

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
División de Nuevas Creaciones
E. S. D.

SUPERINDUSTRIA Y COMERCIO
Radiación : 01035236 00000003 Folios: 44
Fecha (NIB): 2001-08-31 16:26:29
Trámite : 002 PATENTES D 1 REGISTRO/ 444 REPUESTA
Dependencia: 2029 DIVISION DE NUEVAS CREACIONES

Ref: EXPEDIENTE N° 01-035236
Solicitud de patente a nombre de
THE QUAKER OATS COMPANY

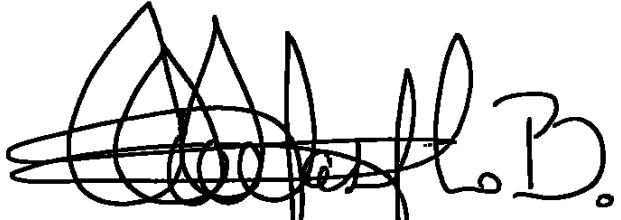
Me refiero al examen de forma recaído en el asunto de la referencia y adjunto presento los siguientes documentos:

- 1- El arte final en dos copias de 12x12 cms.
- 2- Fotocopia del poder conferido, legalizado por Apostilla con su traducción simple y en el que se acredita la existencia y representación de la sociedad solicitante.
- 3- El documento de cesión de la invención a los solicitantes.
- 4- Los dibujos formales
- 5- La copia certificada de la solicitud estadounidense No 09/564.942 del 5 de mayo del 2000, . Observo que sus reivindicaciones coinciden con las originalmente presentadas.

La sociedad solicitante está organizada conforme a las leyes del Estado de New Jersey , Estados Unidos de América.

Como el expediente queda así completo, pido se ordene la publicación del extracto.

Atentamente,



JERONIMO CASTILLO BONILLA
T.P 104167 C.S. JUDICATURA
C.C. 79.482.057 Bogotá

34

**ESTADO DE ILLINOIS
SECRETARIA DE ESTADO**

SPRINGFIELD ILLINOIS

**APOSTILLA
(Convención de la Haya de 5 de Octubre 1961)**

- 1 País Estados Unidos de América
Este documento publico
- 2 Ha sido firmado por DOLORES R NELSON
3 Actuando en capacidad de NOTARIO PUBLICO DEL CONDADO DU PAGE
4 Coloca su sello/estampilla del ESTADP DE ILLINOIS

CERTIFICA

- 5 Springfield Illinois
6 ABRIL 5 2001
7 Por la secretaria de Estado Estado de Illinois
8 No 8841
9 Sello/Estampilla

10 Firma

(Firmado)
JESSE WHITE
SECRETARIO DE ESTADO
ESTADO DE ILLINOIS



APOSTILLE

(Convention de La Haye du 5 Octobre 1961)

1 Country United States of America

This public document

2 has been signed by DOLORES R NELSON

3 acting in the capacity of NOTARY PUBLIC DU PAGE COUNTY

4 bears the seal/stamp of STATE OF ILLINOIS

Certified

5 Springfield Illinois

6 APRIL 5 2001

7 by the Secretary of State State of Illinois

8 No 8841

9 Seal/Stamp

10 Signature

Jesse White

JESSE WHITE
SECRETARY OF STATE
STATE OF ILLINOIS

LAW OFFICES
PEDRO CASTILLO PINEDA &
ASSOCIATES
 P O BOX 48362
 Bogotá, Colombia / South America

IMPORTANT NOTE

The lodging of this GENERAL POWER with the Patent Office obviates the need of presenting special powers with each individual trade mark application.

FOR PATENTS AND TRADE MARKS IN
COLOMBIA

	Poder General	General Power of Attorney
1 Applicant's name	(1) THE QUAKER OATS COMPANY Una corporación del Estado de New Jersey	(1) The Quaker Oats Company, a New Jersey corporation located at
2 Applicant's address	domiciliado en (2) 321 North Clark Street, Chicago, Illinois, Estados Unidos de América	domiciled in (2) 321 North Clark Street, Chicago, Illinois 60610 USA

nombramos al Dr. Jerónimo Castillo Bonilla y/o Ximena Bonilla Pereira y/o Alvaro Castillo Grau, CALLE 93A No 14-17 ofc 311 en Bogotá, Colombia

como sus representantes con poder especial, amplio y suficiente, para recibir de las oficinas y autoridades Colombianas, administrativas, judiciales o de policía, en primera o segunda instancia, la obtención de Patentes de Invención, Registro de Marcas, de Modelos y de Dibujos Industriales, de Nombres Comerciales y Enseñas, Letras Comerciales y Denominaciones de Origen, lo mismo que trasposos, extensiones, renovaciones, cambios de nombre, registro de licencias de explotación y registro de licencias de uso referentes a tales actuaciones, cancelación de Registros de marcas, a cuyo efecto les faculta para dar ante dichas autoridades todos los pasos necesarios al objeto indicado, elevar solicitudes, formular descripciones, enmiendas, protestas, declaraciones, apelaciones y reclamos, solicitar la aplicación de medidas cautelares; solicitar la nulidad de Patentes de Invención, modelos de utilidad, diseños industriales, así como la de registros de marcas ante la autoridad nacional competente; aceptar en nuestro nombre y representación la Cesión de derechos de invención y de patente de invención que se nos haga por cualquier persona, abonar todos los impuestos, cuotas y pagos determinados por la ley recibir todos los documentos y valores dando el descargo respectivo, llenar cualesquiera otros requisitos, desistir y tomar en fin todas las medidas que creyeran conducentes al resguardo de nuestros intereses y en caso de presentarse oposiciones y/o observaciones para que intervengan como demandantes o como demandados, con todas las demás facultades necesarias. Este poder comprende además las facultades de recibir desistir transigir comprometer sustituir revocar sustituciones, recibir notificaciones y nombrar apoderados judiciales o extrajudiciales.

Dado y firmado en (3) Chicago, Illinois, April 5, 2001

hereby appoint Dr. Jerónimo Castillo Bonilla and/or Ximena Bonilla Pereira and/or Alvaro Castillo Grau, Calle 93A No 14-17 oficina 311 Bogotá, Colombia

as our representatives with special ample and sufficient power to obtain from the offices and Colombian authorities, administrative, judicial and police, in first or in second instance, Privileged Patents of invention, Registration of Trade Marks, of Models and Industrial Drawings, of Commercial Names and ensigns, Commercial slogans and Origin Denominations as well as assignments, extensions, renewals, changes of name, registration of license of exploitation and of license of use referred to said actions, Cancellation Actions against trademark Registrations, who are empowered to take before said authorities all of the necessary steps for the purposes indicated, to file applications, to formulate descriptions, corrections, protests, declarations, appeals, and claims, apply for precautionary measures apply for the nullity of Patent Inventions, Utility Models, Industrial Designs, as well as for Trademark Registrations before the competent national authority to accept on our behalf and representation the assignment of rights of inventions and titles of invention that may be done to us by any person, to pay all taxes, quotas and payments prescribed by law to receive all the documents and proceeds giving the respective acquittance or receipt to fulfill any other requisites to desist and take in fact any other measures that may be deemed conducive to the safeguard of our interests, and in case that oppositions and/or observations are presented to intervene as complainant and defendant, with all necessary legal faculties.

This power of attorney includes the faculties to receive, desist, compromise transact substitute it in all or in part, to revoke substitutions, to receive notifications and to appoint extra-judicial or judicial attorneys.

Given and signed in (3) Chicago, Illinois April 5, 2001

Joseph W. Bean, Assistant Secretary

3 Date
 4 Applicant's signature

The Applicant's signature must be attested by a Notary Public through the NOTARIAL CERTIFICATE of the "(Individual)" when the signer is a natural person and the "(Corporations)" who is a legal one. The Notary's signatures must then be legalized by a Colombian Consular Officer. La firma del solicitante debe ser atestada por un Notario Público por medio de la DECLARACIÓN NOTARIAL en la "(Individual)" cuando el firmante es una persona natural y en la de "(Sociedades)" cuando es una persona jurídica. La firma del Notario deberá ser legalizada por el Consulado Colombiano.

1) Signature (s)

DECLARACION NOTARIAL
(Individual)

A los días del mes de
 compareció y/o comparecieron

personalmente ante mí, Notario Público

quien (es) doy fe de conocer y me consta que
es (son) la(s) persona(s) descrita(s) y
firmante(s) del documento que precede,
declarando ante mí que otorga(n) el mismo
para los fines y propósitos que en él se
expresan.

Notario Público,

NOTARIAL CERTIFICATE
(Individual)

On this day of of
personally appeared before me

a Notary Public

to me known, and known to me to be the person(s)
described in and who executed the foregoing
document, and he (they) duly acknowledged to me
that he (they) executed same for the uses and
purposes therein expressed.

Notary Public.

(Sociedades)

El suscrito Notario Certifica que la firma que
antecede y dice **JOSEPH W BEAN**

es auténtica, que el signatario desempeña
actualmente el cargo de
SECRETARIO ASISTENTE
de **THE QUAKER OATS COMPANY**

que tiene facultad para otorgar este poder y
que dicha compañía esta domiciliada en
321 No Clark Street, Chicago, Illinois,
Estados Unidos de América
y actualmente existe y esta organizada de
acuerdo a las leyes del Estado de New Jersey

Todos los hechos anteriores le constan por
haber examinado los documentos respectivos y
de todo ello da fe.

Dado y firmado en **CHICAGO, ILLINOIS**
April 5, 2001

El Notario Público,

(Con legalización Consular)

(Corporations)

The undersigned Notary Public certifies that the
preceding signature reading **Joseph W Bean**

is authentic; that the signer at present fills the post of
Assistant Secretary

of **The Quaker Oats Company**

and that he is empowered to grant this power and
that said company is domiciled in **321 No Clark Street,**
Chicago, IL USA

and actually exists and is organized in accordance
with the laws of the State of New Jersey

All the foregoing facts are known to the Notary due
to his having examined the respective documents to
which he, the Notary attests.

Given and signed in **Chicago, Illinois**
April 5, 2001


Notary Public.

(With Consular legalization)



August 22 2001
Corp No 000000000
Ref No 346752

IOWA

SECRETARY OF STATE

C T CORPORATION SYSTEM
NANCY
2222 CPAND
DES MOINE JA J0312

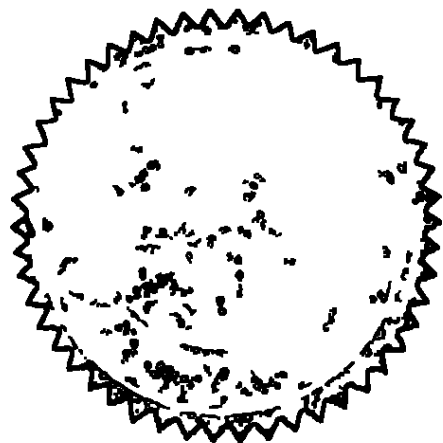
APOSTILLE

(Convention de la Hague du 5 octobre 1961)

- 1 Country United States of America
- 2 This public document has been signed by NANCY L BLAZEK
- 3 acting in the capacity of NOTARY PUBLIC
- 4 bearing the seal/stamp NOTARY PUBLIC IN AND FOR THE STATE OF IOWA

CERTIFIED

- 5 at DES MOINES IOWA UNITED STATES OF AMERICA
- 6 DATE AUGUST 20 2001
- 7 by the Secretary of State of the State of Iowa United States of America



Chester J Culver

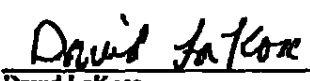
CHESTER J CULVER SECRETARY OF STATE



DESGLOSADO
D 13 M 09 A 2001
del Expediente No. 01 35236
Auto No. 2468 Fe. No. 13-09/01

[Handwritten signature]
13-7-01

BENTATA
Abogados

DECLARATION OF INVENTORSHIP WITH ASSIGNMENT	DECLARACION DE INVENTORES CON TRANSFERENCIA
We, the undersigned	Nosotros
(1) Joseph Alfred Byrd and (2) David LaKose both citizens of the United States of America	(1) Joseph Alfred Byrd (2) David LaKose De nacionalidad todos de los Estados Unidos de América
Both residing in Iowa, United States of America	Domiciliados en Iodos en Illinois, Estados Unidos de América
By these presents declare under oath to be the sole and true inventors of the invention titled	Pro el presente documento declaramos bajo juramento ser los únicos y verdaderos inventores de la invención titulada
ROTARY GRANULAR MATERIAL CUTTERS	ROTARY GRANULAR MATERIAL CUTTERS
An I transfer in full property without reservation or limitation whatsoever all our rights in said I	Y que cedem en plena propiedad y sin reserva ni limitación alguna todos nuestros derechos sobre la misma
The Quaker Oats Company	The Quaker Oats Company
Residing at	Domiciliada en
Chicago, Illinois, United States of America	Chicago, Illinois, Estados Unidos de América
Who may apply for and obtain in its own name the registration of the corresponding patent in the Republic of Venezuela, holding all of the corresponding rights.	Quien podrá solicitar y obtener a su nombre el registro de la patente correspondiente en la República de Venezuela ejerciendo todos los derechos que a ello corresponde
Granted and signed at Cedar Rapids, Iowa	Dado y firmado en A los días del mes de
Inventors	Inventores
 Joseph Alfred Byrd	 Nancy L. Blazek Notary for Joseph Alfred Byrd Date 8 20 01 Expires 11 21 03
 David LaKose	 Nancy L. Blazek Notary for David LaKose Date 8 20 01 Expires 11 21 03

(Incorp Estudio Bentata Abogados & Victor Bentata & Asociados, Establ 1954)
P O Box 67 348 Caracas 1061 A Venezuela Torre Las Mercedes, Piso 2, Chuao, Caracas
Tel (58 2) 993 9004 - 992 0720 - 992 9620 Fax (58-2) 992.6609 - 992 6676
E-mail lawyers@bentata.com Home Page www.bentata.com

DESGLASADO
DL3 H 09 A 01
del Expediente No 0135236
Auto No 2468 13-09/01

[Signature]
15-9-01

26
7 36

APOSTILLA

1 País Estados Unidos de America

Este documento publico

2 Ha sido firmado por W Montgomery

3 Actuando en la capacidad de Oficial Certificador

4 Otorga su sello/estampilla de la Oficina de Patentes y Marcas

CERTIFICADO

5 En Washington D C

6 El siete de Agosto 2001

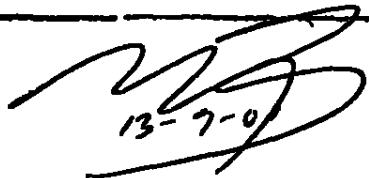
7 Por el Oficial Asistente de Autenticación Departamento de Estado Estados Unidos

8 No 01024381 1

9 Sello/Estampilla

10 Firma Patrick O Hatchett

DESGLOSADO
DIB MO9 A01
del Expediente No 0135236
Auto No 2468 13-09/01


13-7-01

9

0



37

Expediente No			No de Folio
Item		No de unidades	✓
1	CD		
2	DVD		
3	REVISTA		
4	LIBRO		
5	PERIODICO		
6	DISQUETES		
7	SOBRE DE MANILA X	1	✓
8	SOBRE BLANCO TAMAÑO CARTA		
9	SOBRE BLANCO TAMAÑO OFICIO		
10	OTROS:		

Observaciones:

Contiene original

38

**TRADUCCION APOSTILLA de un documento de cesión de la invención titulada
CORTADORES ROTATORIOS DE MATERIAL GRANULADO**

Agosto 22 2001

Corp No 000000000

Ref No 346752

IOWA SECRETARIA DE ESTADO

C T Corporation System

NANCY 2222 Grand Des Moines IA 50312

APOSTILLA

(Convención de La Haya del 5 de octubre de 1961)

- 1 País Estados Unidos de America**
- 2 Este documento publico ha sido firmado por NANCY L BLAZEK**
- 3 actuando en su capacidad de NOTARIO PUBLICO**
- 4 Otorga su sello/estampilla NOTARIO PUBLICO EN Y POR EL
ESTADO DE IOWA**

CERTIFICADO

- 5 En Des Moines Iowa Estados Unidos de América**
- 6 FECHA Agosto 20 2001**
- 7 por el Secretario de Estado del Estado de Iowa Estados Unidos de América
(fdo) Chester J Culver Secretario de Estado**

APOSTILLE

(Convention de La Haye du 5 octobre 1961)

39

1 Country United States of America

This public document

2 has been signed by W Montgomery

3 acting in the capacity of Certifying Officer

4 bears the seal/stamp of Patent and Trademark Office

Certified

5 at Washington D C

6 the seventh of August, 2001

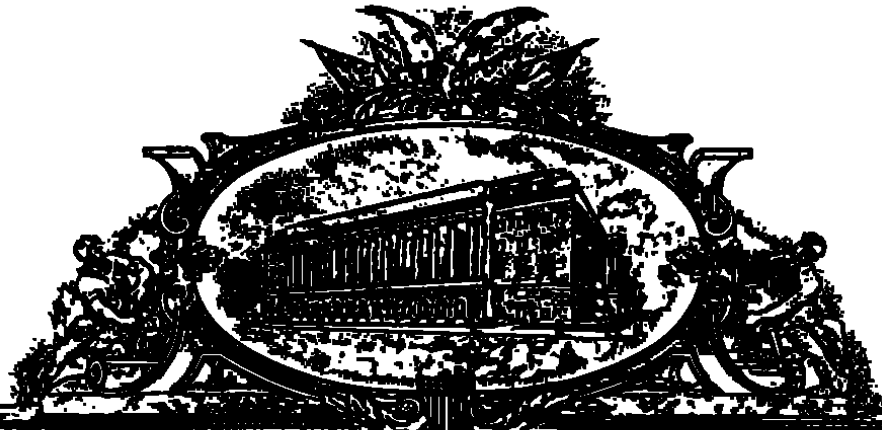
7 by Assistant Authentication Officer United States Department of State

8 No 01024381 1

9 Seal/Stamp

10 Signature

Patrick O Hatchett
Patrick O Hatchett



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

July 05, 2001

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE UNDER 35 USC 111.

APPLICATION NUMBER: 09/564,942

FILING DATE: May 05, 2000



**By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS**

W. Montgomery
W. MONTGOMERY

Certifying Officer

05/05/00

09564942 050500

UTILITY PATENT APPLICATION TRANSMITTAL

Attorney Docket No. 765-66
 First Inventor or Application Identifier Joe Byrd and David LaKose
 Title Rotary Granular Material Cutters
 Express Mail Label No.

APPLICATION ELEMENTS

ADDRESS TO:

Assistant Commissioner for Patents
 Box Patent Application
 Washington, DC 20231

- 1 ☒ Fee Transmittal Form
(Submit an original and a duplicate for fee processing)
- 2 ☒ Specification [Total Pages 18]
 Descriptive title of the invention
 Cross References to Related Applications
 Statement Regarding Fed sponsored R & D
 Reference to Microfiche Appendix
 Background of the invention
 Brief Summary of the invention
 Brief Description of the Drawings (if filed)
 Detailed Description
 Claim(s)
 Abstract of the Disclosure
- 3 ☒ Drawing(s) [Total Sheets 5]
4. Oath or Declaration [Total Pages 3]
 a. ☒ Newly executed (original or copy)
 b. ☐ Copy from a prior application
(for continuation/divisional with Box 16 completed)
 1. ☐ **DELETION OF INVENTOR(S)**
 Signed statement attached deleting
 Inventor(s) named in the prior
 Application, see 37 CFR §§1.63(d)(2)
 And 1.33(b).

5. ☐ Microfiche Computer Program (Appendix)
6. Nucleotide and/or Amino Acid Sequence
 Submission (if applicable, all necessary)
 a. ☐ Computer Readable Copy
 b. ☐ Paper Copy (Identical to computer copy)
 c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

- 7 ☐ Assignment Papers (cover sheet & documents)
8. ☐ 37 C.F.R. §3 73(b) Statement ☐ Power of Attorney
(when there is an assignee)
- 9 ☐ English Translation Document (if applicable)
- 10 ☐ Information Disclosure Statement (IDS) ☐ Copies of IDS Citations
- 11 ☐ Preliminary Amendment
- 12 ☒ Return Receipt Postcard (Should be itemized)
13. ☐ Small Entry ☐ Statement filed in prior application, Status still proper and desired
14. ☐ Certified Copy of Priority Documents(s)
(if foreign priority is claimed)
- 15 ☐ Other

16. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and on a preliminary amendment:
☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No. _____
 Prior application information Examiner Group/Art Unit

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4a, is considered part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

17 CORRESPONDENCE ADDRESS

- ☐ Customer Number or Bar Code Label or ☒ Correspondence address below

Name	Douglas J Stilwell				
Address	500 Firstar Bank Building, P.O. Box 2107				
City	Cedar Rapids	State	Iowa	Zip Code	52406
Country	USA	Telephone	(319) 365-9461	Fax	(319) 365-8443

Name	Douglas J Stilwell	Registration No.	45,450
Signature	<i>Douglas J Stilwell</i>	Date	May 2, 2000

3/5
42

0

SPECIFICATION

TO WHOM IT MAY CONCERN

5 **BE IT KNOWN** that Joe Byrd and David LaKose citizens of the United States and residents in Cedar Rapids in the County of Linn and State of Iowa, have invented a new and useful improvement in

ROTARY GRANULAR MATERIAL CUTTERS

10 of which the following is a specification.

005050 2464942 050500

43

BACKGROUND OF THE INVENTION

The present invention relates generally to the field of grain processing and specifically to an apparatus and method for cutting "groats" (de-hulled oats) other grains, or other granular material. Finely cut groats commonly are used for the production of "quick-oats" and other oat-based food products. Because finely cut groats have a greater surface area to volume ratio than more coarsely cut groats, more surface area is available for a given volume of groats. This increased surface area allows greater contact between, for example, boiling water and the groats. As a result, the moistening and cooking of finely cut groats may be performed in a relatively short time, hence the name "quick-oats". The production of quick-oats, in addition to other types of oat based food products, therefore depends upon the production of finely cut groats.

The basic technology for cutting granular material applies to a variety of grains for a variety of products. Each grain product and each different producer of grain products may require grain to be cut to a different degree of fineness. The present invention relates specifically to improvements that may increase grain cutting efficiency for grain cutting in general, for different grains and for different levels of desired fineness. Therefore, although the examples detail the fine-cutting of groats, it will be apparent to one skilled in the art that the present invention may be applied to different materials and to make coarser or finer end products.

44
44

The prior art technology for cutting groats includes the use of a drum that spins on a horizontal axis and contains a plurality of perforations in its sidewall. The perforations in the spinning drum s sidewall allow groats to extend from the drum interior at least partially through the sidewalls where they may contact one or a series of stationary cutting blades that are arranged in close proximity to the drum sidewall exterior US Patent No 307 882 (the 882 patent) discloses a typical prior art groat cutting apparatus that employs this technology The common "Kip Kelly" type cutter (developed many years ago and currently marketed by Arrow Corp of Winnipeg Canada) also employs this basic technology Other examples of prior art groat cutting devices include U.S. Pat Nos. 208 970 (the 970 patent) 241,249 (the 249 patent) and 279,594 (the 594 patent)

As disclosed in the 882 patent, the rotary groat cutting apparatus receives groats into the interior of the perforated, spinning drum. The spinning drum is nested in a blade assembly that consists of a series of four knife blades separated by grain support surfaces. Groats of grain extend through the perforations and contact either a blade or a support surface between the blades. The spinning drum causes the groats to ride upon the support surfaces until the groats encounter a cutting blade When a groat is cut sufficiently fine, its cut portions exit the drum completely and another groat extends through the perforation. The apparatus disclosed in the 882 patent, therefore, utilizes only a fraction of the blade assembly for actual cutting.

The 882 patent also discloses a separate, spinning cylinder or "pinwheel" located on the exterior of the spinning drum. The pinwheel contains pins aligned with passing perforations in the drum. These pins clear the perforations of groat portions or other obstructions. In the 882 patent, separate gear mechanisms on the drum and pinwheel work cooperatively to rotate the drum and pinwheel. Alternatively, the pinwheel may serve as the source of rotation for the drum. Because the spinning drum and pinwheel spin cooperatively, it is important to maintain precise alignment of the pins with the drum perforations to avoid damage to the drum or pins and to avoid the loss of metal from the drum or pins into the groat stream.

A primary cause of the loss of alignment between the pinwheel pins and the drum perforations is contamination of the pinwheel assembly with dust from the groat cutting process (which inherently produces a great deal of dust). Over time, this dust tends to work its way into spaces between machine components. The 882 patent discloses a solid pinwheel assembly that consists of one cylinder having a plurality of pins that extend from its perimeter. This solid cylinder design is only minimally susceptible to dust because it has few seams into which dust may migrate.

Unfortunately, this solid cylinder design demands repair or replacement of the entire pinwheel cylinder when only one or a few pins are damaged. Therefore, a more typical pinwheel design consists of a series of parallel rings. Parallel ring construction allows removal and replacement of a damaged ring (only a portion of the pinwheel) when only one or a few pins become damaged. Unfortunately, this advantageous design itself

46

leads to pin misalignment as seams are inherent in the parallel ring construction, and migrating dust may force the parallel rings apart. There is, therefore, a need for a pinwheel assembly improvement to prevent the migration of dust into the pinwheel assembly while maintaining the advantage of a parallel ring construction.

5 The knife blades mounted generally below and near the exterior of the spinning drum also require periodic replacement or maintenance and they are typically mounted individually upon a knife mounting assembly. As discussed the 882 patent discloses the use of four independent knife blades separated by a casing upon which protruding goat portions may "ride" as the drum spins. The 249 patent discloses the use of a plurality of knife blades wherein the blades are "substantially tangential" to the spinning drum. Similarly the common "Kip Kelly Cutter" utilizes a series of knife blades that form a "nest" generally around the bottom half or a portion of the bottom half of the spinning drum. Over time, these knife blades may loosen or slip and cause damage to the rapidly spinning drum and blades.

15 The knife blades and pinwheel assemblies, of course, must be replaced periodically. However when blades slip or pins become misaligned, contact with the rapidly spinning drum needlessly cuts short the "life" of these components. In addition, damage to the drums demands repair or replacement of the drums, which are themselves expensive, precision- engineered components. The replacement of drums, pinwheels or blades necessarily demands lost production associated with each stopped machine and labor expenses associated with the replacement of parts. There is

005050 050500 2464942 09564942

47

therefore, a need for a means to prevent or minimize instances of contact between the blades and the spinning drum as well as a means to prevent the misalignment of pins and drum perforations

In prior art groat cutting devices, even when a series of knife blades were employed, most cutting was performed by only a limited number of blades located at an effective cutting region generally at the bottom or extreme bottom of the knife blade assembly. This effective cutting region varied depending on the type of grain being cut and the desired level of fineness or coarseness. The focus of cutting in an effective region occurs because gravity is the primary force that draws groats to the perimeter of the rotating drum, augmented only in small part by centrifugal force. Therefore, gravity makes groats available for cutting along a majority of the bottom of the spinning drum during operation. It is only in the effective cutting region at the bottom of the profile where the pull of gravity acts to move the grains directly into the perforations. At side regions the pull of gravity aids to a lesser extent and groats are less effectively cut. Therefore, there is a need for an improved rotary granulator that more effectively utilizes knife blades mounted beyond the limited effective cutting region currently found at the bottom or extreme bottom of the spinning drums.

Finally groat cutting efficiency is decreased by groats that enter the interior of the spinning drum but fail to disburse evenly throughout the drum so as to protrude through the perforated sidewall at all locations along longitudinal expanse of the sidewall. In general, for a given flow rate of groats, there is a drum retention time that

48
48

represents the average time spent in the interior of the spinning drum for a groat. This retention time is roughly proportionate to the volume of the spinning drum occupied by grains during operation, divided by the volumetric flow rate of groats through the machine. The groat flow rate may be maximized, and the groat retention time may be minimized, by minimizing the number of "empty" perforations that pass knife blades during each rotation of the drum. There is therefore a need for an improved rotary granulator that minimizes drum retention time and maximizes groat flow rate by more effectively utilizing all available sidewall perforations through each rotation of the drum.

SUMMARY OF THE INVENTION

The present invention is an improved grain cutting apparatus comprised of a perforated drum that spins on a horizontal axis. A pinwheel assembly spins cooperatively with the perforated drum, and pins on the pinwheel assembly engage and disengage drum perforations as the drum and assembly spin. Groats are received into the interior of the perforated drum and a grooved baffle in the interior of the perforated drum directs groats towards passing perforations in the drum sidewall. These groats eventually reach the sidewall and extend partially through the perforations. The grooved baffle prevents the incoming groat stream from remaining in a focused stream, and instead diffuses the stream to direct groats towards perforations along the entire length of the sidewall.

98
49

The protruding groats contact one or a series of stationary knife blades. The knife blades are mounted so that the cutting edge of each blade forms an identifiable angle of contact with a line tangent to the drum sidewall at the location of the blade. Different angles of contact are employed for blades at different locations on the blade assembly. This varied knife blade profile extends the effective cutting region beyond the traditional bottom region of the assembly to include blades along the rising sides of the assembly. This variation in the angles within the blade assembly allows cutting to occur over a greater region of the blade assembly and dramatically enhances groat cutting throughput and efficiency.

The present invention also incorporates improved knife blade supports with toe stops to further secure the knife blades and prevent the blades from slipping and contacting the spinning drum.

BRIEF DESCRIPTION OF THE DRAWING

Figure 1 is a cut-away top view of a perforated drum with a grooved channel.

Figure 2 is a cut-away end view of a perforated drum with a grooved channel.

Figure 3 is a detailed cut-away cross-sectional view of a perforated drum sidewall and knife blades.

Figure 4 is a cut-away cross-sectional view of a knife blade assembly.

Figure 5 is a side view of a knife blade support with toe stop.

Figure 6 is a front end view of a knife blade support with toe stop.

Figure 7 is a top view of a knife blade support with toe stop

Figure 8 is a perspective view of a prior art goat cutter

DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

5 The preferred embodiment of the present invention is comprised of a perforated drum 2 a knife blade assembly 4 a pinwheel assembly 6 and a support frame assembly 8. The perforated drum 2 is comprised of a drum sidewall 10 having a plurality of perforations 12 appropriately sized to allow groats to extend therethrough. Perforations 12 ideally comprise tapered perforations having a broader diameter opening on the interior side of the drum sidewall 10 than on the exterior side of the drum sidewall 10. This tapered perforation design helps to facilitate the entry of groats into the perforations. The perforated drum 2 is also comprised of drum end walls 14, 42 generally perpendicular to the drum sidewall 10. At least one of the drum end walls 14 is a non rotational drum end wall 42 that remains fixed to allow groats to flow into the perforated drum interior through a stationary inlet 44.

The perforated drum 2 is positioned in a support frame assembly 8. The support frame assembly 8 holds the drum in a position to place the generally cylindrical drum's longitudinal axis of rotation in a generally horizontal position. The drum is held preferably by means of a horizontal axle 18 that extends through the drum end walls 14 and the interior of the drum. The drum may be supported by other alternative means such as exterior drum end wall supports 20 that engage the drum end walls 22 to

support the drum along a central axis of rotation, or wheel assemblies that may support the drum or support and drive the drum's rotation through contact with the drum exterior

The support frame assembly 8 may be of any convenient height, or it may be designed for integration with preexisting support structures in a milling facility. In the preferred embodiment, the support frame assembly 8 supports the perforated drum 2 and knife blade assembly 4 at a height convenient for inspection by a person of average height. The preferred support frame assembly 8 also engages a cutter cover 24 to control the release of grain dust into the cutting room environment and to serve as a shield to prevent accidental contact with the spinning drum or stationary blades. The cutter cover is preferably of a design that allows convenient viewing of the perforated drum 2.

The preferred knife blade assembly 4 is comprised of a plurality of knife blades 26 mounted upon knife holders 28 that typically comprise mounting wedges. The knife holders 28 include toe stops 30 in addition to a means, preferably mechanical, such as a tee bolt, for affixing the knife blade 26 to the knife holders 28. The knife holders 28 in turn are affixed to a knife blade mounting frame 32 that follows the shape and curvature of the drum sidewall 10. When knife holders 28 are affixed to the knife blade mounting frame 32 on opposite edges of the drum sidewall 10 and knife blades 26 are attached thereto, the knife blades 26 span the perforated drum sidewall 10 separated therefrom by a short clearance.

82
CB
52

The knife holders 28 are comprised of a wedge portion 34 with a toe stop 36 thereon. The wedge portion 34 has a wedge portion top face 38 that forms an angle of contact 44, 46 with a line that is generally tangent to the perforated drum sidewall 10 at the location of the knife holder 28. In the preferred embodiment, knife holders 28 placed along the bottom portion of the knife blade mounting frame 32 include a wedge portion top face 38 that forms an angle of contact of about 9.75° . Knife holders 28 placed higher on the knife blade support structure 32 include a wedge portion top face 38 that forms an angle of contact 44 of about 17.5° . These angles are, of course, merely the presently preferred embodiment. It will be understood by one of ordinary skill in the art that the present invention relates generally to the use of multiple angles of contact wherein the angle of contact 46 is generally less for blades located in lower mounting frame 32 positions than the angle of contact 44 in higher regions on the knife assembly. Further, although the presently preferred embodiment employs only two discrete angles of contact, the present invention also encompasses the use of a plurality or a general progression of angles.

To further enhance the efficiency of the cutter, the perforated drum 2 interior contains a grooved baffle 40 affixed to the non-rotating drum end wall 42. The grooved baffle 40 is located in a position relative to the incoming groat stream to receive the stream and diffuse its focused profile. In the presently preferred embodiment, this location is generally above the perforated drum's axis of rotation. Further, the grooved baffle 40 is angled generally downward and towards the drum sidewall so that

53
A

incoming groats are directed towards the sidewall perforations 12 at a location generally near the first knife blade in the series of blades 28. The grooved baffle 40 more effectively aligns groats with the sidewall perforations than does the known, non-grooved baffle, or baffle-less drum configuration. Further, the grooved baffle causes the incoming stream of groats to disperse along a greater portion of the drum's width than a non-grooved baffle because the grooves prevent the stream of groats from remaining condensed along a tight path. By distributing the groats over a greater length of the drum cylinder and aligning the groats for entry to the perforations, more of the perforations in the sidewall are exposed to properly align input groats for cutting.

A pinwheel 48 is located on the exterior of the drum sidewall 10 at a top location, or an alternative location to which access is not otherwise obstructed by the mounting frame 32. The pinwheel 48 comprises a series of parallel disks or rings 50 each having pins 52 that extend radially therefrom and that align with drum sidewall perforations 12 as the pinwheel 48 and drum 2 spin in cooperation. The pins 52 of the pinwheel 48 thus clear drum sidewall perforations 12 of granular material that fails to exit through the normal cutting process. In the preferred embodiment, the cylinder includes bushings to prevent the migration of dust between the parallel rings or disks.

Having thus described the invention in connection with the preferred embodiments thereof, it will be evident to those skilled in the art that various revisions can be made to the preferred embodiments described herein without departing from the spirit and scope of the invention. It is my intention, however, that all such revisions and

54
~~57~~

modifications that are evident to those skilled in the art will be included within the scope of the following claims.

09564 42 050500

18
26
55

CLAIMS

I claim

1 A knife blade mounting assembly for use with a rotary drum to cut granular material, said knife blade mounting assembly comprising:

a mounting frame defining a substantially semi-circular profile, said profile having a center region bounded by a first end region and a second end region,

5 a plurality of knife blades combined with the mounting frame each of said knife blades defining a plane, and each of said planes intersecting a line tangent to the mounting frame semi-circular profile at the location of the knife blade to form an angle of intersection, said angles of intersection being generally greater at locations on at least one of the mounting frame end regions than at locations on the mounting frame center region.

2 The knife blade mounting assembly of Claim 1 wherein.

the angles of intersection comprise a plurality of angles situated relative to one another and said angles progress generally from a shallow degrees of inclination at knife blades in the center region to steeper degrees of inclination at knife blades in the end regions

3 The knife blade mounting assembly of Claim 2 wherein the general progression is continuous

4 The knife blade mounting assembly of Claim 1 wherein the angles of intersection in the central region are about 9 75 degrees.

095 4942 050500

5b
~~27~~

5 The knife blade mounting assembly of Claim 1 wherein the angles of intersection in the end regions are about 17.5 degrees

6 The knife blade mounting assembly of Claim 1 wherein the mounting frame comprises two parallel rails.

7 The knife blade mounting assembly of Claim 1 further comprising knife supports combined with the mounting frame each of said knife supports comprising a wedge face that defines the angle of intersection at the location of the knife support.

8 The knife blade mounting assembly of Claim 7 wherein the knife supports further comprise a knife toe-stop

9 A rotary grain cutting apparatus comprising a rotary perforated drum having a sidewall and a longitudinal axis generally parallel to the sidewall,

a knife blade mounting assembly combined with the perforated drum and spaced apart therefrom, said knife blade assembly comprising:

a mounting frame defining a substantially semi-circular profile, said profile having a central region bounded by a first end region and a second end region,

a plurality of knife blades combined with the mounting frame and being spaced apart from the perforated drum sidewall, each of said knife blades defining a plane, and each of said planes intersecting a line tangent to the mounting frame semi-circular profile at the location of the knife blade to form an angle of intersection, said angles of

51
2/8

intersection being generally greater at locations on at least one of the mounting frame end regions than at locations on the mounting frame bottom region.

10 The invention of Claim 9 wherein the perforated drum comprises

a fixed, perforated drum end wall having an opening therein, and a perforated sidewall having a plurality of openings formed therein, said openings being generally tapered from a wider diameter at a sidewall interior face to a more narrow diameter at a
5 sidewall exterior face

11 A rotary grain cutting apparatus comprising:

a rotary perforated drum comprising a sidewall and a fixed end wall generally perpendicular to the sidewall, said fixed end wall having an entry port defined therein,

a knife blade mounting assembly combined with the perforated drum and
5 spaced apart therefrom,

an interior baffle having an upper surface with series of grooves therein, said baffle being located generally beneath the entry port that is defined by the fixed end wall

12 A rotary grain cutting apparatus comprising:

a rotary perforated drum comprising a sidewall and a fixed end wall generally perpendicular to the sidewall, said fixed end wall having an entry port defined therein,

a knife blade mounting assembly combined with the perforated drum and
5 spaced apart therefrom,

09564942 050500

58
29

an interior baffle having an upper surface with a series of grooves therein, said baffle being located generally beneath the entry port that is defined by the fixed end wall.

10 a knife blade mounting assembly combined with the perforated drum and spaced apart therefrom, said knife blade mounting assembly comprising

15 a mounting frame having a generally semi-circular profile with knife supports connected thereto each of said knife supports having a wedge face that defines a plane, each of said planes intersecting a line tangent to the mounting frame semi-circular profile at the location of the knife blade to form an angle of intersection, said angles of intersection being generally greater at locations on the mounting frame end regions than at locations on the mounting frame bottom region,

said knife supports further comprising a toe stop

09564942 050500

59
~~30~~

ABSTRACT OF THE DISCLOSURE

The present invention is an improved rotary granular material cutting apparatus and knife blade assembly. The apparatus comprises a perforated drum that may receive granular material into its interior. The grains of material extend through perforations in the spinning drum where they encounter a series of knife blades. The blades are arranged to form angles of contact with tangents to the spinning drum. Those angles of contact are steeper on the side regions of the spinning drum than on the bottom regions. The apparatus also includes a grooved interior baffle to disburse input material within the drum, and knife-mounting wedges that include toe or base stops to help secure knife blades in arrangement about the drum.

005050 24649560
10

34
60

DECLARATION FOR PATENT APPLICATION

As a below named inventor I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **ROTARY GRANULAR MATERIAL CUTTERS**, the specification of which is attached hereto unless the following box is checked.

☐ was filed on _____ as United States Application Number or PCT International Application Number _____ and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations, §1.56

I hereby claim foreign priority benefits under Title 35 United State Code, §119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed

Prior Foreign Application(s)			Priority Claimed	
Number	Country	Day/Month/Year Filed	Yes	No

I hereby claim the benefit under Title 35 United States Code, §119(e) of any United States provisional application(s) listed below

95
4942
050500

32
61

Application Number	Filing Date

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

Application Number	Filing Date	Status - Patented, Pending, Abandoned

I hereby appoint James C. Nemmers (Registration No. 19,143), Glenn Johnson (Registration No. 37,362) and Douglas J. Stilwell (Registration No. P-45,450), Telephone No. 319-365-9461, 500 Firstar Bank Building, P.O. Box 2107, Cedar Rapids, Iowa 52406, my attorneys with full power of substitution and revocation, to prosecute this application, to transact all business in the Patent and Trademark Office connected therewith, and to receive the Letters Patent, all correspondence to be conducted with James C. Nemmers.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor: Joseph Alfred Byrd
Signature: *Joseph Alfred Byrd*
Date: 3/29/2000

9564942-050500

6T
62

Residence 158 Eastman St NW Cedar Rapids Iowa

Citizenship United States of America

Post Office Address Same

Full name of second joint inventor if any David Lakose

Signature David Lakose

Date March 29th 2000

Residence 2710 First Ave NW Cedar Rapids Iowa

Citizenship United States of America

Post Office Address Same

005050 2464 560

Fig 1

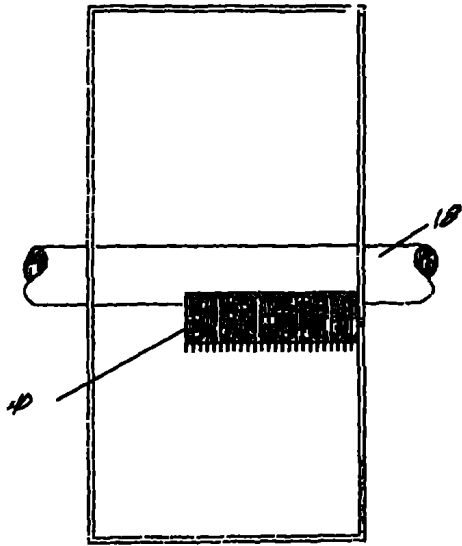
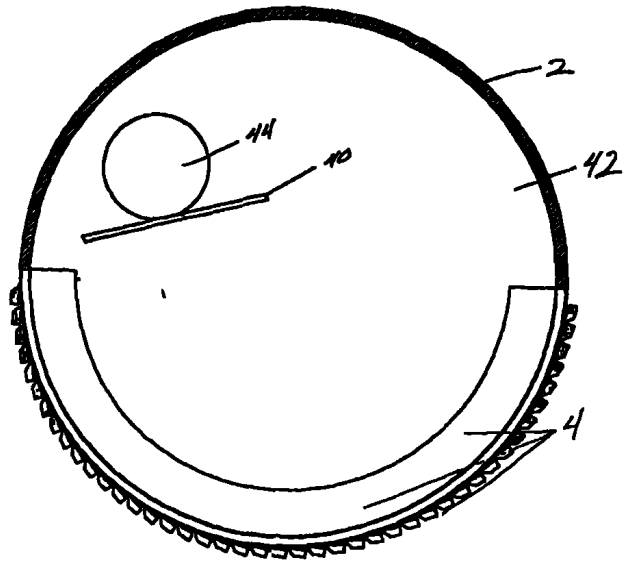


Fig 2



25

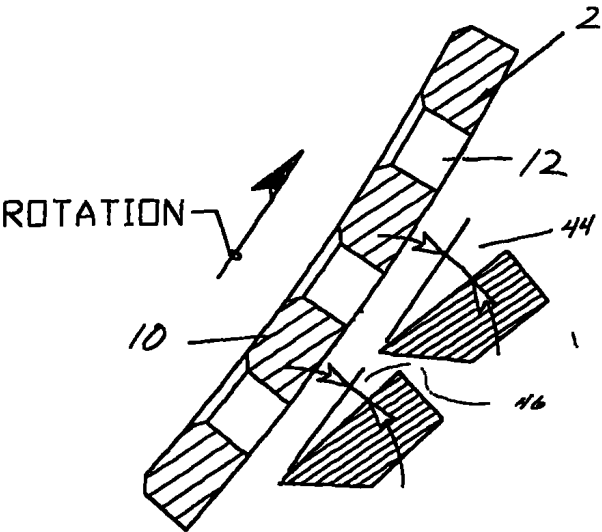
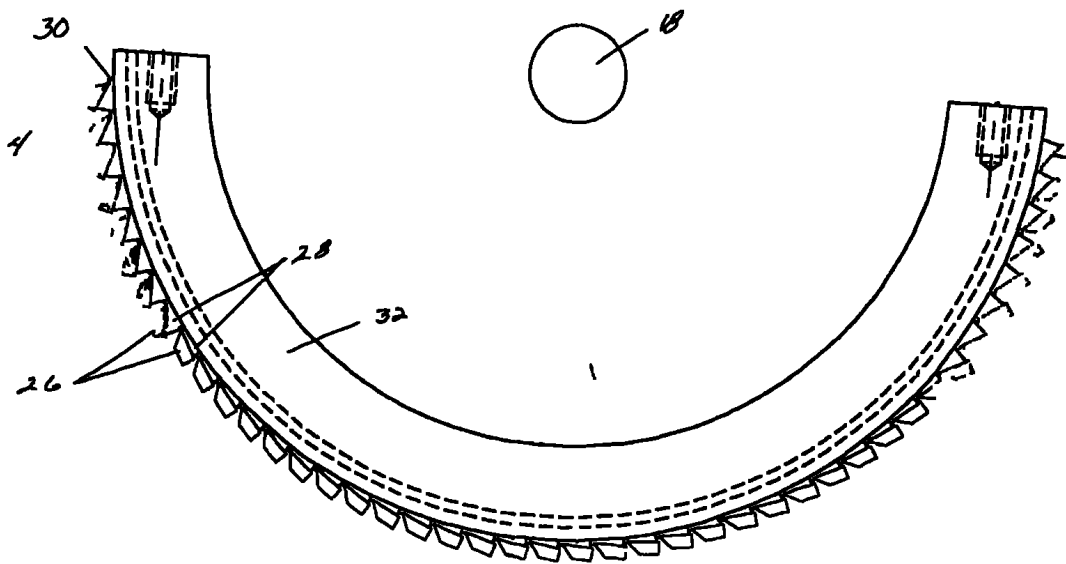


Fig 3

~~Fig 3~~

Fig 4



4/19

FIG 7

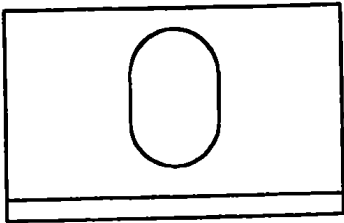


FIG 6

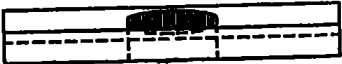
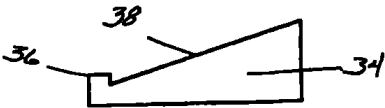
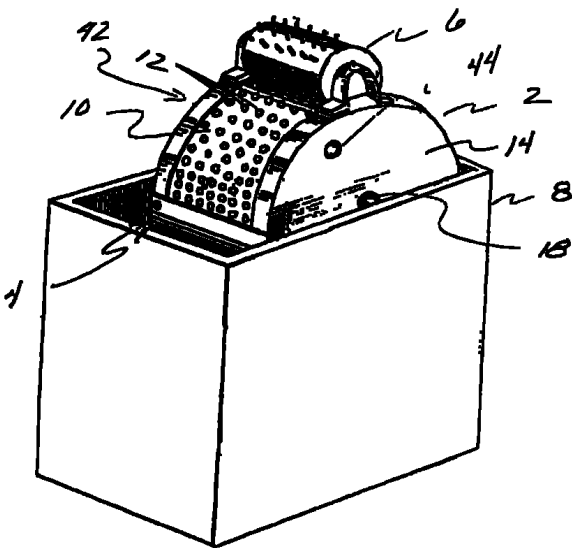


FIG 5



4/7

FIG. 8



25 18

3/2

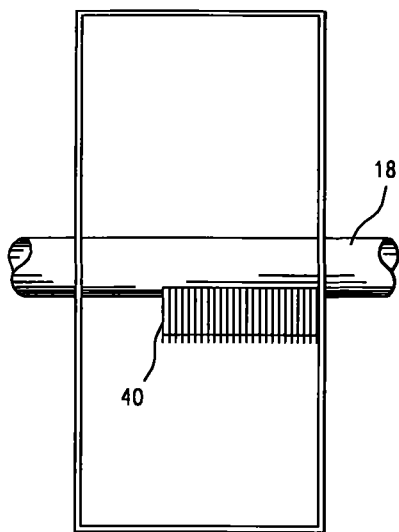


FIG 1

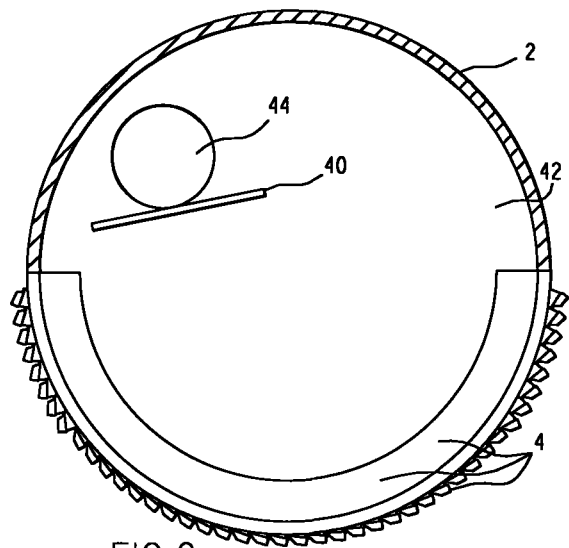


FIG 2



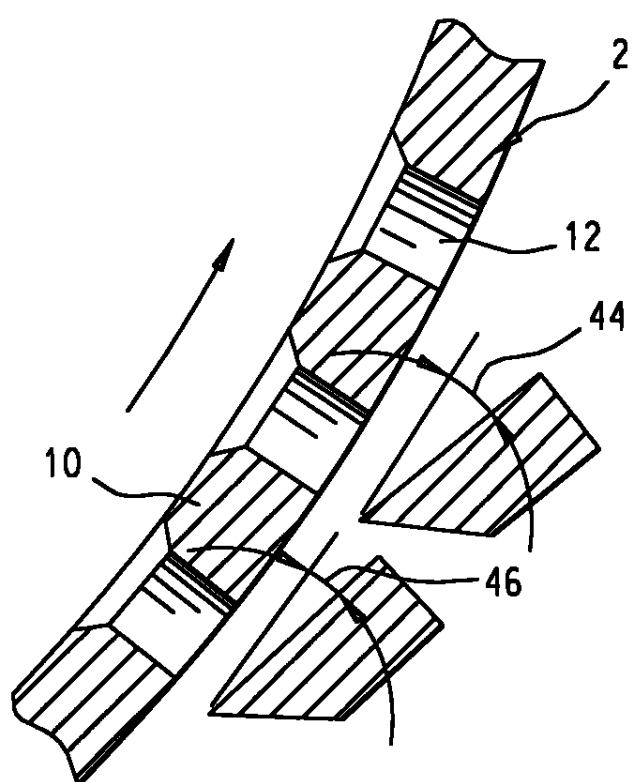


FIG 3

22

70

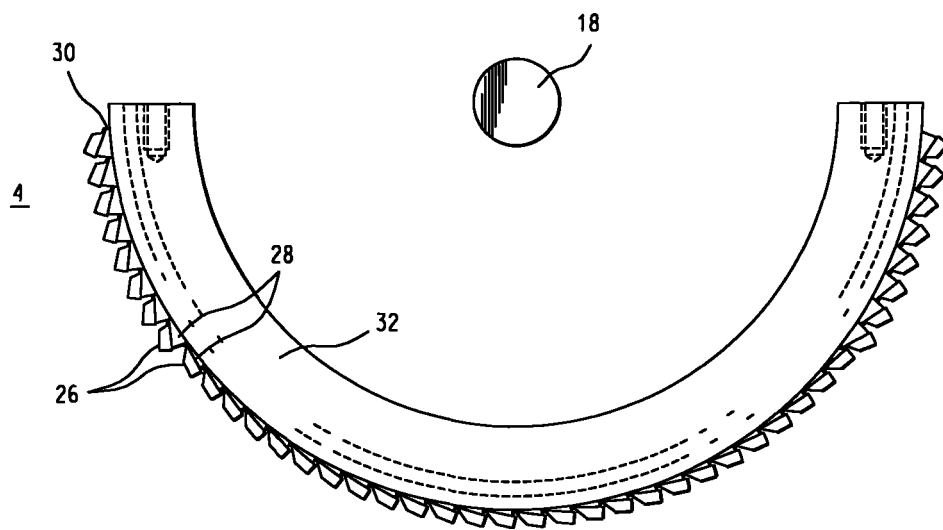


FIG 4



3

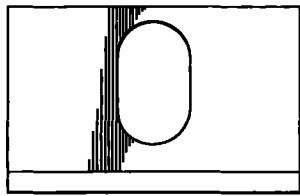


FIG 7

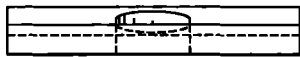


FIG 6

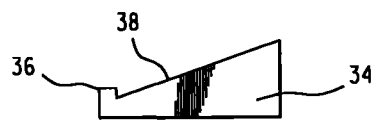


FIG 5

• •



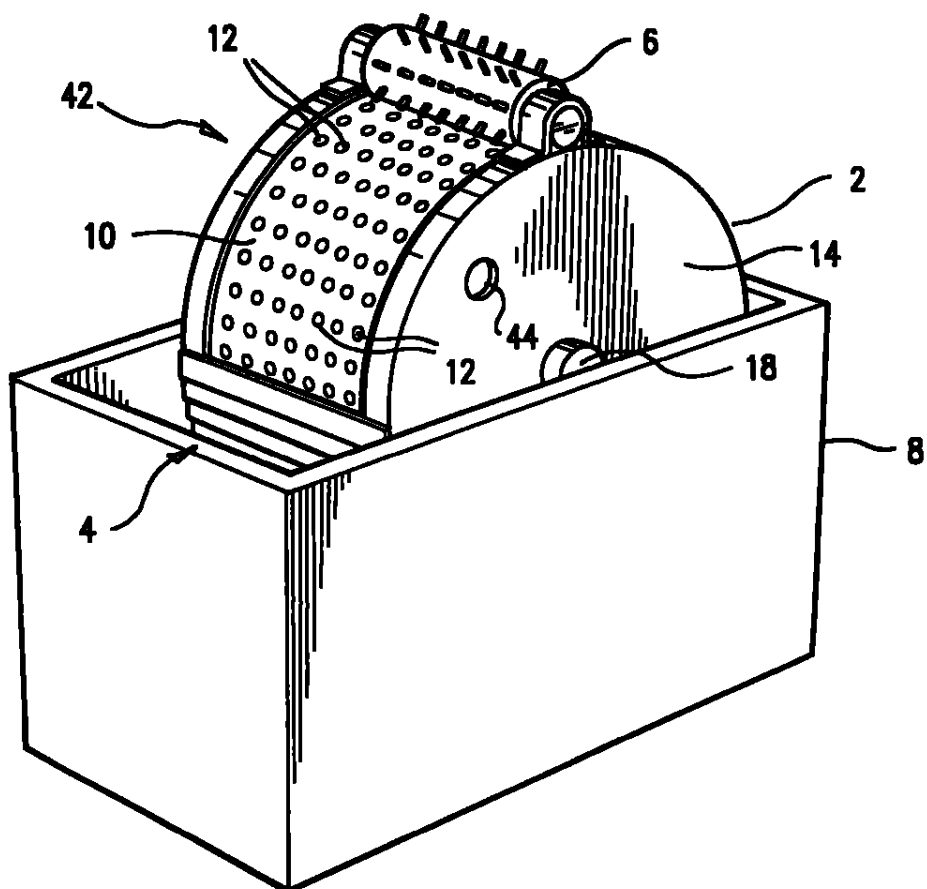


FIG 8