranged in a staggered array from adjacent a bottom edge of the screen to adjacent a top edge of the screen

5 The screen as set forth in claim 1, wherein said screen includes perforated and non-perforated areas, said raised regions being embossed in said non-perforated areas

6 The screen as set forth in claim 1, wherein said screen includes perforated and non-perforated areas, said raised regions being embossed in said perforated areas

7 The screen as set forth in claim 1, wherein said integral deflector has a smoothly continuous ramped edge with adjacent non-raised portions of said screen inner surface

6d

8 The screen as set forth in claim 1, wherein said deflector is embossed and protrudes inwardly, relative to non-embossed portions of said inner surface, about 0 10 inches to about 0 25 inches

9 The screen as set forth in claim 8, wherein said deflector has a width of about 0 25 inches to about 0 80 inches

10 The screen as set forth in claim 1, wherein each raised region forming a deflector extends substantially from a top of the screen to a bottom thereof

11 A centrifugal pellet dryer comprising a dryer housing having a cylindrical screen mounted vertically therein, generally concentric with a bladed rotor, an inlet for receiving a slurry of water and solid particles from an underwater pelletizer into a bottom section of the screen, said solid particles being moved upwardly in a circular flow through the screen by the rotor to an outlet at an upper end of the screen, an inner surface of said screen having a raised region that protrudes inwardly to form a deflector that disrupts the circular flow of particles being dried to improve particle flow through the dryer, said deflector being integral with said screen such that said deflector is not a separate component from the screen and does not impact an overall weight of the screen

12 The dryer as set forth in claim 11, wherein each raised region forms a substantially vertical raised deflector strip

13 The dryer as set forth in claim 12, wherein said screen includes a plurality of raised regions formed as substantially vertical deflector strips spaced from one another around the inside surface of the screen

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14 The dryer as set forth in claim 13, wherein said deflector strips are arranged in a staggered array from adjacent a bottom edge of the screen to adjacent a top edge thereof

15 The dryer as set forth in claim 12, wherein said screen includes perforated and non-perforated areas, said deflector strip being embossed in a non-perforated area

16 The dryer as set forth in claim 12, wherein said screen includes perforated and non-perforated areas, said deflector strip being embossed in a perforated area

17 The dryer as set forth in claim 11, wherein said integral deflector has a smoothly continuous ramped edge with adjacent non-raised portions of said screen inner surface

18 The dryer as set forth in claim 13, wherein said deflector strips have a width of from about 0 25 inches to about 0 80 inches and protrude inwardly, relative to non-raised portions of said screen inner surface, about 0 10 inches to about 0 25 inches

19 The dryer as set forth in claim 13, wherein said deflector strips have a width of about 0 62 inches and protrude inwardly, relative to non-raised portions of said screen inner surface, about 0 14 inches

20 The dryer as set forth in claim 11, wherein said screen includes a plurality of interconnected, vertically aligned screen sections

21 The dryer as set forth in claim 20, wherein each of said screen sections has a raised region forming a deflector

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strip such that said deflector strips extend in a substantially continuous arrangement from a top of the dryer to a bottom thereof

REPLACEMENT SHEET

72

IN THE UNITED STATES PATENT OFFICE
AS RECEIVING OFFICE

In re application of GALA INDUSTRIES, INC
International Appln No PCT/US2008/006522
International Filing Date 22 May 2008 (22 05 2008)
Entitled CENTRIFUGAL PELLET DRYER SCREEN WITH INTEGRAL
EMBOSSED DEFLECTOR STRIPS
Attorney's File Ref P71933WO1

RESPONSE TO INVITATION TO CORRECT DEFECTS

Mail Stop PCT
Commissioner for Patents
P O Box 1450
Alexandria, VA 22313-1450

Sir

In response to the Invitation to Correct Defects mailed June 12, 2008, Applicant hereby provides a corrected page 1 of the PCT Request (1 sheet) which is attached hereto and in which the title has been amended to correspond with the title heading the description Entry thereof in place of page 1 of the Request as originally filed is requested

Respectfully submitted,
JACOBSON HOLMAN PLLC

Date August 12, 2008

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference P71933WO1	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as where applicable item 5 below
International application No PCT/US 08/06522	International filing date (day/month/year) 22 May 2008 (22 05 2008)	(Earliest) Priority Date (day/month/year) 23 May 2007 (23 05 2007)
Applicant GALA INDUSTRIES INC		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets

☐ It is also accompanied by a copy of each prior art document cited in this report

1 Basis of the report

a With regard to the language the international search was carried out on the basis of

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a))

c ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application see Box No. I

2 ☐ Certain claims were found unsearchable (see Box No. II)

3 ☐ Unity of invention is lacking (see Box No. III)

4 With regard to the title

☒ the text is approved as submitted by the applicant

☐ the text has been established by this Authority to read as follows

5 With regard to the abstract

☒ the text is approved as submitted by the applicant

☐ the text has been established according to Rule 38.2(b) by this Authority as it appears in Box No. IV. The applicant may within one month from the date of mailing of this international search report submit comments to this Authority.

6 With regard to the drawings

a the figure of the drawings to be published with the abstract is Figure No. 13

☒ as suggested by the applicant

☐ as selected by this Authority because the applicant failed to suggest a figure

☐ as selected by this Authority because this figure better characterizes the invention

b ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No

PCT/US 08/06522

A CLASSIFICATION OF SUBJECT MATTER

IPC(8) F26B 5/08 (2008 04)

USPC 34/318

According to International Patent Classification (IPC) or to both national classification and IPC

B FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) F26B 5/08 (2008 04)

USPC 34/318

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

IPC(8) F26B 5/08 (2008 04) see search terms below

USPC 34/58 166 312 318 322 210/374 377 512 3 see search terms below

Electronic data base consulted during the international search (name of data base and, where practicable search terms used)

PubWEST(USPT PGPB EPAB JPAB) DialogPRO(Engineering) Google Scholar

Centrifugal pellet dryer screen array strip emboss deflector ramp edge dryer

C DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document with indication where appropriate of the relevant passages	Relevant to claim No
X - Y	US 6 739 457 B2 (HUMPHRIES II et al) 25 May 2004 (25 05 2004) entire document especially Fig 5 6 col 2 ln 31 37 col 7 ln 27 29 col 7 ln 49 52 col 8 ln 44-48	1 3 and 5 10 4 and 11 21
Y	US 5 265 347 A (WOODSON et al) 30 November 1993 (30 11 1993) entire document especially Fig 1 3 4 6 7 col 4 ln 29 37 col 4 ln 57 59	11 21
Y	US 6 698 107 B2 (SONG et al) 02 March 2004 (02 03 2004) Fig 7	4 and 14

☐ Further documents are listed in the continuation of Box C

* Special categories of cited documents

A document defining the general state of the art which is not considered to be of particular relevance

E earlier application or patent but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure use exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

Tⁿ later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the inventionXⁿ document of particular relevance the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken aloneYⁿ document of particular relevance the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents such combination being obvious to a person skilled in the art

& document member of the same patent family

Date of the actual completion of the international search

08 September 2008 (08 09 2008)

Date of mailing of the international search report

12 SEP 2008

Name and mailing address of the ISA/US

Mail Stop PCT Attn ISA/US Commissioner for Patents
P O Box 1450 Alexandria Virginia 22313 1450

Facsimile No 571 273-3201

Authorized officer

Lee W Young

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PCT OSP 571 272 7774



Industria y Comercio
SUPERINTENDENCIA

REQUISITOS MINIMOS PARA ADMISIÓN A TRAMITE
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PATENTE DE INVENCION

☒

MODELO DE UTILIDAD ☐

- ◆ Indicacion de que se solicita la concesion de una patente ☒
- ◆ Datos de identificacion del solicitante o de la persona que presenta la solicitud ☒
- ◆ Descripcion de la invencion ☒
- ◆ Dibujos de ser estos pertinentes ☐
- ◆ Comprobante de pago de las tasas establecidas ☒

COMPLETA ☐

INCOMPLETA ☐

DISEÑO INDUSTRIAL ☐

- ◆ Indicacion de que se solicita el registro de Diseño Industrial ☐
- ◆ Datos de identificacion del solicitante o de la persona que presenta la solicitud ☐
- ◆ Representacion grafica y fotografica del Diseño Industrial o muestra del material que incorpora el diseño ☐
- ◆ Comprobante de pago de las tasas establecidas ☐

COMPLETA ☐

INCOMPLETA ☐

ESQUEMA DE TRAZADO ☐

- ◆ Indicacion de que se solicita el registro de un Esquema de Trazado ☐
- ◆ Datos de identificacion del solicitante o de la persona que presenta la solicitud ☐
- ◆ Representacion grafica del esquema trazado ☐
- ◆ Comprobante de pago de las tasas establecidas ☐

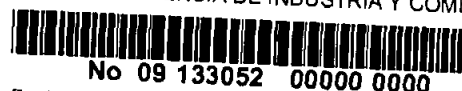
COMPLETA ☐

INCOMPLETA ☐

Firma Responsable

Fecha

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No 09 133052 00000 0000

Fecha 2009 11 23 16 51 06 Dep 2020 DIR NUEVASCR
Tra 11 PATENTE IYII Eve 379 FASENACIONAL II
Act 411 PRESENTACION Folios 74

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Bogota
2020

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Apoderado(a) y/o Representante de
GALA INDUSTRIES INC

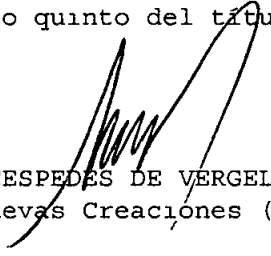
REFERENCIA	Radicación No	09 133052
	Solicitud internacional	PCT/US2008/006522
	Fecha inicio fase nacional	23/12/2009
	Tramite	11
	Evento	379
	Actuación	430
	Oficio No	-N- 913

Como resultado del examen de forma realizado con fundamento en el artículo 38 de la Decisión 486 de la Comisión de la Comunidad Andina artículo 27 del Tratado de Cooperación en Materia de Patentes (PCT) regla 51 bis del Reglamento y Circular Única de la Superintendencia de Industria y Comercio se le comunica que

1 La solicitud no contiene la copia del documento en que consta la cesión del derecho a la patente del inventor al solicitante o a su causante conforme a lo establecido por el artículo 26 literal k) de la Decisión 486 de la Comisión de la Comunidad Andina. Cuando se trate de documentos otorgados en el extranjero, estos deberán legalizarse de conformidad con lo dispuesto por los artículos 259 y 260 del Código de Procedimiento Civil. Cuando se trate de las declaraciones a que hace referencia la Regla 4.17.11) del Tratado de Cooperación en Materia de Patentes PCT, el alcance de las tales declaraciones se determinará según indiquen claramente una cesión de derechos del inventor al solicitante o su causante de conformidad con lo dispuesto en el numeral 5.2.15 del Capítulo Quinto Título X de la Circular Única de Superintendencia de Industria y Comercio.

En cumplimiento de lo dispuesto por el artículo 39 de la Decisión 486, se le requiere para que dentro del término de dos meses siguientes a la fecha de notificación del presente oficio complete los requisitos anteriormente enunciados. En caso de no dar cumplimiento al presente requerimiento, la solicitud se considerará abandonada y perderá su prelación.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2 literal e) del capítulo quinto del título primero de la Circular Única No 10 de 2001.


ALIX CARMENZA CESPEDÉS DE VERGEL
Directora de Nuevas Creaciones (c)

El anterior requerimiento fue notificado por fijación en lista de fecha 29 ENE 2010
adpall

Al contestar favor indique el número de radicación consignado en el rótulo

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