

#

REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES
SOLICITUD DE PATENTE DE INVENCION PCT

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 14-000189-00000-0000

Fecha: 2014-01-02 12:51:37 Dep. 2020 DIR.NUEVASCR
Tra. 11 PATENTEIYII Eve: 379 FASENACIONALII
Act. 411 PRESENTACION Folios: 87 84

EXPEDIENTE :

TITULO: : MÓDULO DE CINTAS PARA COSECHA DE CAÑA
DE AZÚCAR Y PROCESO DE COSECHA

CLASE : A01D 45/10 (2006,01)

INVENTORES : GUILHERME RIBEIRO GRAY / JOSÉ LEONARDO
CAMARGO DE CAMPOS / EFRAIM ALBRETCH
NETO / OSCAR ANTONIO BRAUNBECK

SOLICITANTE : CENTRO NACIONAL DE PESQUISA EM ENERGIA
E MATERIAIS CNPEM

DOMICILIO : CAMPINAS, ESTADO DE SAO PAULO, BRASIL

APODERADO : JUAN CARLOS CUESTA Q.

FECHA : ENERO DE 2014

PETITORIO



Industria y Comercio
SUPERINTENDENCIA

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 14-000189-00000-0000

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FORMULARIO UNICO DE SOLICITUD DE PATENTE
PCT
ENTRADA EN FASE NACIONAL

①



Patente de Invención

SOLICITUD DE:



Patente de Modelo de Utilidad



Capítulo I.



Capítulo II

②

SOLICITANTE
(71)

Nombre: CENTRO NACIONAL DE PESQUISA
EM ENERGIA E MATERIAIS CNPEM

Dirección: Giuseppe Máximo Scolfaro, No. 10,000,
Guará, Campinas, Estado de Sao Paulo,
Brasil

Nacionalidad o Domicilio: Brasil

Lugar de Constitución: Campinas, Estado de
Sao Paulo, Brasil

Teléfono:

Fax:

E-mail:

IDENTIFICACION

C.C.



NIT



C.E.



Otro



Número

Cual _____
Empresa Extranjera

③

REPRESENTANTE
O APODERADO

Nombre JUAN CARLOS CUESTA Q.

Dirección CALLE 72 No. 10-07 Of. 603

Teléfono: 2113097 Fax: 2554538

E-mail: contacto@cuestalawyers.com

IDENTIFICACION

C.C.



NIT



C.E.



Otro



Número

79.339.809 TP 43273

④

INVENTORES
(72)

Guilherme Ribeiro Gray / José Leonardo Camargo de Campos / Efraim
Albretch Neto / Oscar Antonio Braunbeck

Dirección: No. Tranquilo Prosperi, No. 383, Jardim Sta. Genebra II / Equador,
No. 106, Jardim Europa / Dr. Antonio Hossri, No. 285, Cidade Universitária II /
Antonio Andrietta No. 27 Condominio Manacas

⑤

PCT (86)

Solicitud Internacional No. PCT/BR2012/000229

Fecha 03/07/2012

Publicación Internacional No. WO/2013/003924 A2

Fecha 10/01/2013

⑥

TITULO (54) MÓDULO DE CINTAS PARA COSECHA DE CAÑA DE AZÚCAR Y PROCESO DE
COSECHA

⑦

Clasificación Internacional (51) No se encuentra clasificada

⑧

Prioridad

(33) País de Origen

(32) Fecha

(31) Número de Solicitud

Si



No



BRASIL

04/07/2011

PI 1103567-6

⑨

Comprobante de pago No.

14-

Fecha

02/01/2014

Instrucciones para el diligenciamiento del presente formulario, ver reverso de esta página.

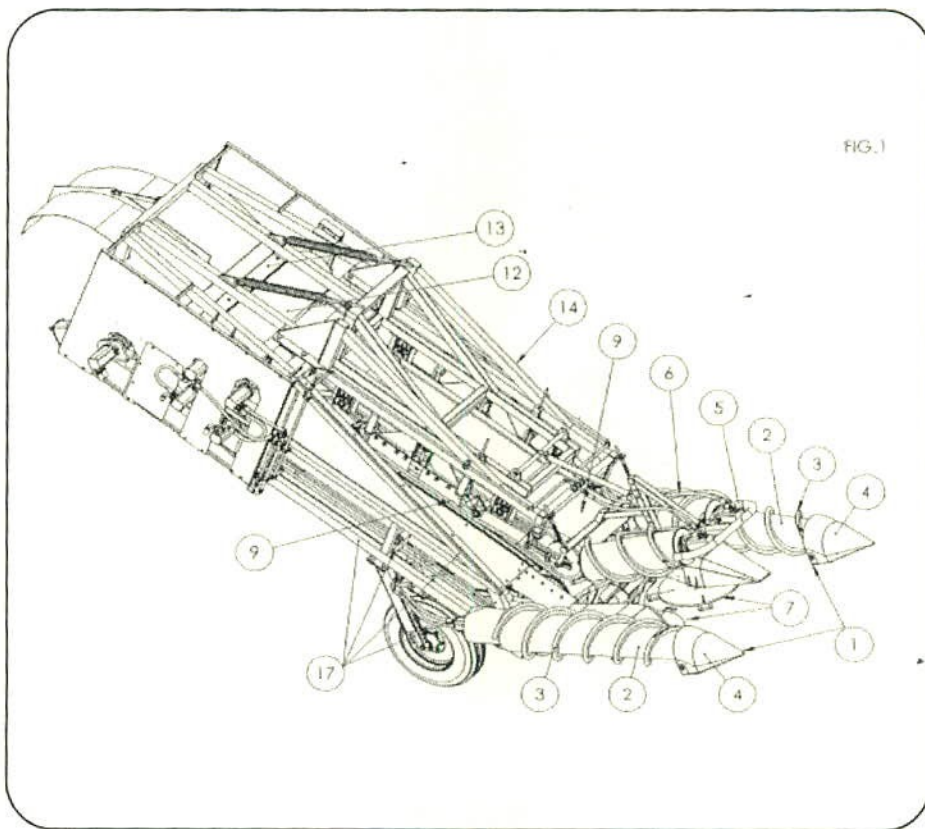
10

ANEXOS

- ☒ Comprobante de pago de la tasa de presentación de la solicitud
- ☐ Documento que acredita la existencia y representación legal cuando el solicitante sea persona jurídica
- ☒ Poderes si fuere el caso
- ☒ Documento de cesión del inventor al solicitante o a su causante
- ☐ Declaraciones
- ☒ Copia de la solicitud internacional
- ☒ Traducción de la solicitud internacional al castellano.
- ☒ Copia del examen preliminar internacional efectuado por la autoridad Internacional de Examen Preliminar
- ☐ Traducción del Examen Preliminar efectuado por la IPEA
- ☐ De ser el caso copia del contrato de acceso
- ☐ De ser el caso, documento que acredite al licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas
- ☐ De ser el caso, certificado de depósito de material biológico
- ☒ Arte final 12x12
- ☐ De ser el caso información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionadas parcial o totalmente con la invención de esta solicitud
- ☐ De ser el caso modificaciones efectuadas a la solicitud internacional
- ☐ Otros

11

FIGURA CARACTERISTICA:



12

Solicito la concesión de la patente,

NOMBRE: JUAN CARLOS CUESTA QUINTERO

FIRMA:

C.C. 79,339,809

I.P. 43,273

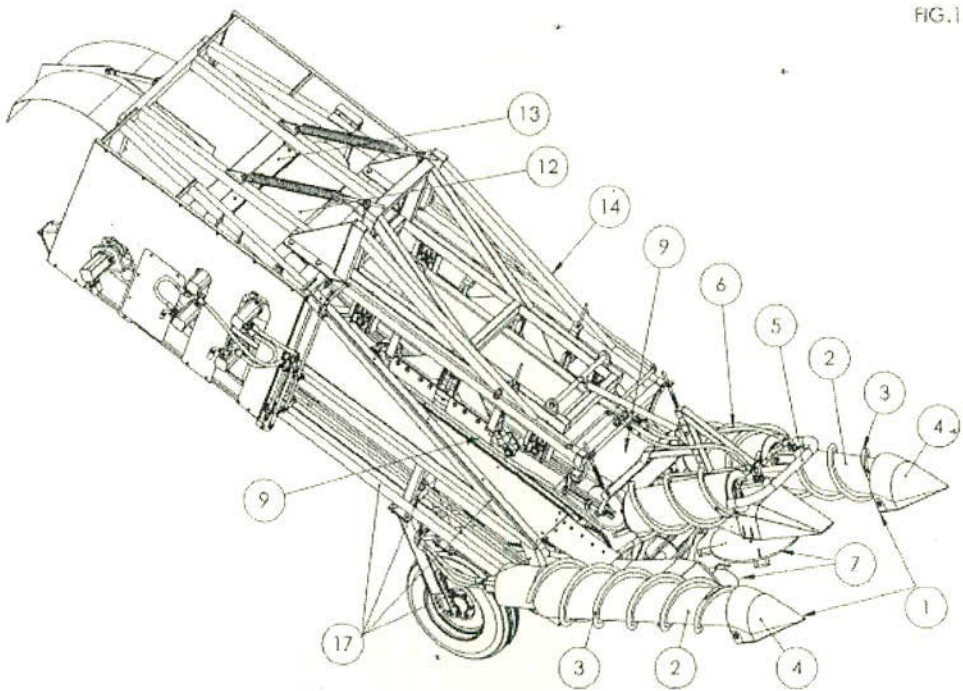
Instrucciones para el diligenciamiento del presente formulario, ver reverso de esta página.

Industria y Comercio SUPERINTENDENCIA		EXTRACTO PARA PUBLICACIÓN ☐ Patente de Invención ☐ Patente modelo de utilidad ☒ PCT	
(21) No. De solicitud PCT/BR2012/000229		(51) int. Cl: A01D 45/10 (2006.01)	
(22) Fecha de solicitud 03/07/2012		(71) Solicitante (s) CENTRO NACIONAL DE PESQUISA EM ENERGIA E MATERIAIS CNPEM	
(30) Prioridad: PI1103567-6 / 04/07/2011 / BR		(72) Interventor (es) ALBRECHT NETO, EFRAIM; (BR) RIBEIRO GRAY, GUILHERME; (BR) CAMARGO DE CAMPOS, JOSÉ LEONARDO; (BR) BRAUNBECK, OSCAR ANTONIO; (BR)	
(33) Pais: Brasil (BR)		(74) Apoderado (s) JUAN CARLOS CUESTA QUINTERO	
(54) Título Módulo de Cintas para Cosecha de Caña de Azúcar y Proceso de Cosecha			
Las casillas identificadas con 85, 86 y 87 sólo aplican para PCT			
(85) Fecha límite inicio Fase Nacional			
(86) Datos relativos a la presentación de la solicitud PCT Fecha de presentación de la solicitud Fecha: 03/07/2013 No. de solicitud PCT: PCT/BR2012/000229		(87) Publicación internacional Fecha (10/01/2013) No. Publicación WO2013/003924 A2	

Resumen reivindicación (es):

La presente invención se refiere a un módulo de cosecha de cintas, particularmente apropiado para cosecha de caña de azúcar, que comprende un mecanismo levantador (1) dispuesto horizontalmente y pudiendo ser desplazado verticalmente; un mecanismo cortador de base (7); un mecanismo deflector (6) dispuesto encima del mecanismo levantador (1) y configurado para modificar la dirección y auxiliar en el desplazamiento de los tallos cortados hasta un mecanismo tirador (9), dicho mecanismo tirador comprendiendo cintas, una cinta superior (10) y una cinta inferior (11); un cilindro levantador (8) situado junto a la extremidad inferior de las cintas (10, 11); un mecanismo transferidor (12) apropiado para recibir los tallos del mecanismo tirador (9) y transferirlos para un mecanismo picador (13), dicho mecanismo picador (13) estando dispuesto en secuencia a dicho mecanismo transferidor (12), y siendo que un mecanismo tensor (14) actúa en la cinta superior (10) del mecanismo tirador.

La invención se refiere también a un proceso de coger la caña de azúcar con el módulo, proceso este que minimiza las fuerzas aplicadas en la raíz.





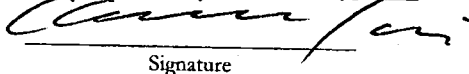
CNPEM

POWER OF ATTORNEY

L (we), the undersigned Carlos Alberto Aragão de Carvalho Filho by the rights that I (we) represent and acting as Director-General and Legal Representative(s) of Centro Nacional de Pesquisa em Energia e Materiais an organization existing under the laws of Brazil and in present execution of its (social) objective, domiciled at Giuseppe Máximo Scolfaro, nº 10.000, Guará, Campinas, state São Paulo, Brazil, do hereby grant POWER OF ATTORNEY to Mr. Juan Carlos Cuesta Quintero and/or Mrs. Diana Romero Calvo, members of Cuesta & Associates Ltda., residing in Bogotá, Colombia, and identified with CC 79.339.809 and CC 52.250.482 and with professional card 43.273 CSJ and 121.002 CSJ, respectively, to act on behalf of grantor before any entity, authority and/or person, specially before those Administrative, Contentious-Administrative, Judicial and/or any other, in all matters concerning the following:

- 1.- To file, obtain and/or register any of the type of Intellectual and Industrial Property right, such as: Patents of Inventions and Model Utility Patents; Industrial Designs, Trademarks, Slogans, Trade Names and emblems or ensigns, and Appellations of Origin; copyrights in any of their presentations (display); sanitary registrations, operating authorizations and/or licenses; as well as their renewals or extensions, assignments, changes of name and/or domicile, agreements and licenses, domain names applications, non use actions, among others.
- 2.- To bring actions of opposition, observances, infringement or refutation, reconsideration, complaints, appeals or legal recourses, cancellation, nullity and other actions related with rights derived from the above-mentioned matters and against the unfair competition, as well as to intervene or participate in Civil, Commercial, Criminal, or Contentious-Administrative Trials; in actions or lawsuits or litigation's that grantor initiates or are initiated against him.
- 3.- In order that this mandate is sufficient enough for all the matters referenced above, I (we) do hereby expressly grant full and ample POWER OF ATTORNEY to exercise the special rights established under Art. 70 of the Civil Procedure Code, this is: to conciliate, settle, submit to arbitration, waive legal proceedings, defer the harmonious testimony or decisive oath, absolve or acquit positions; and to receive the object related to the litigation or to take possession of the said object. Attorneys may execute any other act that requires a special clause; for any and/or all the provisions mentioned in these instruments.
- 4.- To exercise Judicial Proxy and to ratify or not the officious agency. Attorneys may also grant power of attorney over the same to act in and out of the Colombian territory.
- 5.- To substitute or delegate this Power of Attorney to act in Colombia and abroad in favor of other or others and to revoke such substitutions or delegations.
- 6.- It is expressly stated that attributions listed under this Power of Attorney are merely exemplifying and not limitative of other implicit attributions, therefore, the attorneys in fact are authorized to exercise without any restriction whatsoever, all the rights granted by the law in force and/or with the legislation to be enacted in the future, related and/or resulting and/or are the consequence of the subject of this Power and regarding all hereby stated.

Granted and signed at 12/19 on 2013

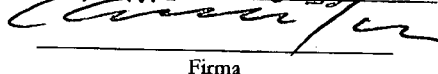

Signature

PODER ESPECIAL

Yo (nosotros), Carlos Alberto Aragão de Carvalho Filho, abajo firmante(s), por los derechos que represento(amos) en mi(nuestra) calidad de **REPRESENTANTE LEGAL** de la sociedad Centro Nacional de Pesquisa em Energia e Materiais, constituida bajo las leyes de Brasil y en actual cumplimiento de su objeto social, con domicilio en Giuseppe Máximo Scolfaro, nº 10.000, Guará, Campinas, estado de São Paulo, Brasil, por el presente instrumento confiero PODER ESPECIAL a favor de Juan Carlos Cuesta Quintero y/o Diana Romero Calvo, miembros de la firma Cuesta & Asociados Ltda., domiciliados en Bogotá, Colombia, identificados con C.C. 79.339.809 y CC 52.250.482 y Tarjetas Profesionales 43.273 CSJ y 121.002 CSJ, respectivamente, para que actuando a nombre del (de la) otorgante lo (la) representante(n) ante cualquier entidad, autoridad, y/o persona, especialmente ante las del orden Administrativo, Contencioso-Administrativo, Judicial y/o de cualquier otra que fuere, en todo lo referente a los siguientes asuntos:

- 1.- Solicitar, tramitar, inscribir y/o registrar cualquiera de las modalidades de Propiedad Industrial, esto es, las Patentes de Invención y Modelos de Utilidad; los Diseños Industriales; los Signos Distintivos, como: Marcas, Lemas, Nombres y Enseñas Comerciales y Denominaciones de Origen; Derechos de Autor; Registros Sanitarios y de Variedades Vegetales; así como sus renovaciones o prórrogas, transferencias, cambios de nombre y/o domicilio, contratos y licencias, solicitud de nombres de dominio, notificación de presentación de acciones de cancelación, entre otras.
- 2.- Ejercer acciones de oposición, observación, impugnación, reposición, apelación, cancelación, nulidad y demás que se relacionen con derechos derivados de los asuntos indicados y en contra de la competencia desleal, así como intervenir en Juicios Civiles, Comerciales, Penales, Contencioso-Administrativos, en acciones o juicios que promueva o se promuevan en contra del (la) mandante.
- 3.- Para que en todos los asuntos arriba mencionados este mandato sea suficiente, confiero expresamente este Poder amplio y suficiente, para ejercer las facultades especiales establecidas en el artículo 70 del Código de Procedimiento Civil, esto es: conciliar, transigir, comprometer el pleito en árbitros, desistir del pleito, deferir al juramento decisorio, absolver posiciones, y recibir la cosa sobre la cual verse el litigio o tomar posesión de ella. Los mandatarios podrán ejecutar cualquier otro acto que requiera de cláusula especial para cualquier o todas las disposiciones que se mencionan en este instrumento.
- 4.- Ejercer Procuración Judicial, y ratificar o no la agencia oficiosa. Los mandatarios quedan facultados para conferir poder en los asuntos aquí mencionados, para actuar bien dentro o fuera del territorio colombiano.
- 5.- Sustituir o delegar el presente Poder y revocar tales sustituciones o delegaciones.
- 6.- Se deja expresa constancia que las facultades enumeradas en este mandato son meramente ejemplificativas y no limitativas de otras facultades implícitas, por cuyo motivo, los mandatarios están autorizados a ejercer, sin restricción alguna, todos los derechos de acuerdo con la ley vigente y/o con la legislación que se promulgue en el futuro, se relacionen y/o emerjan y/o sean consecuencia del objeto del presente Poder y en razón de lo aquí expresado.

Dado y firmado en 19/12 a 2013


Firma

ASSIGNMENT

I / We, the undersigned, (Inventor's name),
Guilherme Ribeiro Gray, which here and
after is referred as the ASSIGNOR,

Citizen/s of Campinas – SP - Brazil
Residing R: Tranquilo Prosperi, nº 383,
Jardim Sta. Genebra II. By these presents
declare under oath to be the solo and true
inventor/s of the invention entitled:
"Conveyors module for sugar-cane harvest
and harvesting process"

And,

Centro Nacional de Pesquisa em Energia e
Materiais, a corporation organized and
existing under the law of [country] Brazil
having its domiciled in R: Giuseppe Máximo
Scolfaro, nº 10.000, Guará, Campinas, SP
(Country, city & address) and represented
by (individual's name) Carlos Alberto Aragão
de Carvalho Filho, acting a his (her) (job
title) Director-General, which here and after
is named as ASSIGNEE,

Both, ASSIGNOR and ASSIGNEE have
agreed the following:

To ASSIGN from the ASIGNOR to the
ASSIGNEE the Industrial Property Rights
related to the Patent PCT /BR2012/000229,
from (date).

Given on 12/19 in 2013

Guilherme Ribeiro Gray
ASSIGNER

Carlos Alberto Aragão de Carvalho Filho
ASSIGNEE

CESION

Yo / Nosotros, abajo firmando/s (Nombre
del inventor) - Guilherme Ribeiro Gray,
quien en adelante será el CEDENTE,

Ciudadano/s de Campinas – SP - Brazil
domiciliado/s en: R: Tranquilo Prosperi, nº
383, Jardim Sta. Genebra II. Por el presente
documento declaramos bajo juramento ser
el/los único/s y verdadero/s inventor/es de la
invención titulada: "Módulo PConveyors
para la cosecha de caña de azúcar y el
proceso de recolección "

Y,-

Centro Nacional de Pesquisa em Energia e
Materiais una sociedad debidamente
constituída y existente bajo las leyes de
(país) Brasil, con domicilio en [país, ciudad
y dirección) in R: Giuseppe Máximo
Scolfaro, nº 10.000, Guará, Campinas, SP -
y representada por (nombre) Carlos Alberto
Aragão de Carvalho Filho quien actúa como
(título) Diretor-Geral, quien en adelante será
el CESIONARIO,

Ambos, CEDENTE y CESIONARIO han
acordado lo siguiente:

CEDER del CEDENTE al CESIONARIO los
derechos de propiedad Industrial relativos a
la Patente PCT /BR2012/000229, del -----
--(fecha)

Dado en 12/19 el 2013

Guilherme Ribeiro Gray
CEDENTE

Carlos Alberto Aragão de Carvalho Filho
CESIONARIO

6 a

ASSIGNMENT

I / We, the undersigned, (Inventor's name),
José Leonardo Camargo de Campos, which
here and after is referred as the
ASSIGNOR,

Citizen/s of Campinas – SP - Brazil
Residing R: Equador, nº 106, Jardim
Europa. By these presents declare under
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José Leonardo Camargo de Campos
ASSIGNER

Carlos Alberto Aragão de Carvalho Filho
ASSIGNEE

CESION

Yo / Nosotros, abajo firmando/s (Nombre
del inventor) - José Leonardo Camargo de
Campos, quien en adelante será el
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Ciudadano/s de Campinas – SP - Brazil
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y representada por (nombre) Carlos Alberto
Aragão de Carvalho Filho quien actúa como
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--(fecha)

Dado en 12/19 el 2013

José Leonardo Camargo de Campos
CEDENTE

Carlos Alberto Aragão de Carvalho Filho
CESIONARIO

ASSIGNMENT

I / We, the undersigned, Efraim Albrecht Neto, which here and after is referred as the ASSIGNOR,

Citizen/s Campinas-SP-Brazil
Residing at R: Dr. Antônio Hossri, nº 285, Cidade Universitária II By these presents declare under oath to be the solo and true inventor/s of the invention entitled:
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And,

Centro Nacional de Pesquisa em Energia e Materiais, a corporation organized and existing under the law of Brazil having its domiciled in R: Giuseppe Maximo Scolfaro. Nº10.000, Guará, Campinas-SP, Brazil and represented by Carlos Alberto Aragão de Carvalho Filho acting a his Director-General, which here and after is named as ASSIGNEE,

Both, ASSIGNOR and ASSIGNEE have agreed the following:

To ASSIGN from the ASIGNOR to the ASSIGNEE the Industrial Property Rights related to the Patent PCT/BR2012000229, from 03.07.2012.

Given on 27/12/2013 in Campinas

Efraim Albrecht Neto

ASSIGNER

ASSIGNEE

CESION

Yo / Nosotros, abajo firmando/s Efraim Albrecht Neto, quien en adelante será el CEDENTE,

Ciudadano/s de Campinas-SP-Brazil
domiciliado/s en R: Dr. Antônio Hossri, nº 285, Cidade Universitária II
Por el presente documento declaramos bajo juramento ser el/los único/s y verdadero/s inventor/es de la invención titulada:
"Modulo de cintas para la cosecha de caña de azúcar y el proceso de recolección"

Y,

Centro Nacional de Pesquisa em Energia e Materiais una sociedad debidamente constituida y existente bajo las leyes de Brasil, con domicilio en R: Giuseppe Maximo Scolfaro. Nº 10.000, Guará, Campinas-SP, Brazil y representada por Carlos Alberto Aragão de Carvalho Filho quien actúa como Diretor Geral, quien en adelante será el CESIONARIO,

Ambos, CEDENTE y CESIONARIO han acordado lo siguiente:

CEDER del CEDENTE al CESIONARIO los derechos de propiedad Industrial relativos a la Patente PCT/BR2012000229, del 03.07.2012.

Dado en 27/12/2013 el Campinas

Efraim Albrecht Neto

CEDENTE

CESIONARIO

8 11

ASSIGNMENT

I / We, the undersigned, (Inventor's name),
Oscar Antônio Braunbeck, which here and
after is referred as the ASSIGNOR,

Citizen/s of Paulinia – SP - Brazil
Residing R: Antônio Andrietta, nº 27 at
Condominio Manacas – Betel. By these
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"Conveyors module for sugar-cane harvest
and harvesting process"

And,

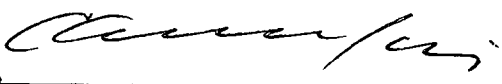
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from (date).

Given on 27/12/13 in Campinas


ASSIGNER


ASSIGNEE

CESION

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del inventor) - Oscar Antônio Braunbeck,
quien en adelante será el CEDENTE,

Ciudadano/s de Paulinia – SP - Brazil
domiciliado/s en- Antônio Andrietta, nº 27 -
Condominio Manacas. Por el presente
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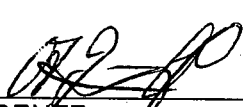
Y,

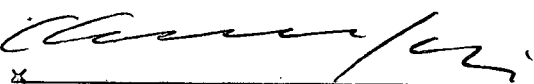
Centro Nacional de Pesquisa em Energia e
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derechos de propiedad Industrial relativos a
la Patente PCT /BR2012/000229, del -----
--(fecha)

Dado en 27/12/13 el Campinas


CEDENTE


CESIONARIO



Rio de Janeiro, April 18, 2013.

C/o WIPO - World Intellectual Property Organization
34, chemin des Colombettes
CH-1211 Geneva 20, Switzerland

Dear Sirs,

The applicant of the application PCT/BR2012/000229 informs that Mr. Douglas de Oliveira Forchezatto and Mr. Douglas Ricardo Frabetti were mistakenly described as inventors of the present application (see the attached sheet). In view of this, the applicant requests that both cited names be cancelled and replaced by the following correct three inventors:

Name: Efraim Albrecht Neto
Address: Rua Dr. Antônio Hosni, 285, Cid. Universitário II, Campinas/SP

Name: Guilherme Ribeiro Gray
Address: Rua Tranquillo Prosper, 383, Jd. Sta. Genebra II, Campinas/SP

Name: José Leonardo Camargo de Campos
Address: Rua Equador, 106, Jardim Europa, Campinas/SP

Mr. Oscar Antonio Braunbeck should be maintained as inventor of the present application.

Very truly, yours,


Mr. Alexandre Mala

Av. Marechal Floriano, 45 - 5ª andar
Centro - Rio de Janeiro - CEP 20.080-003 - Brasil
Caixa Postal / P.O. Box 65002

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Patents Department
Tavares Propriedade Intelectual

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NOTIFICATION OF THE RECORDING
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To:

TAVARES PROPRIEDADE INTELECTUAL LTDA.
Av. Marechal Floriano, 45 - 6° Andar
Centro - RJ
BRÉSIL

Date of mailing (day/month/year)

10 May 2013 (10.05.2013)

Applicant's or agent's file reference

OS-964-12

IMPORTANT NOTIFICATION

International application No.

PCT/BR2012/000229

International filing date (day/month/year)

03 July 2012 (03.07.2012)

1. The following indications appeared on record concerning:

☒ the applicant ☒ the inventor ☐ the agent ☐ the common representative

Name and Address

DE OLIVEIRA FORCHEZATTO, Douglas
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State of Residence

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Telephone No.

Facsimile No.

E-mail address

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person ☐ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address

State of Nationality

State of Residence

Telephone No.

Facsimile No.

E-mail address

☐ Notifications by e-mail authorized

3. Further observations, if necessary:

The person identified in Box 1 has been deleted from the records.

4. A copy of this notification has been sent to:

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- ☐
- the Authority(ies) specified for supplementary search

- ☐
- the International Preliminary Examining Authority
-
- ☒
- the designated Offices concerned
-
- ☐
- the elected Offices concerned
-
- ☒
- other: DE OLIVEIRA FORCHEZATTO, Douglas

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Suarez Javier

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Name and Address

FRABETTI, Douglas Ricardo
Rua Macedo Soares, 708, Cidade Univ. II. Barão Gerado
Campinas - SP
Brazil

State of Nationality

BR

State of Residence

BR

Telephone No.

Facsimile No.

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- the designated Offices concerned
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- ☐
- the elected Offices concerned
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- ☒
- other: FRABETTI, Douglas Ricardo

The International Bureau of WIPO
34, chemin des Colombettes
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Name and Address	State of Nationality	State of Residence
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Name and Address NETO, Efraim Alberto Rua Dr. Antônio Hossri, 285 Cid Universitario II Campinas / SP Brazil	State of Nationality	State of Residence
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	Facsimile No.	
	E-mail address ☐ Notifications by e-mail authorized	

3. Further observations, if necessary:

The person identified in Box 2 has been added as applicant for US only and inventor for all designated States.

4. A copy of this notification has been sent to:

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Name and Address	State of Nationality	State of Residence
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2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

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Name and Address RIBEIRO GRAY, Guilherme Rua Tranquilo Prosperi, 383, Jd Sta. Genebra II Campinas / SP Brazil	State of Nationality	State of Residence
	Telephone No.	
	Facsimile No.	
	E-mail address ☐ Notifications by e-mail authorized	

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☒ the person ☐ the name ☐ the address ☐ the nationality ☐ the residence

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State of Nationality

State of Residence

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Brazil

Telephone No.

Facsimile No.

E-mail address

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"MÓDULO DE CINTAS PARA COSECHA DE CAÑA DE AZÚCAR Y PROCESO DE COSECHA"

La presente invención se refiere a un módulo de cosecha de caña de azúcar, el cual puede ser acoplado a un tractor o a una cosechadora completa, con auto-propulsión. La invención se refiere también a un proceso de cosecha de la caña.

ANTECEDENTES DE LA INVENCION:

La alimentación de la cosechadora de caña consiste en el proceso de retirada de los tallos de caña de azúcar de la plantación y su introducción en el equipo, de forma paralelamente ordenada.

Los tallos de caña, dentro de la plantación de caña de azúcar, pueden estar orientados de formas distintas, variando entre una posición verticalmente ordenada, en los cañaverales erectos, hasta una forma aleatoriamente desordenada en los cañaverales fuertemente acostados. Frecuentemente existen ambos casos dentro de un mismo terreno lo que indica que el equipo de cosecha debe tener habilidad para procesar ambas configuraciones.

Los procesos de cosecha existentes actualmente exigen que los tallos sean ordenados paralelamente unos con respecto a otros, tanto en la cosecha de la caña picada como en la de caña entera. En el primer caso ese arreglo paralelo se hace necesario para conseguir una longitud de fraccionamiento uniforme, y en el segundo caso, arreglo paralelo es necesario para obtener se una densidad de carga económicamente aceptable.

El proceso de cosecha mecanizada de las cosechadoras de la técnica anterior, particularmente de las cosechadoras australianas de caña picada (ver Figura A - cosechadora australiana de caña picada) se inicia con el corte de los cogollos, esta operación es opcional que, cuando

se ejecuta, libera el material al suelo, o, si desactivada, alimenta los cogollos junto con los tallos. Después de la despuntadura, los tallos son inclinados por la acción de un deflector estático o rotativo y, en la secuencia, dos discos con cuchillas periféricas ejecutan el corte basal, liberando los tallos de las raigambres, lo que permite que los mismos se acuesten sobre el suelo o sobre los tallos vecinos aún en pie. A medida en que la cosechadora avanza, y con el auxilio de los discos cortadores de base, los tallos alcanzan un mecanismo de cilindro levantador seguido por una cascada de cilindros limpiadores que los conducen hasta el picador. Cuando la caña es cogida sin quemazón previa, y sin despuntadura, el picador sincrónico corta hojas y cogollos en fragmentos, los cuales son separados neumáticamente por una corriente de aire ascendiente generada por un extractor de flujo axial.

El antecedente GB 317352 muestra una cosechadora de caña de azúcar que comprende un mecanismo de empuje 11, 12; un mecanismo cortador de base 4; un mecanismo concentrador 5; un mecanismo tirador con una estera de la parte superior 9 y una estera inferior 6, un mecanismo transferidor 7 que recibe los cogollos del mecanismo tirador y los transfiere a un mecanismo picador 8.

El antecedente US 4154047 muestra con más detalle la cosechadora de la técnica anterior, como se muestra en la Figura A. Observado en el documento estadounidense un cortador de punteros 21, un mecanismo elevador 22, un dispositivo de alineación 84, rodillos de alimentación 64, 70, 72, 74, 76, 28, un cortador de cogollo 28, un extractor primario 32 y un extractor secundario 36.

INCONVENIENTES DE LAS COSECHADORAS DE LA TÉCNICA ANTERIOR:

Las cosechadoras de la técnica anterior, particularmente las cosechadoras australianas de caña picada (figura A y US 4154047), encuentran dificultades para coger líneas múltiples de cañas acostadas, muy enmarañadas. Esas

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cañas son identificadas por los productores como de baja factibilidad de ser cosechadas. Sin embargo, esos casos tienden a hacerse más frecuentes debido al buen crecimiento vegetativo, a medida que variedades progresivamente más productivas son desarrolladas. Las figuras B y C muestran ejemplos de tallos enmarañados. El cruzamiento de cañas curvadas genera una interacción o vínculo entre tallos en contacto que dificulta su remoción.

La figura D muestra las fuerzas aplicadas actuantes en los tallos, cuando ocurre la remoción de los mismos por la cosechadora de la técnica anterior de caña picada. Dicho dispositivo se denomina de separador de línea, o separador helicoidal, o pirulí. Se observa en la figura B que los separadores de línea quedan en una posición cercana a la vertical y empujan a los tallos en el sentido del desplazamiento de la cosechadora, hasta alinearlos longitudinalmente no sentido do movimiento.

Cuando los tallos encuentran dificultad para deslizarse sobre los separadores de línea se generan fuerzas de flexión P_h y P_v aplicadas en un punto intermedio del tallo, fuerzas estas que, frecuentemente, son de magnitud suficiente para provocar la ruptura del tallo o la arrancadura de la raíz.

Además, las cosechadoras de caña picada empujan y acuestan los tallos para ser alineados (peinados) longitudinalmente en posición muy próxima de la superficie del suelo, los cuales reciben contaminación con impurezas minerales movidas por el cortador de base. Ese gran volumen de tierra es parcialmente retirado de los tallos durante el paso de los mismos por los cilindros limpiadores, generando gran demanda de potencia y disminuyendo la eficiencia en la extracción de la sacarosa.

En la cosechadora de la patente GB 317.352 se producen los mismos inconvenientes ya citados, es decir, el mecanismo de empuje empuja las cañas hacia adelante hasta que

inclinan longitudinalmente provocando la rotura del cogollo o desgarro de los tallos en la raíz. Este inconveniente se hace aún más relevante en el caso de cañas enmarañadas, inclinó y cayó de lado.

DESCRIPCIÓN DE LA INVENCION:

La presente invención tiene el objetivo de reducir las pérdidas de materia prima y la demanda de potencia, por medio de un nuevo módulo de cosecha.

La figura E muestra un nuevo principio de cosecha obtenido con el módulo de acuerdo con la invención. El nuevo principio efectúa la remoción de los tallos de la plantación aplicando fuerzas F_h y F_v , directamente en la base del tallo, de modo a generar una configuración de fuerzas como la ilustrada en la Figura E, configuración esta que es más simple y menos agresiva para la resistencia del tallo que aquella que se muestra en la Figura D, la cual representa el principio utilizado en las cosechadoras de la técnica anterior de caña picada. La condición de carga en la figura E resulta predominantemente en fuerzas de tracción aplicadas en el extremo del tallo, en vez de cargas de flexión aplicadas en un punto intermedio de dicho tallo, conforme muestra la figura D. En el caso de las cosechadoras de caña picada de la técnica anterior, los separadores de línea empujan (peinan) los tallos en el sentido de desplazamiento de la cosechadora, hasta alinearlos longitudinalmente en el sentido del movimiento.

Para conseguir capturar un tallo es necesario conocer la localización de un punto del mismo dentro de la distribución espacial de la plantación. El único punto de un tallo cuya localización es conocida es el punto de inserción del mismo en la raigambre, punto este donde se realiza el corte de base. Con el módulo de acuerdo con la invención, el tallo es capturado y aplicada tracción a partir de ese punto, y, así, el proceso de remoción se hace bastante indiferente al grado de acostamiento del cañaveral. En la medida en que

progresar el proceso de remoción, aplicándose tracción a los tallos en dirección a un punto común, acontecerá espontáneamente su orden paralelo.

El objetivo de la invención es alcanzado por medio de un módulo de cosecha de cintas, que comprende un mecanismo levantador dispuesto horizontalmente y pudiendo ser desplazado verticalmente; un mecanismo cortador de base; un mecanismo deflector colocado encima del mecanismo levantador y configurado para modificar y auxiliar el desplazamiento de los tallos cortados hasta un mecanismo tirador, dicho mecanismo tirador comprendiendo cintas, una cinta superior y una cinta inferior; un cilindro levantador situado junto a la extremidad inferior de las cintas; un mecanismo transferidor apropiado para recibir los tallos del mecanismo tirador y transferirlos a un mecanismo picador, dicho mecanismo picador estando colocado en secuencia a dicho mecanismo transferidor, y siendo que un mecanismo tensor actúa en la cinta superior del mecanismo tirador.

Así, el módulo de acuerdo con la invención proporciona una reducción substancial de las pérdidas en las cosechas, evitando la ruptura de los tallos y el arrancamiento de la raíz.

Otra ventaja del módulo de acuerdo con la invención es el hecho que el proceso de remoción de los tallos de la plantación es poco dependiente del grado de acostamiento del cañaveral, una vez que los tallos son cortados cerca de la raíz.

El proceso de acuerdo con la invención comprende las siguientes etapas:

Proceso de cosecha de caña de azúcar erecta:

Una tabique deflector inclina la caña longitudinalmente efectuando un mínimo esfuerzo en la raíz de dicha caña; discos de corte cortan la caña; un cilindro

levantador levanta la extremidad de la caña y la transfiere para cintas; y las cintas de un mecanismo tirador tiran la caña, y un mecanismo de transferidor transfiere la caña para un mecanismo picador, el cual corta la caña en trozos.

Proceso de cosecha de caña de azúcar inclinada lateralmente:

Un disco de corte corta la caña sin efectuar ningún esfuerzo en la raíz de la citada caña, y la caña, consecuentemente, cae sobre la superficie superior de un cono metálico del mecanismo levantador; la otra extremidad de la caña, consecuentemente, se eleva y se apoya en la superficie inferior de un cilindro de un mecanismo deflector; los helicoides del mecanismo levantador y los helicoides del mecanismo deflector, por medio de rotación, desplazan a la caña hasta las cintas de un mecanismo tirador; y las cintas del mecanismo tirador tiran la caña hasta un mecanismo transferidor, y el mecanismo transferidor transfiere la caña para un mecanismo picador, el cual corta la caña en pedazos.

Proceso de cosecha de caña de azúcar acostada lateralmente:

Un cono metálico de un mecanismo levantador levanta un poco la caña sin efectuar ningún esfuerzo en la raíz de dicha caña; un disco de corte corta la caña, y la caña, consecuentemente, cae sobre la superficie superior del mecanismo levantador; la otra extremidad de la caña, consecuentemente, se eleva y se apoya en la superficie inferior de un cilindro de un mecanismo deflector; los helicoides del mecanismo levantador y los helicoides del mecanismo deflector, por medio de rotación, desplazan a la caña hasta las cintas de un mecanismo tirador; y las cintas del mecanismo tirador tiran la caña, y un mecanismo transferidor transfiere la caña a un mecanismo picador, el cual corta la caña en pedazos.

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Proceso de cosecha de caña de azúcar acostada longitudinalmente hacia adelante o hacia atrás:

El disco de corte corta la caña efectuando un mínimo esfuerzo en la raíz de dicha caña; un cilindro levantador levanta la extremidad de la caña y la transfiere para cintas de un mecanismo tirador; y las cintas del mecanismo tirador tiran la caña, y un mecanismo transferidor transfiere la caña para un mecanismo picador, el cual corta la caña en trozos.

La invención será, a continuación, más detalladamente descrita, a título de ejemplo, con base en las figuras anexas:

FIGURA 1 - vista en perspectiva de una concretización preferida del módulo de cintas de acuerdo con la invención;

FIGURA 2 - vista lateral del módulo de la figura 1;

FIGURA 3 - vista superior del módulo de la figura 1;

FIGURA 4 - vista frontal del módulo de la figura 1;

FIGURA 5 - vista inferior del módulo de la figura 1;

FIGURA 6 - vista en perspectiva delantera de una concretización preferida del mecanismo levantador de acuerdo con la invención;

FIGURA 7 - vista en perspectiva posterior del mecanismo levantador de la figura 6;

FIGURA 8 - vista lateral del mecanismo levantador de la figura 6;

FIGURA 9 - vista en perspectiva de una concretización preferida del mecanismo deflector de acuerdo con la invención;

FIGURA 10 - vista lateral del mecanismo deflector;

FIGURA 11 - vista superior del mecanismo deflector;

FIGURA 12 - vista frontal de una concretización preferida del mecanismo cortador de base de acuerdo con la invención;

FIGURA 13 - vista frontal del mecanismo cortador de base de la figura 12 sin las chapas de protección;

FIGURA 14 - vista superior del mecanismo cortador de base de la figura 12 sin las chapas de protección y sin el mecanismo deflector;

FIGURA 15 - vista en perspectiva del mecanismo cortador de base de la figura 12 sin las chapas de protección;

FIGURA 16 - vista inferior del mecanismo cortador de base de la figura 12;

FIGURA 17 - vista inferior de un cilindro levantador de acuerdo con la invención;

FIGURA 18 - vista inferior de cilindro levantador de la figura 17 y de un mecanismo tirador;

FIGURA 19 - vista lateral de una concretización preferida del mecanismo tirador de acuerdo con la invención;

FIGURA 20 - vista en perspectiva del mecanismo tirador de la figura 19;

FIGURA 21 - vista en perspectiva del mecanismo tirador de la figura 19 sin la cinta superior;

FIGURA 22 - vista en perspectiva del mecanismo tirador de la figura 19 sin la cinta superior y sin el mecanismo tensor;

FIGURA 23 - vista en perspectiva posterior de la estructura de sustentación del módulo de acuerdo con la invención;

FIGURA 24 - vista inferior de la estructura completa de sustentación del módulo de acuerdo con la invención;

FIGURA 25 - vista delantera de la parte inferior de la estructura de sustentación del módulo de acuerdo con la invención;

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FIGURA 25A - vista posterior de la parte inferior de la estructura de sustentación del módulo de acuerdo con la invención;

FIGURA 26 - vista en perspectiva de una concretización preferida del mecanismo tensor de acuerdo con la invención;

FIGURA 27 - vista lateral del mecanismo tensor de la figura 26;

FIGURAS 27A a 27 D - vistas del mecanismo tensor de la figura 26;

FIGURA 28 - vista lateral de una concretización preferida del mecanismo transferidor de acuerdo con la invención y de la parte superior del mecanismo tensor de la figura 26;

FIGURA 29 - vista de la parte superior del mecanismo tensor de la figura 26;

FIGURA 30 - vista en perspectiva de una concretización preferida del mecanismo transferidor y de la parte superior del mecanismo tensor de la figura 26;

FIGURA 31 - vista en perspectiva del mecanismo transferidor de la figura 30 y de una concretización preferida del mecanismo picador;

FIGURA 32 - vista en perspectiva del mecanismo picador de la figura 31; e

FIGURA 33 - vista inferior de la chapa de salida del mecanismo picador.

Las figuras 1 a 5 muestran las vistas generales del módulo de acuerdo con la invención, mientras que las figuras 6 a 33 detallan todos los mecanismos que componen el módulo.

Las figuras 1 a 5 muestran una concretización preferida del módulo de acuerdo con la invención, donde se observa un mecanismo levantador 1 que comprende dos conos metálicos giratorios 2 con respectivos helicoides 3 dispuestos en su superficie. Las puntas 4 de los conos metálicos 2, de preferencia, no son giratorias y son mantenidas apoyadas en el suelo, levantando los tallos de

caña de azúcar acostados en el suelo transversalmente a la dirección de desplazamiento del módulo. Hoy en día, debido a la mayor productividad de las plantaciones de caña, los tallos alcanzan alturas mayores y, frecuentemente, muchos de ellos caen transversalmente sobre el suelo y necesitan ser levantados antes del corte. Adicionalmente, los tallos que permanecen erectos en la plantación son acostados longitudinalmente por un tabique deflector 5 de un mecanismo deflector 6 para ser cogidos. Así, con todos los tallos levantados, o acostados longitudinalmente en la dirección de desplazamiento del módulo, un mecanismo cortador de base 7 corta los tallos junto a la raíz. En seguida, el mecanismo deflector 6 y un cilindro levantador 8 transfieren los tallos para un mecanismo tirador 9, que aprieta los tallos entre sus cintas, cinta superior 10 y cinta inferior 11. Dichas cintas transportan los tallos para arriba y los transfieren para un mecanismo transferidor 12, el cual, a su vez, los transfiere para un mecanismo picador 13. Un mecanismo tensor 14 soporta y tensiona la cinta superior 10, bien como regula la distancia entre las citadas cintas 10 y 11.

Enseguida, después que el módulo efectúa todas las etapas de trabajo, la paja es removida por una corriente de aire y los pedazos de caña de aproximadamente 20 cm son lanzados en la tolva de un camión de volteo.

Mecanismo levantador (ver figuras 6 a 8):

Las figuras 6 a 8 detallan el mecanismo levantador 1 que comprende el cono metálico 2 giratorio con el helicoide 3 dispuesto en su superficie y con una punta 4, de preferencia, no giratoria, y que desliza apoyada en el suelo durante la operación del módulo. El cono 2 es accionado por un motor 15, de preferencia, un motor hidráulico, y un eje de basculamiento 16 del mecanismo puede fijarse en la estructura de sustentación del módulo 17 (ver figura 1). El eje de basculamiento 16 posibilita que el cono sea levantado y bajado, de tal modo que siga las oscilaciones del terreno.

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Mecanismo cortador de base (ver figuras 12 a 16 y 19):

El mecanismo cortador de base 7 comprende, de preferencia, dos dispositivos de corte situados en oposición uno al otro, cada dispositivo siendo accionado por un motor 18 y comprendiendo un disco 19 donde están fijadas cuchillas de corte 20, dichos discos estando inclinados hacia adelante de preferencia en 12° . Los motores 18 son protegidos por chapas de protección 21 y cada dispositivo de corte es fijado por medio de un vástago 22 y a la estructura del módulo 17.

Las figuras 13 a 16 no muestran las chapas de protección 21.

Mecanismo deflector (ver figuras 9, 10 y 11):

El mecanismo deflector comprende un tabique frontal 5 y, de preferencia, dos cilindros metálicos giratorios 23 con un helicoides 24 dispuesto en superficie, dichos cilindros siendo accionados, respectivamente, por un motor 25 y estando dispuestos, de preferencia, horizontalmente. La estructura 26 del mecanismo deflector está fijada por medio de vástagos 27 en la estructura del módulo.

Así, en el caso de cañas acostadas transversalmente a la dirección de desplazamiento del módulo, el cono metálico 2 levanta la caña, sin desplazar el tallo en el sentido del movimiento, de modo a minimizar las fuerzas aplicadas en la raíz, y, en seguida, las cuchillas de corte 20 cortan dicha caña, haciendo con que ella caiga sobre el cono metálico 2. Con esto, la extremidad de la caña, donde se hizo el corte, se eleva, haciendo con que la caña se apoye en la parte inferior del cilindro metálico 23. Así, con una extremidad de la caña apoyada sobre la parte superior del cono 2, y la otra extremidad apoyándose en la parte inferior del cilindro 23, dicha caña es desplazada hacia atrás, por medio de la rotación de los helicoides 3 y 23, hasta alcanzar

las cintas 10 y 11 del mecanismo tirador 9, que, tiran la caña y la transfieren para el mecanismo transferidor 12, el cual, por su vez, transfiere la caña para el mecanismo picador 13. En el caso de cañas inclinadas, ocurren las mismas etapas descritas arriba, siendo que, en este caso, las cañas no precisan ser levantadas por los conos metálicos 2, pues ellas no están acostadas lateralmente, solamente inclinadas.

En el caso de cañas erectas, el tabique frontal 5 inclina la caña longitudinalmente, sin efectuar ningún esfuerzo en la raíz de dicha caña, las cuchillas de corte 20 cortan la caña, y el cilindro levantador 8 levanta la extremidad de la caña y la transfiere a las cintas 10 y 11 del mecanismo tirador, las cuales transfieren la caña al mecanismo transferidor 12 y este la transfiere al mecanismo picador 13. En el caso de cañas acostadas longitudinalmente hacia adelante o hacia atrás, ocurren las mismas etapas descritas anteriormente para las cañas erectas.

En el caso de cañas erectas o acostadas longitudinalmente, los conos 2 y los cilindros 23 del mecanismo deflector 6 no tienen ninguna actuación.

Cilindro levantador (ver figuras 9, 16, 17 y 18):

El cilindro levantador 8 se sitúa junto a la extremidad inferior de las correas superior 10 e inferior 11, es accionado, de preferencia, por un motor hidráulico 28 y está apoyado en las extremidades por cojinetes 29 montados en una estructura 30.

Mecanismo tirador (ver figuras 10, 18 a 22, 24, 26, y 31):

El mecanismo tirador comprende, de preferencia, dos cintas, una cinta superior 10 y una cinta inferior 11, dichas cintas estando montadas, cada una, de

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preferencia, en un cilindro superior 31 y un cilindro inferior 32, cada cinta comprendiendo, en el centro, en la superficie interna, una nervura longitudinal 33 con muescas transversales, nervura esta que actúa en un bisel situado al centro de los cilindros 31 y 32, a fin de que las cintas no se desplacen hacia afuera de los cilindros. Uno de los cilindros de cada cinta, de preferencia los cilindros superiores 31, es accionado por un motor hidráulico 35, mientras los cilindros inferiores 32 son conducidos.

Se observa también en las figuras que la cinta inferior presenta listones 36 en la superficie externa, los cuales sirven para aumentar el roce con las cañas y, consecuentemente, mejorar el desplazamiento de dichas cañas.

En las figura 21 y 22, la cinta superior 10 no está mostrada, a fin de facilitar la visualización de la cinta inferior 11.

Mecanismo tensor (ver figuras 10, 26, 27, 27A, 27B, 27C, 27D, 28 y 29):

El mecanismo tensor 14 comprende una estructura móvil 37 con un cojinete de esferas 38 que articula 10 toda la estructura del mecanismo 37, cojinete este donde está dispuesto un vástago roscado 39 de reglaje de la separación entre la cinta superior 10 y la inferior 11. El cojinete 38 y resortes 40 posibilitan que la estructura oscile y retorne para a su posición. Una chapa 41, con extremidades inclinadas hacia arriba, está fijada en la estructura del mecanismo 37 y se extiende en todo el ancho de la cinta superior 10. La chapa 41 se apoya en la superficie interna inferior de la cinta superior 10 y tiene la finalidad de evitar la deformación de la cinta 10 cuando los tallos de caña de azúcar C están siendo comprimidos y transportados entre dichas cintas 10 y 11 (ver figura 27). La flecha 42 indica el desplazamiento de los tallos.

Se observa también en las figuras que la estructura 37 posee brazos basculantes 43 con una extremidad fijada en los centros de los cilindros 31 y 32 de la cinta superior 10, y la otra extremidad fijada en una barra 45, la cual está montada en el vástago rosqueado 39 y presenta articulaciones 46 en las extremidades. El mecanismo tensor posee también rodillos 47 fijados en vástagos rosqueados de reglaje de tensión 48, rodillos estos que empujan la superficie superior de la cinta superior 10 para abajo, manteniendo dicha cinta 10 tensionada. Los rodillos están instalados en cojinetes de esferas 49, los cuales están montados en respectivas estructuras 50, donde también están montados los vástagos rosqueados 48.

Así, cuando las cintas 10 y 11 del mecanismo tirador 9 tiran los tallos de caña de azúcar C, el cilindro inferior 32, junto con el brazo basculante inferior 43, se levantan, y el tallo va pasando, y la chapa 41 mantiene la parte inferior de la cinta 10 estirada, sin deformación. Cuando el tallo termina su paso por las cintas, el cilindro superior 31 y el brazo oscilante 43 se levantan, y el tallo C es transferido para el mecanismo transferidor 12. Resortes de reposicionamiento 51 actúan en los cilindros 31 y 32, de modo que dichos cilindros retornen a las respectivas posiciones. Cuando ocurre el paso de los tallos C, la estructura 37 también oscila en el cojinete 38, y los resortes 40 garantizan el retorno de dicha estructura para su posición.

Mecanismo transferidor (ver figuras 28, 30 y 31).

El mecanismo transferidor 12 comprende dos cilindros 52 accionados, respectivamente, por un motor 53, dichos cilindros 52 estando dispuestos paralelamente y girando en sentidos opuestos, y siendo que uno de los cilindros es móvil y puede apartarse del otro cilindro por medio de un dispositivo de variación de distancia 54.

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Dicho dispositivo de variación de distancia 54 comprende brazos que pueden ser articulados 55, donde está fijado el cilindro móvil, y resortes 56.

Mecanismo picador (ver figuras 31, 32 y 33):

El mecanismo picador 13 comprende un cuerpo 57 con por lo menos una cuchilla de corte 58, y siendo que dicho cuerpo es accionado de forma giratoria por un motor 59. Una canaleta 60, con un formato aproximadamente circular, encamina los pedazos de caña cortados.

Estructura de sustentación del módulo (ver figuras 23, 24, 25 y 25A):

Las figuras muestran la estructura de sustentación del módulo 17 donde están montadas las rodas 62.

Además de las concretizaciones presentadas anteriormente, el mismo concepto inventivo podrá ser aplicado a otras alternativas o posibilidades de utilización del invento, como por ejemplo, en vez de motores hidráulicos, pueden ser utilizados motores neumáticos. Además de eso, el mecanismo deflector puede ser simplificado y, en vez de los cilindros convergentes, puede ser constituido de una chapa o barras.

Siendo así, será comprendido que la presente invención deberá ser interpretada de manera amplia, siendo su amplitud determinada por los términos de las reivindicaciones anexas.

REIVINDICACIONES:

1. Módulo de cosecha de cintas, particularmente apropiado para la cosecha de caña de azúcar, comprendiendo un mecanismo levantador (1); un mecanismo cortador de base (7); un mecanismo deflector (6) dispuesto encima del mecanismo levantador (1); un mecanismo tirador (9) comprendiendo cintas, una cinta superior (10) y una cinta inferior (11); un mecanismo transferidor (12) apropiado para recibir los tallos del mecanismo tirador (9) y transferirlos a un mecanismo picador (13), dicho mecanismo picador (13) estando dispuesto en secuencia a dicho mecanismo transferidor (12), caracterizado por el hecho de que comprende el mecanismo levantador (1) dispuesto horizontalmente y pudiendo oscilar verticalmente siguiendo las ondulaciones del suelo; un cilindro levantador (8) situado junto a la extremidad inferior de las cintas (10, 11); un mecanismo tensor (14) que actúa en la cinta superior (10) del mecanismo tirador, y el mecanismo deflector comprende, un tabique frontal (5) y, de preferencia, dos cilindros metálicos giratorios (23) con un helicoide (24) dispuesto en su superficie, dichos cilindros siendo accionados, respectivamente, por un motor (25) y estando dispuestos, de preferencia, horizontalmente.

2. Módulo de acuerdo con la reivindicación 1, caracterizado por el hecho que el mecanismo levantador (1) comprende por lo menos un cono metálico (2) giratorio con un helicoide (3) dispuesto en su superficie y con una punta (4), de preferencia, no giratoria, dicho cono siendo accionado por un motor (15), y siendo que un eje de basculamiento (16) del mecanismo puede ser fijado en la estructura de sustentación del módulo (17).

3. Módulo de acuerdo con la reivindicación 1, caracterizado por el hecho que el mecanismo tensor (14) comprende una estructura móvil (37), la estructura poseyendo brazos basculantes (43), cada brazo (43) presentando una extremidad fijada en el centro de un cilindro (31, 32) de la cinta superior (10) y la otra extremidad fijada en una barra (45) por medio de rótulas (46); el mecanismo comprendiendo también rodillos (47) que actúan en la superficie superior de la cinta superior (10), tensionando dicha cinta, resortes de reposicionamiento de la estructura móvil (40) y resortes de reposicionamiento de los cilindros (51).

4. Módulo de acuerdo con la reivindicación 3, caracterizado por el hecho que los rodillos (47) están instalados en cojinetes de esferas (49), los cuales están montados en respectivas estructuras (50) que poseen un vástago rosqueado de reglaje de tensión (48).

5. Módulo de acuerdo con la reivindicación 3, caracterizado por el hecho que el mecanismo tensor (14) comprende adicionalmente un cojinete de esferas (38) que articula toda la estructura del mecanismo (37), cojinete este donde está dispuesto un vástago rosqueado (39) de reglaje de la separación entre la cinta superior (10) y la inferior (11), y siendo que una chapa con extremidades inclinadas para arriba (41), fijada en la estructura del mecanismo (37), está dispuesta apoyándose en la superficie interna inferior de la cinta superior (10).

6. Módulo de acuerdo con la reivindicación 1, caracterizado por el hecho que el mecanismo cortador de base (7) comprende, de preferencia, dos dispositivos de corte situados en oposición uno al otro, cada dispositivo

siendo accionado por un motor (18) y comprendiendo un disco (19) donde están fijadas cuchillas de corte (20), dichos discos (19) estando inclinados hacia adelante, de preferencia en 12°.

7. Módulo de acuerdo con la reivindicación 1, caracterizado por el hecho que el mecanismo tirador (9) comprende, de preferencia, dos cintas, una cinta superior (10) y una cinta inferior (11), dichas cintas estando montadas, cada una, de preferencia, en un cilindro superior (31) y un cilindro inferior (32), y siendo que, por lo menos uno de los cilindros de cada cinta es accionado por un motor (35).

8. Módulo de acuerdo con la reivindicación 7, caracterizado por el hecho que los cilindros superiores (31) son accionados y los cilindros inferiores (32) son conducidos, y siendo que la cinta inferior (32) presenta listones (36) en la superficie externa.

9. Módulo de acuerdo con la reivindicación 7, caracterizado por el hecho que cada cinta comprende en el centro, en la superficie interna, una nervura longitudinal (33) con muescas transversales, nervura esta que actúa en un bisel situado en el centro de los cilindros (31 y 32).

10. Módulo de acuerdo con la reivindicación 1, caracterizado por el hecho que el mecanismo transferidor (12) comprende dos cilindros (52) accionados, cada uno, por un motor (53), dichos cilindros (52) siendo dispuestos paralelamente y girando en sentidos opuestos, y siendo que un de los cilindros es móvil y puede apartarse del otro cilindro por medio de un dispositivo de variación de distancia (54, 55, 56).

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11. Módulo de acuerdo con la reivindicación 10, caracterizado por el hecho que el dispositivo de variación de distancia (54, 55, 56) comprende brazos que pueden articularse (55) donde está fijado el cilindro móvil (52) y resortes (56).

12. Módulo de acuerdo con la reivindicación 1, caracterizado por el hecho que el mecanismo picador (13) comprende un cuerpo (57) con por lo menos una cuchilla de corte (58), y siendo que dicho cuerpo es accionado de forma giratoria por un motor (59).

13. Proceso de cosecha de caña de azúcar erecta, utilizando un módulo de cintas conforme definido en la reivindicación 1, caracterizado por el hecho de que comprende, secuencialmente, las siguientes etapas:

a) un tabique deflector (5) inclina la caña longitudinalmente, sin desplazar el tallo en el sentido del movimiento, de modo a minimizar las fuerzas aplicadas en la raíz;

b) discos de corte (19) cortan la caña;

c) un cilindro levantador (8) levanta la extremidad de la caña y la transfiere a las cintas (10, 11); y

d) las cintas (10, 11) de un mecanismo tirador (9) tiran la caña, y un mecanismo transferidor (12) transfiere la caña para un mecanismo picador (13), el cual corta la caña en pedazos.

14. Proceso de cosecha de caña de azúcar inclinada lateralmente, utilizando un módulo de cintas conforme definido en la reivindicación 1,

caracterizado por el hecho de que comprende, secuencialmente, las siguientes etapas:

a) un disco de corte (19) corta la caña sin efectuar ningún esfuerzo en la raíz de dicha caña, y la caña, consecuentemente, cae sobre la superficie superior de un cono metálico (2) del mecanismo levantador (1);

b) la otra extremidad de la caña, consecuentemente, se eleva y se apoya en la superficie inferior de un cilindro (23) de un mecanismo deflector (6);

c) los helicoides (3) del cono metálico (2) y los helicoides (24) de cilindro (23), por medio de rotación, desplazan la caña hasta las cintas (10, 11) de un mecanismo tirador; y

d) las cintas (10, 11) del mecanismo tirador tiran la caña hasta un mecanismo transferidor (12), y el mecanismo transferidor (12) transfiere la caña para un mecanismo picador (13), el cual corta la caña en pedazos.

15. Proceso de cosecha de caña de azúcar acostada lateralmente, utilizando un módulo de cintas conforme definido en la reivindicación 1, caracterizado por el hecho de que comprende, secuencialmente, las siguientes etapas:

a) un cono metálico (2) de un mecanismo levantador (1) levanta un poco la caña, sin desplazar el tallo en el sentido del movimiento, de modo a minimizar las fuerzas aplicadas en la raíz;

b) un disco de corte (19) corta la caña, y la caña, consecuentemente, cae sobre la superficie superior del cono metálico (2);

c) la otra extremidad de la caña, consecuentemente, se eleva y se apoya en la superficie inferior de un cilindro (23) de un mecanismo deflector (6);

d) los helicoides (3) del cono metálico (2) y los helicoides (24) del cilindro (23), por medio de rotación, desplazan la caña hasta las cintas (10, 11) de un mecanismo tirador (9); y

e) las cintas (10, 11) del mecanismo tirador tiran la caña, y un mecanismo transferidor (12) transfiere la caña para un mecanismo picador (13), el cual corta la caña en pedazos.

16. Proceso de cosecha de caña de azúcar acostada longitudinalmente hacia adelante o hacia atrás, utilizando un módulo de cintas conforme definido en la reivindicación 1, caracterizado por el hecho de que comprende, secuencialmente, las siguientes etapas:

a) el disco de corte (19) corta la caña sin efectuar ningún esfuerzo en la raíz de dicha caña;

b) un cilindro levantador (8) levanta la extremidad de la caña y la transfiere para cintas (10, 11) de un mecanismo tirador (9); y

c) las cintas (10, 11) del mecanismo tirador (9) tiran la caña, y un mecanismo transferidor (12)

transfiere la caña para un mecanismo picador (13), el cual corta la caña en pedazos.

26.10

RESUMEN:

"MÓDULO DE CINTAS PARA COSECHA DE CAÑA DE AZÚCAR Y PROCESO DE COSECHA"

La presente invención se refiere a un módulo de cosecha de cintas, particularmente apropiado para cosecha de caña de azúcar, que comprende un mecanismo levantador (1) dispuesto horizontalmente y pudiendo ser desplazado verticalmente; un mecanismo cortador de base (7); un mecanismo deflector (6) dispuesto encima del mecanismo levantador (1) y configurado para modificar la dirección y auxiliar en el desplazamiento de los tallos cortados hasta un mecanismo tirador (9), dicho mecanismo tirador comprendiendo cintas, una cinta superior (10) y una cinta inferior (11); un cilindro levantador (8) situado junto a la extremidad inferior de las cintas (10, 11); un mecanismo transferidor (12) apropiado para recibir los tallos del mecanismo tirador (9) y transferirlos para un mecanismo picador (13), dicho mecanismo picador (13) estando dispuesto en secuencia a dicho mecanismo transferidor (12), y siendo que un mecanismo tensor (14) actúa en la cinta superior (10) del mecanismo tirador.

La invención se refiere también a un proceso de coger la caña de azúcar con el módulo, proceso este que minimiza las fuerzas aplicadas en la raíz.

Fig. A

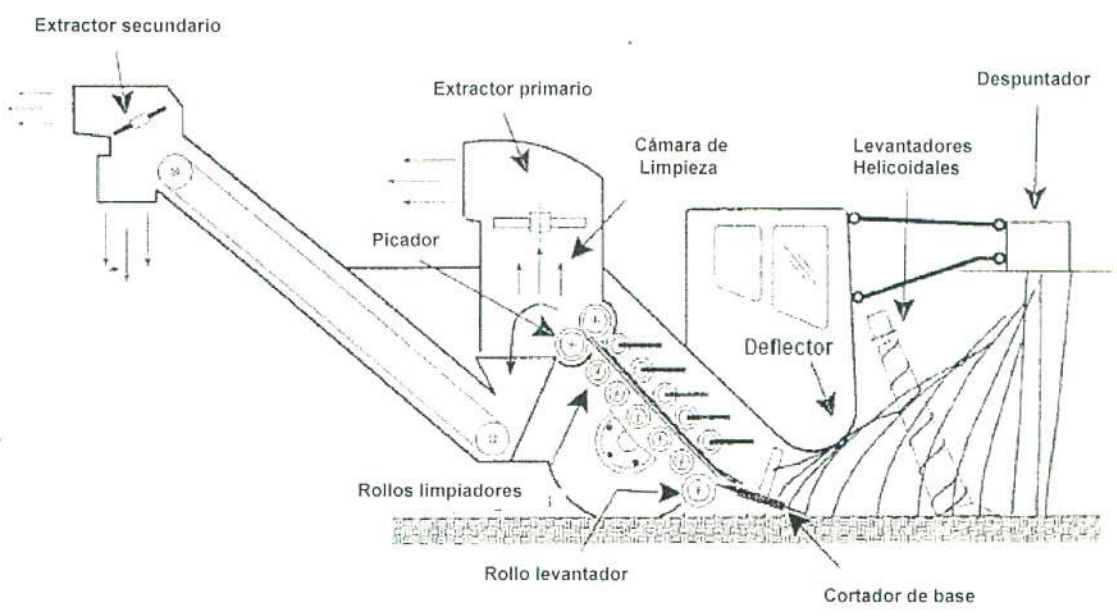
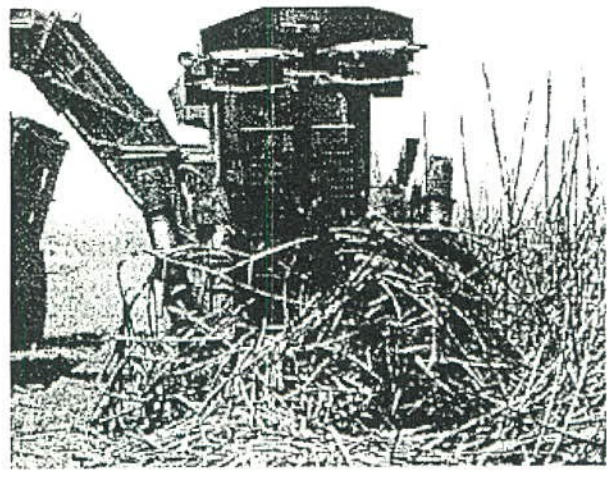


Fig. B



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27

Fig. C

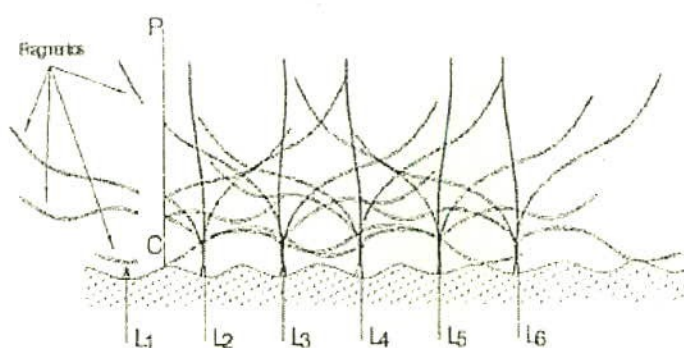


Fig. D

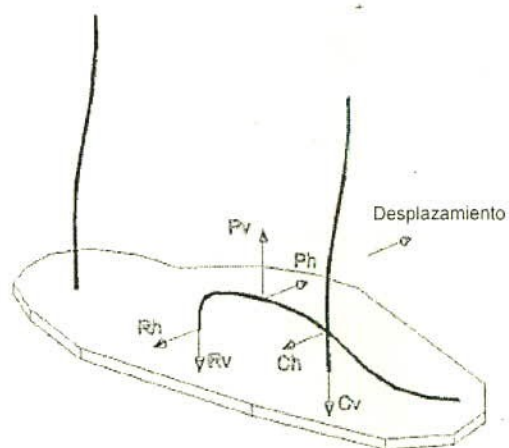


Fig. E

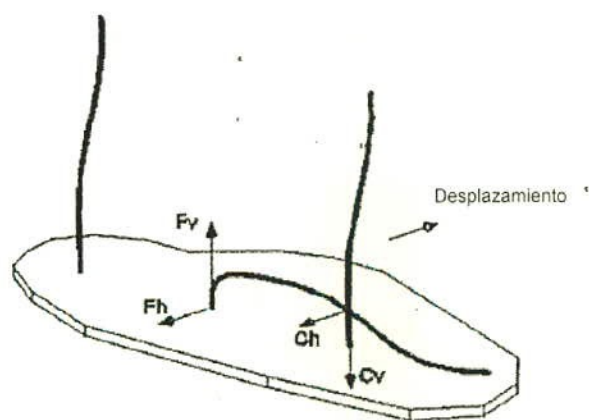
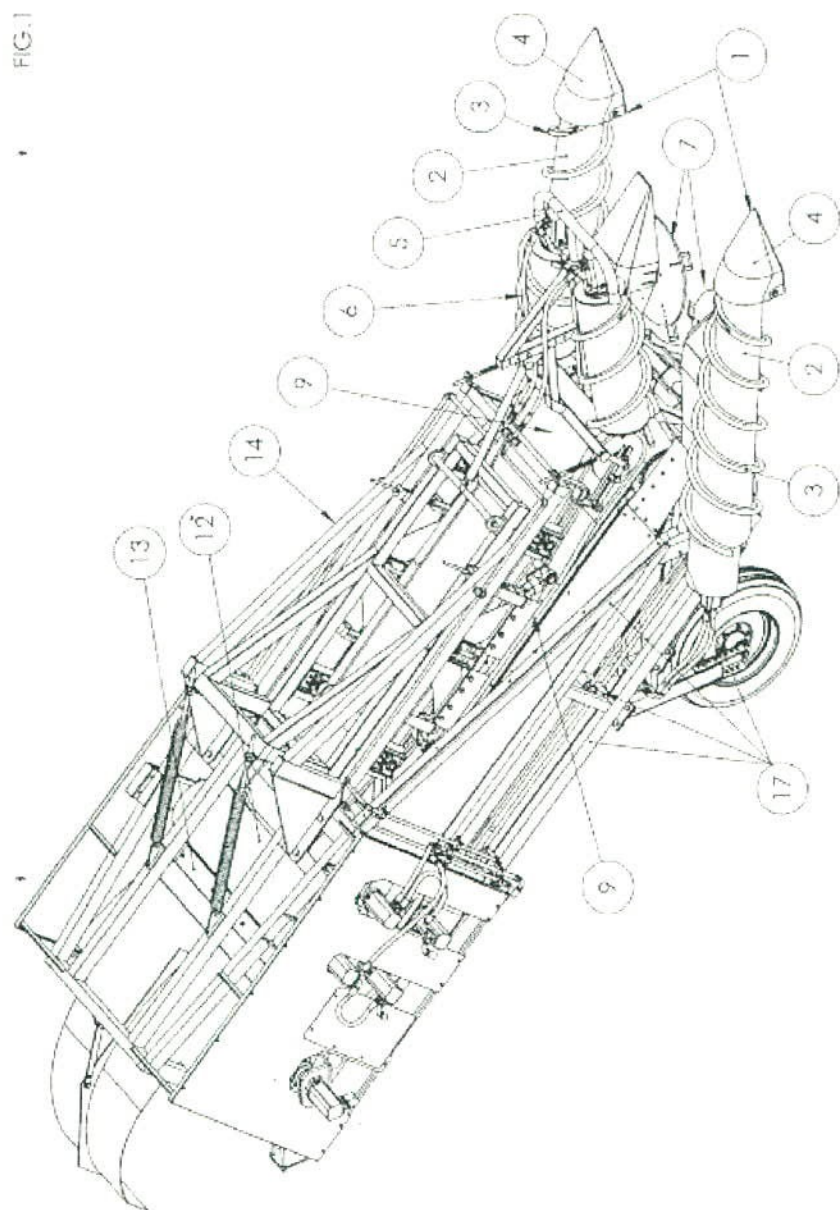


FIG. 1



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FIG.2

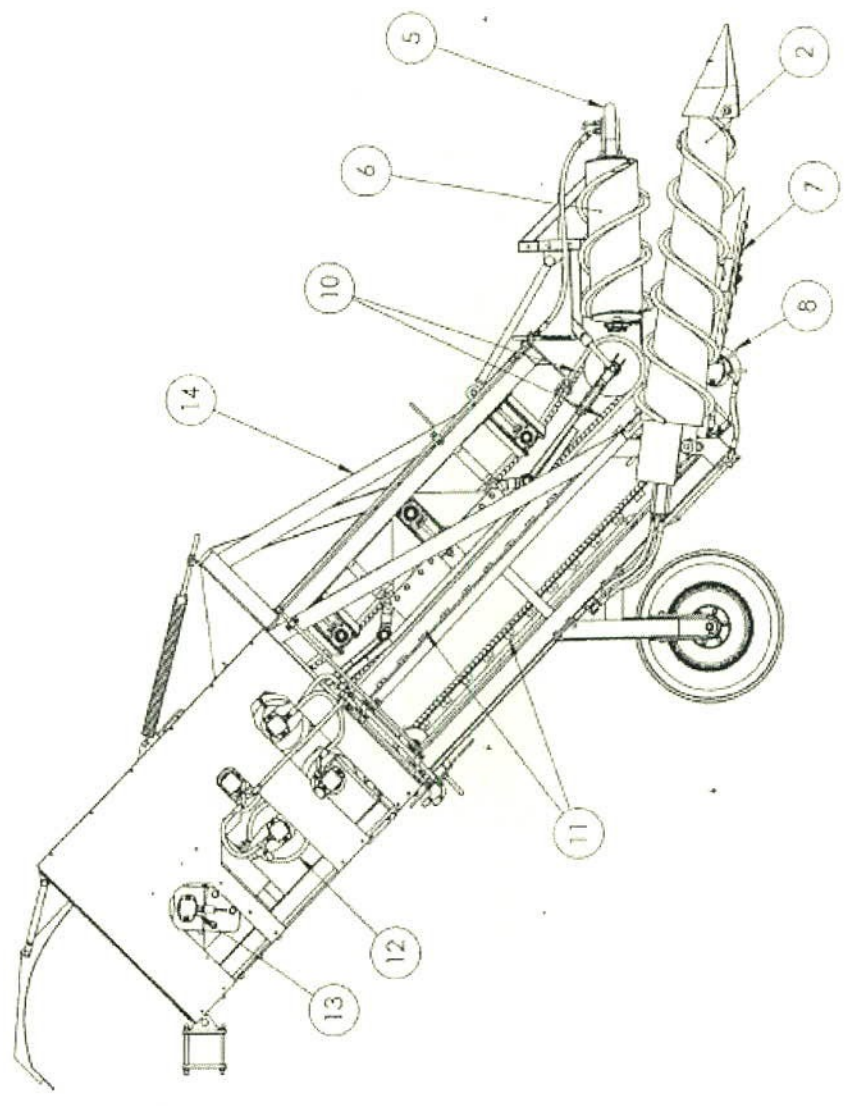
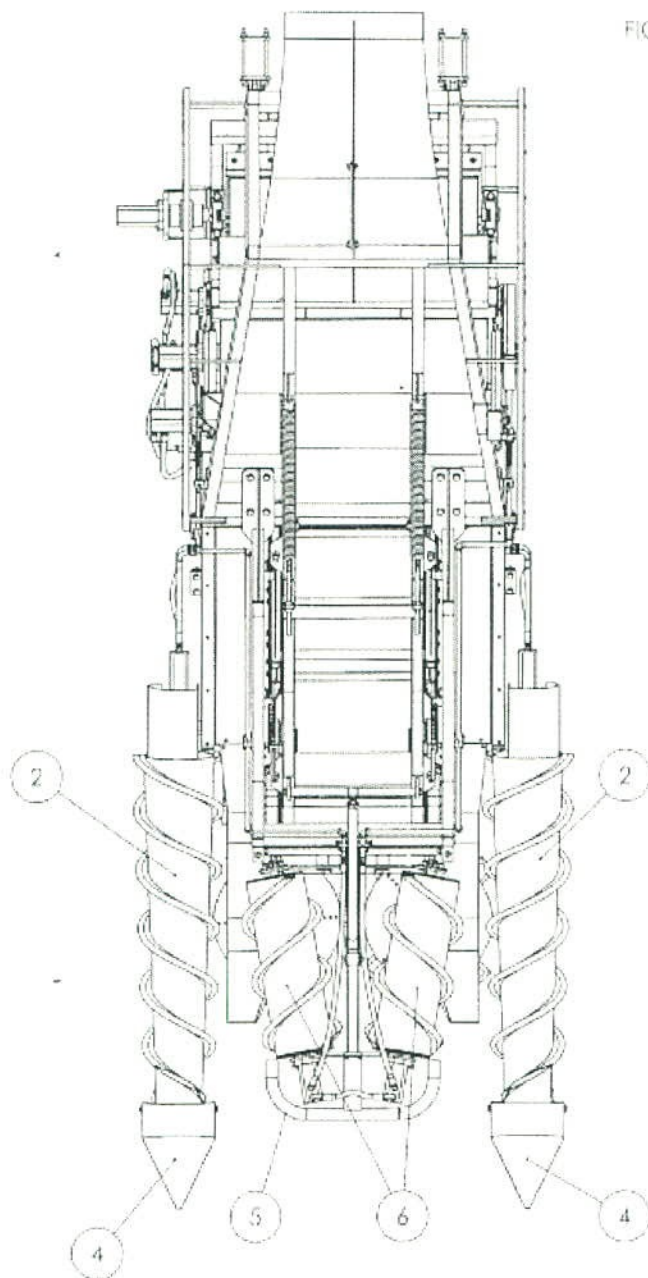


FIG.3



32
29

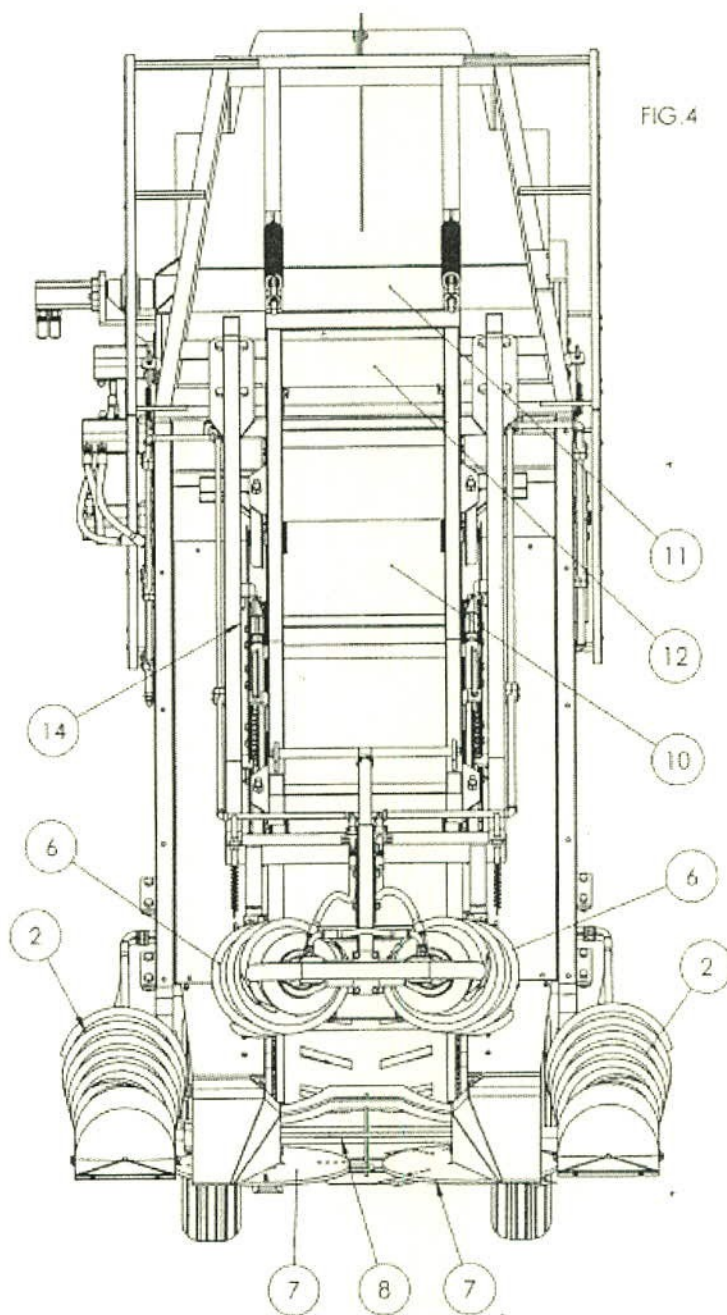


FIG. 5

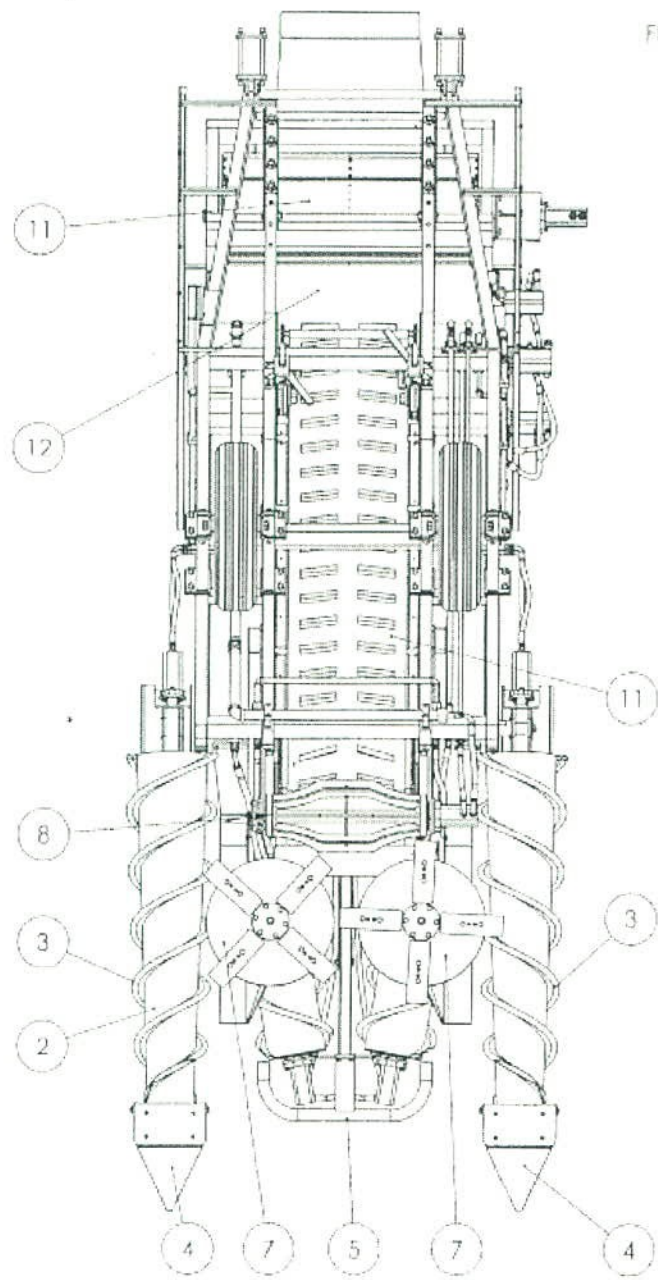
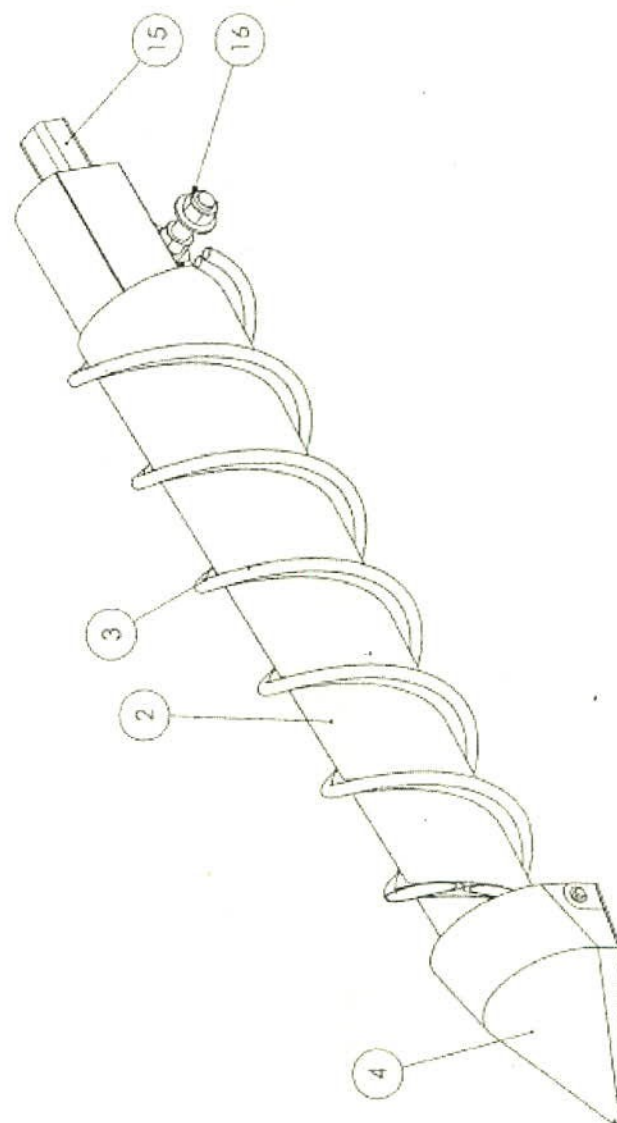


FIG. 6



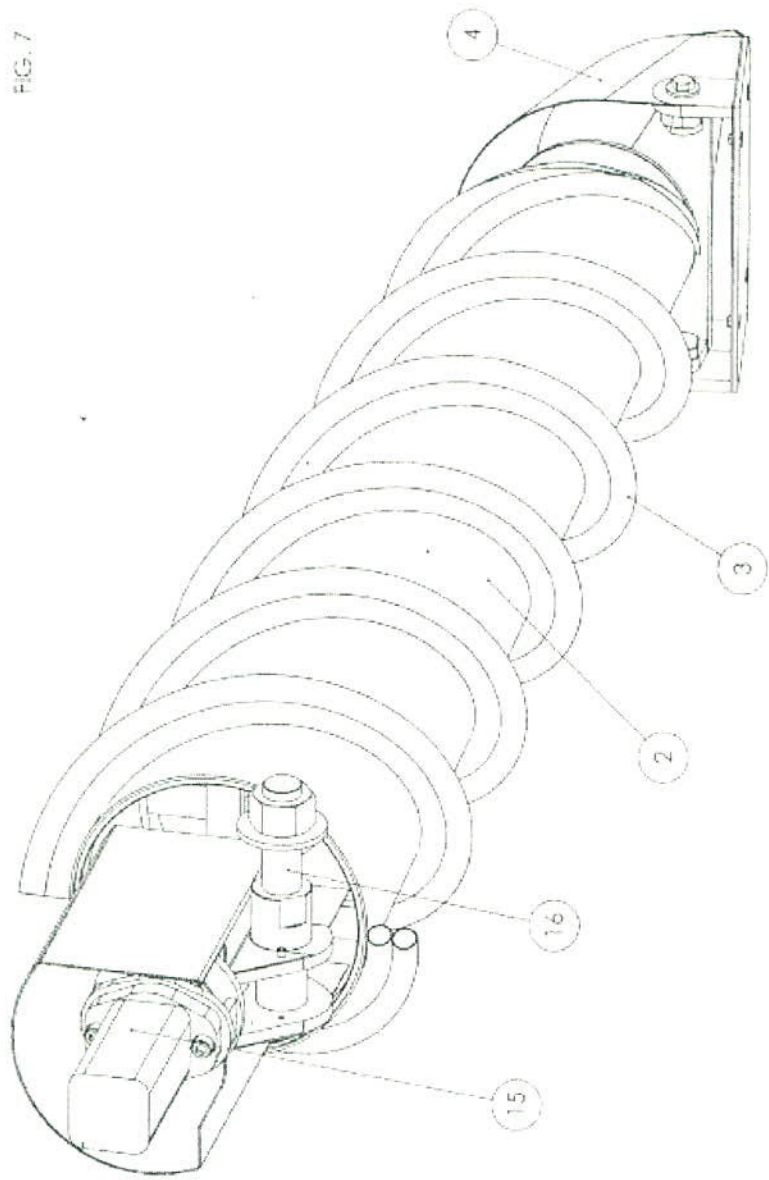
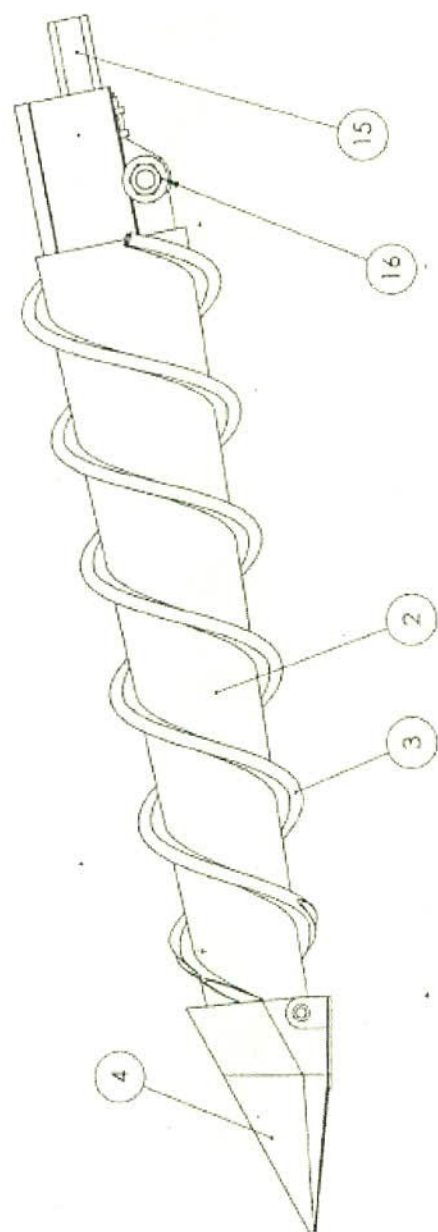


FIG. 7

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31

FIG. 8



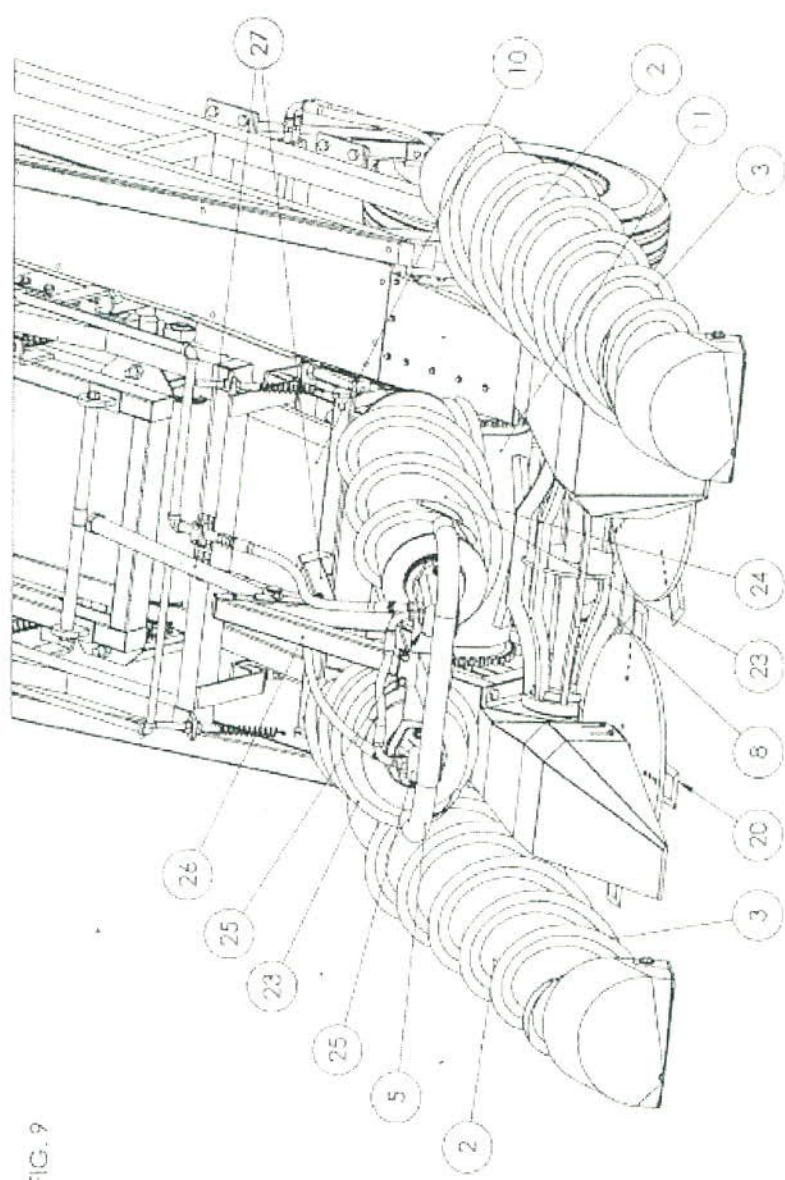


FIG. 9

35
32

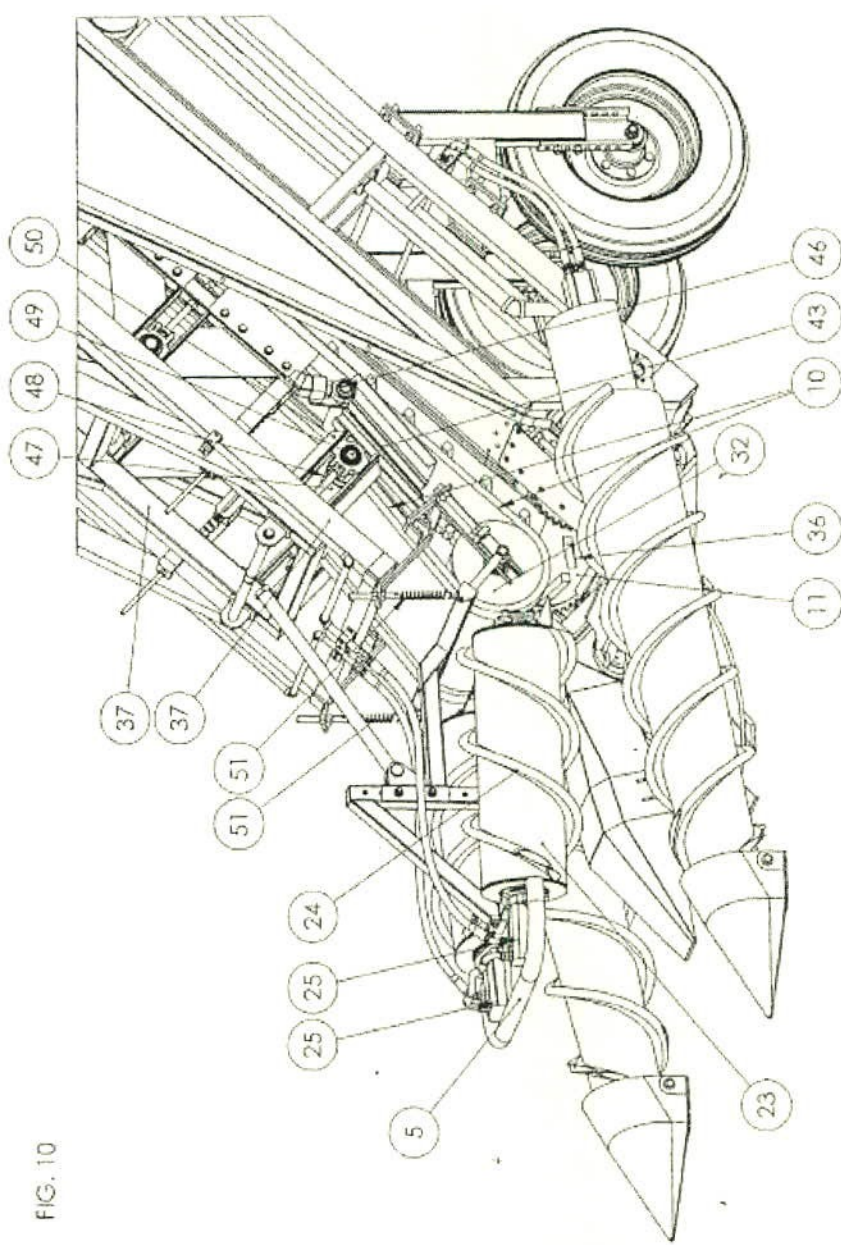


FIG. 10

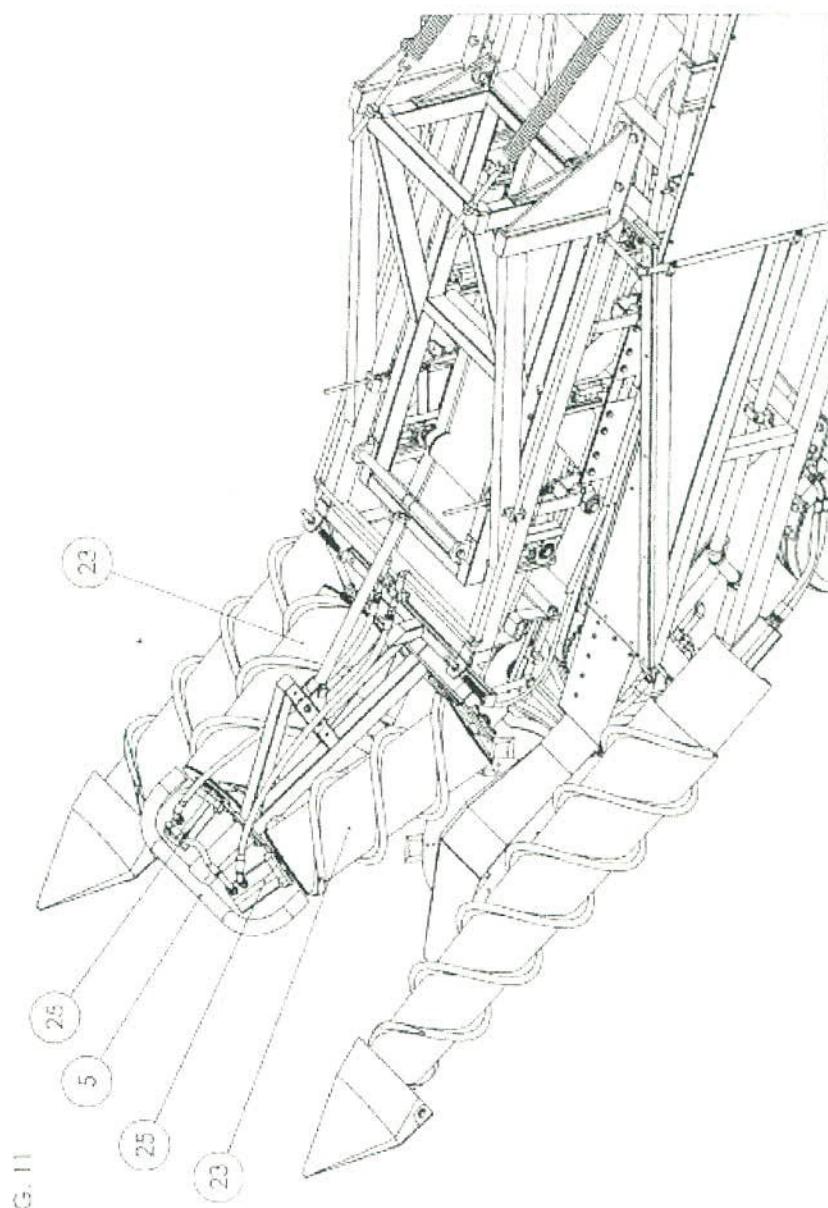


FIG. 11

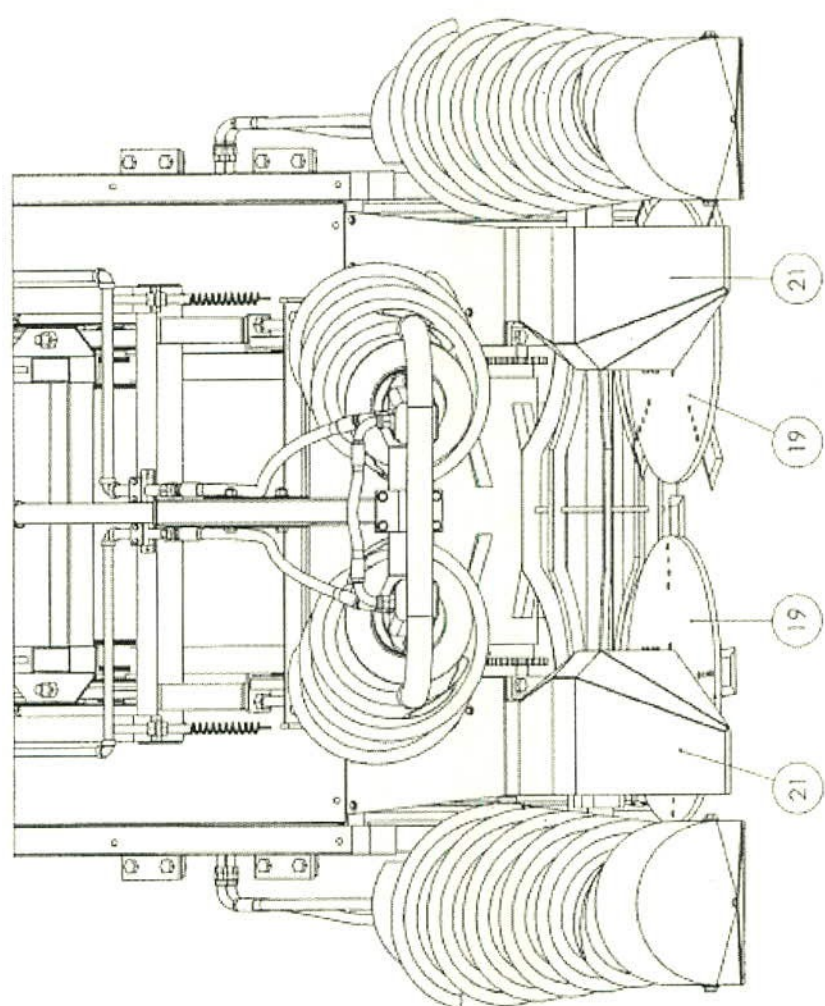


FIG. 12

FIG. 13

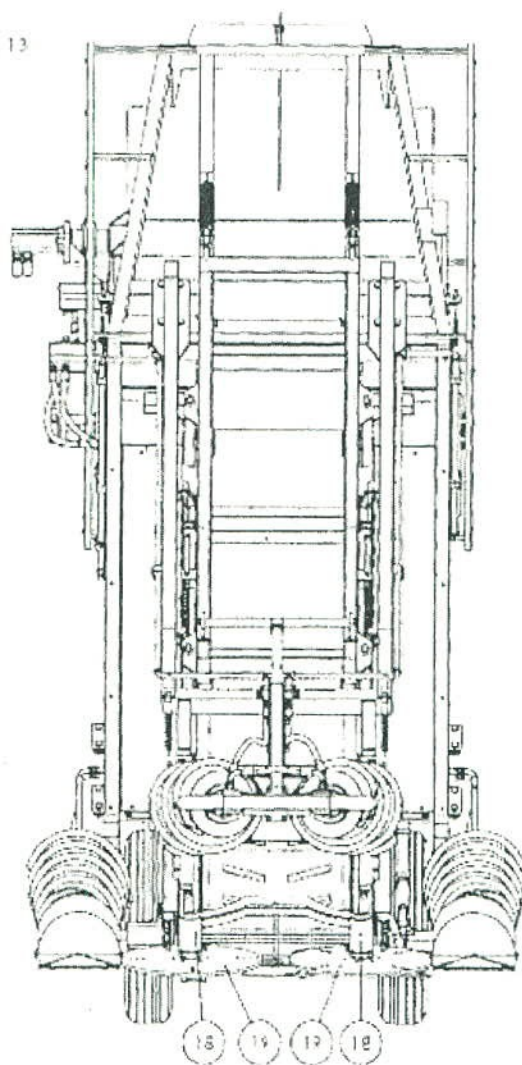
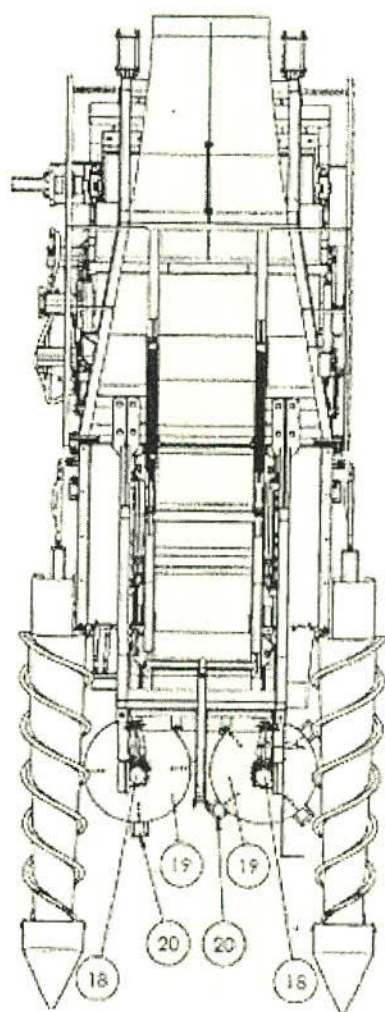


FIG. 14



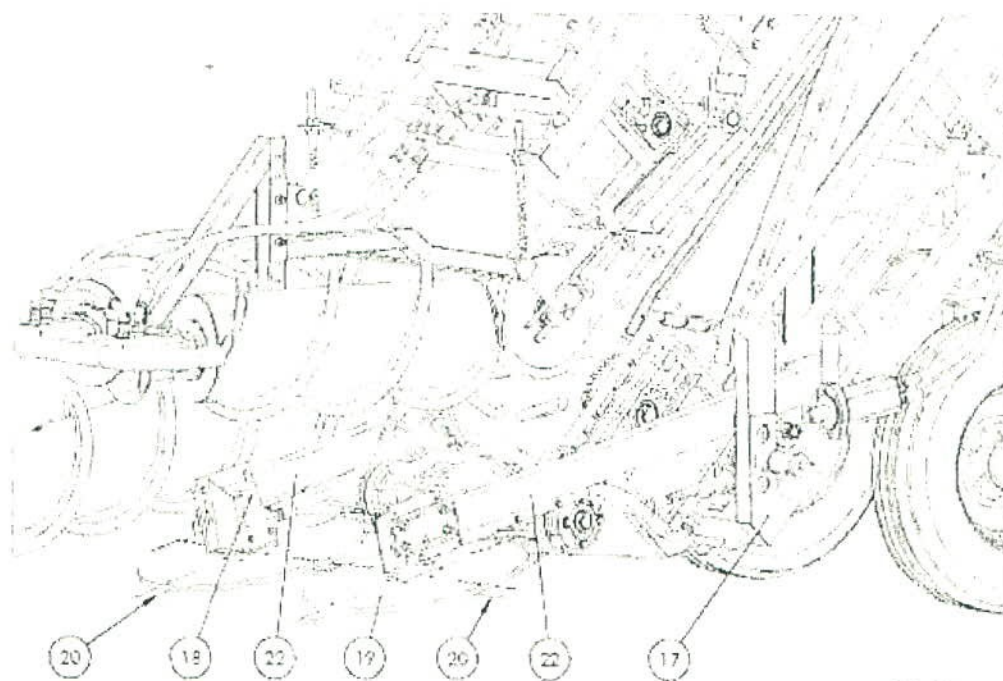


FIG. 15

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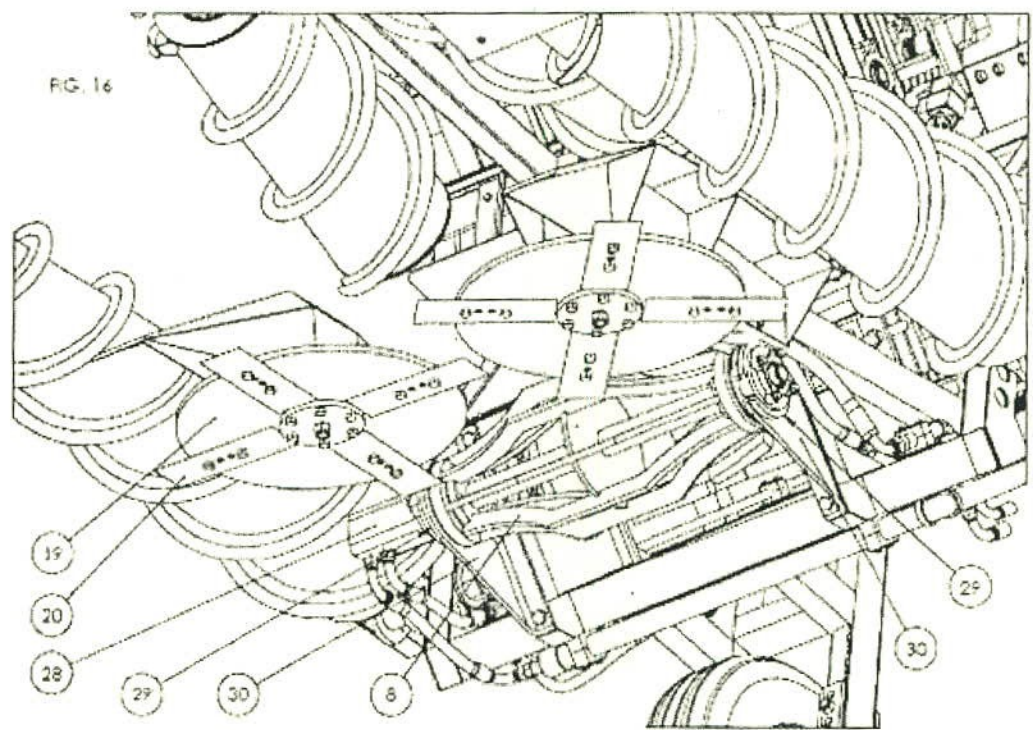
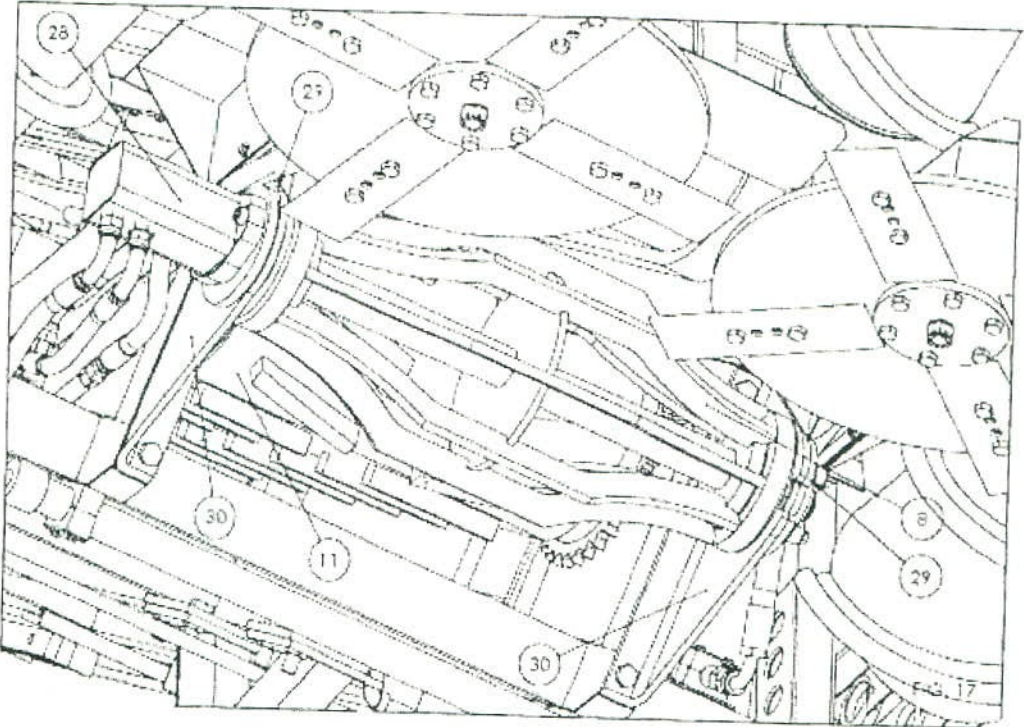


Fig.17



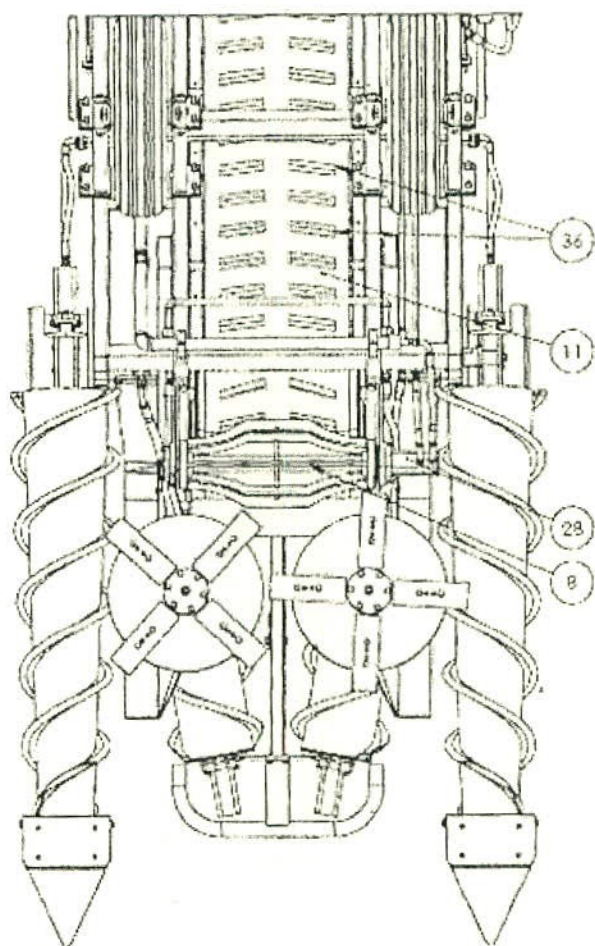


FIG. 18

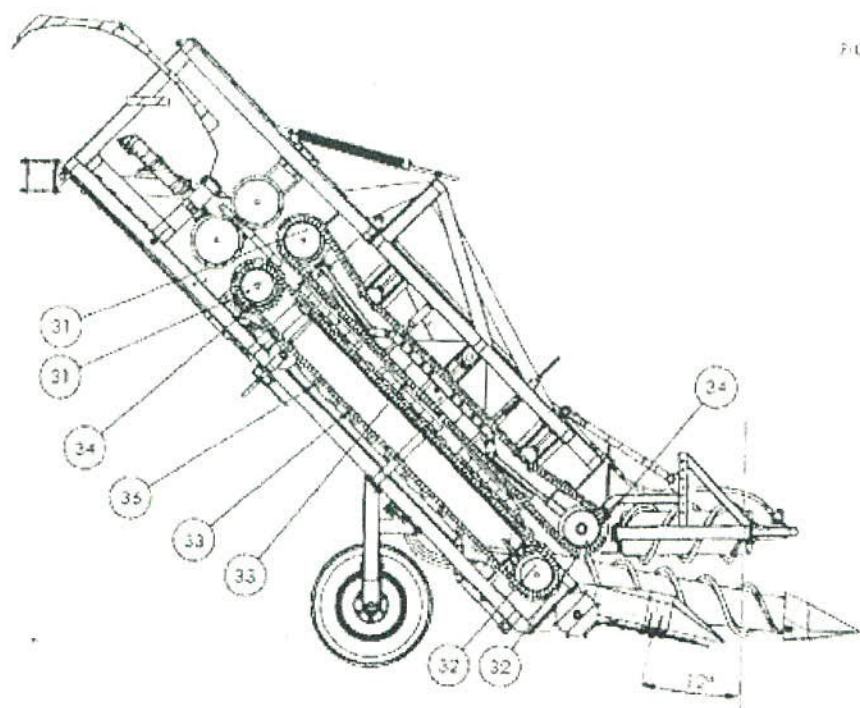


FIG. 19

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FIG. 20

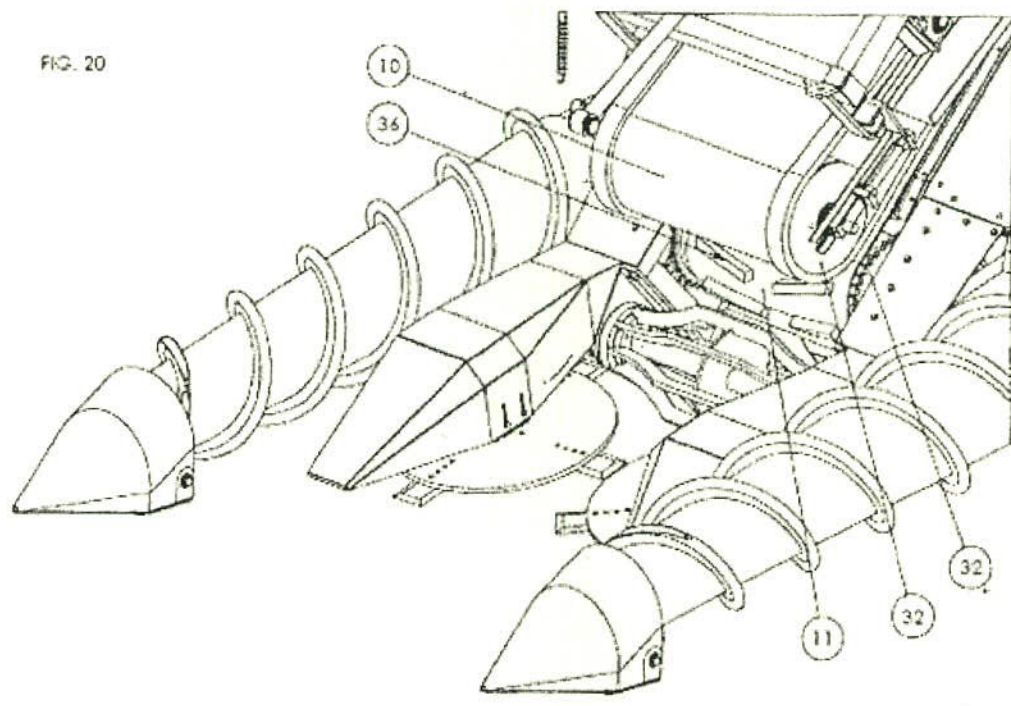
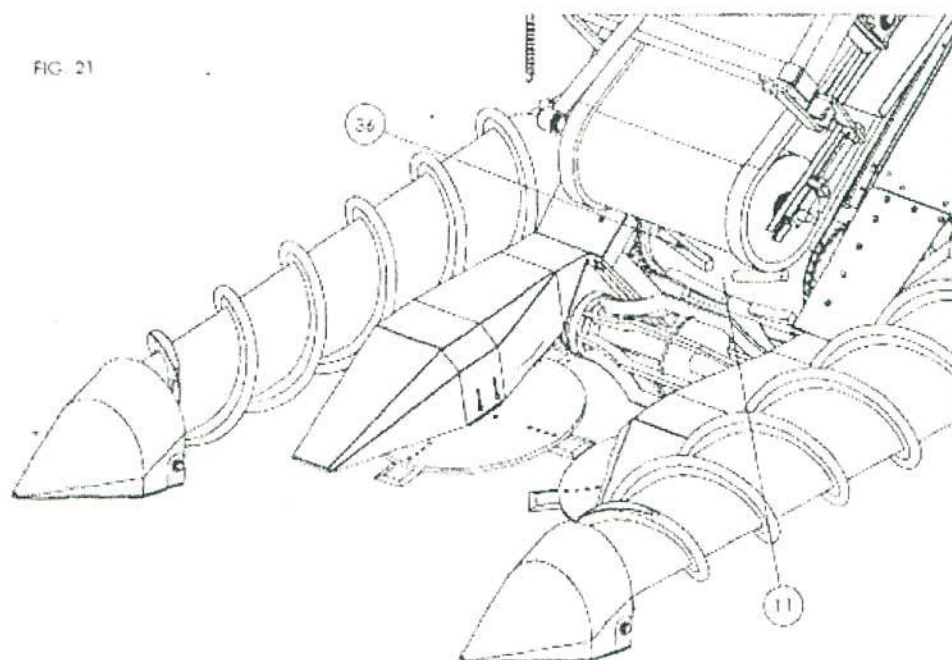


FIG. 21



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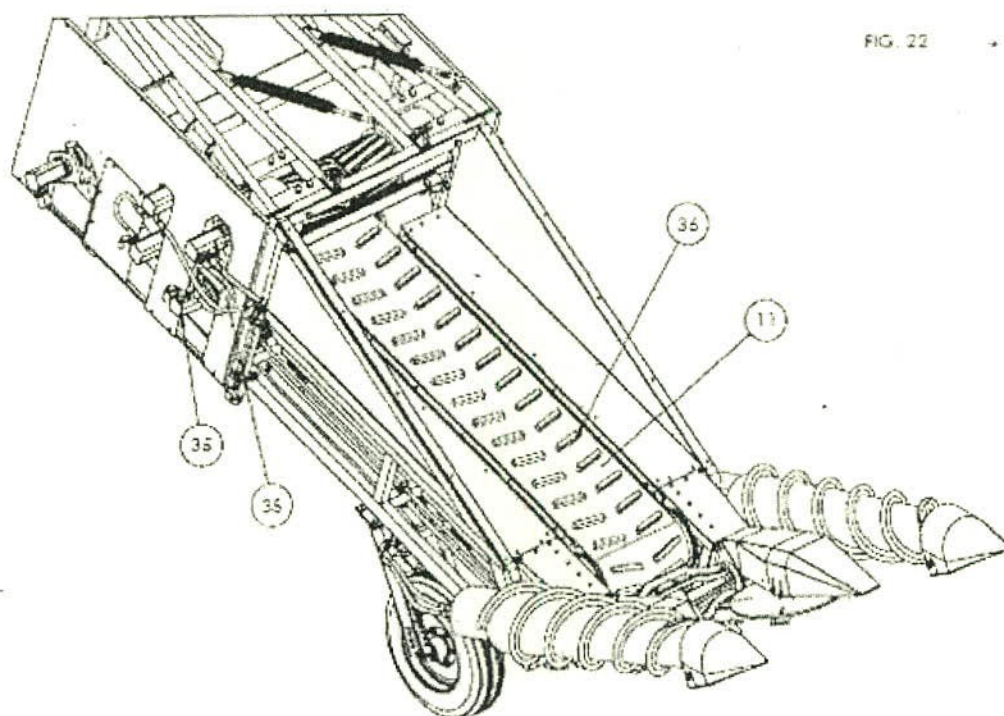
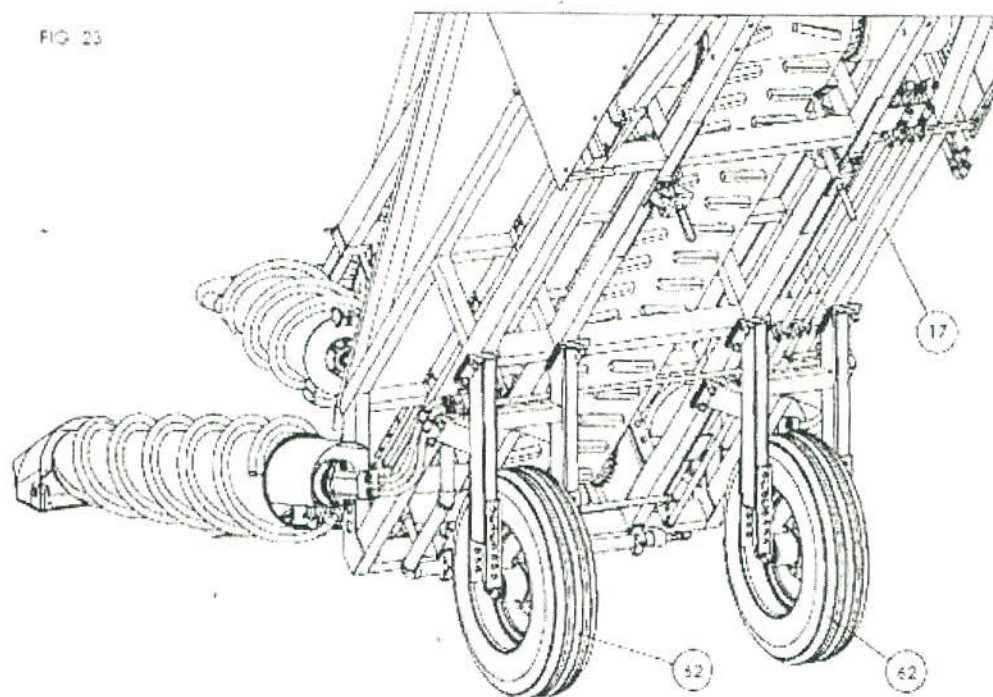


FIG. 22

FIG. 23



39
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Fig. 24

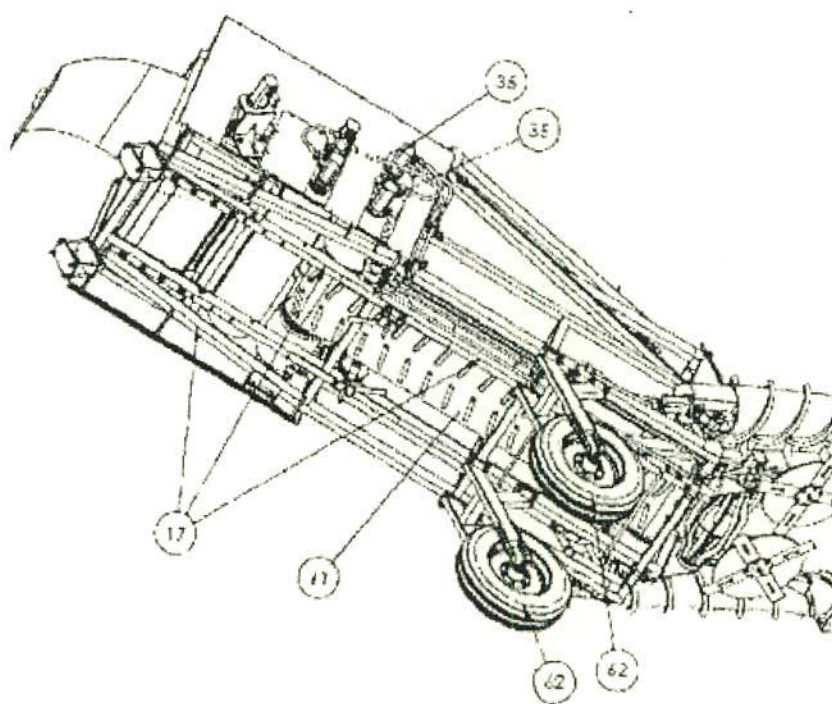
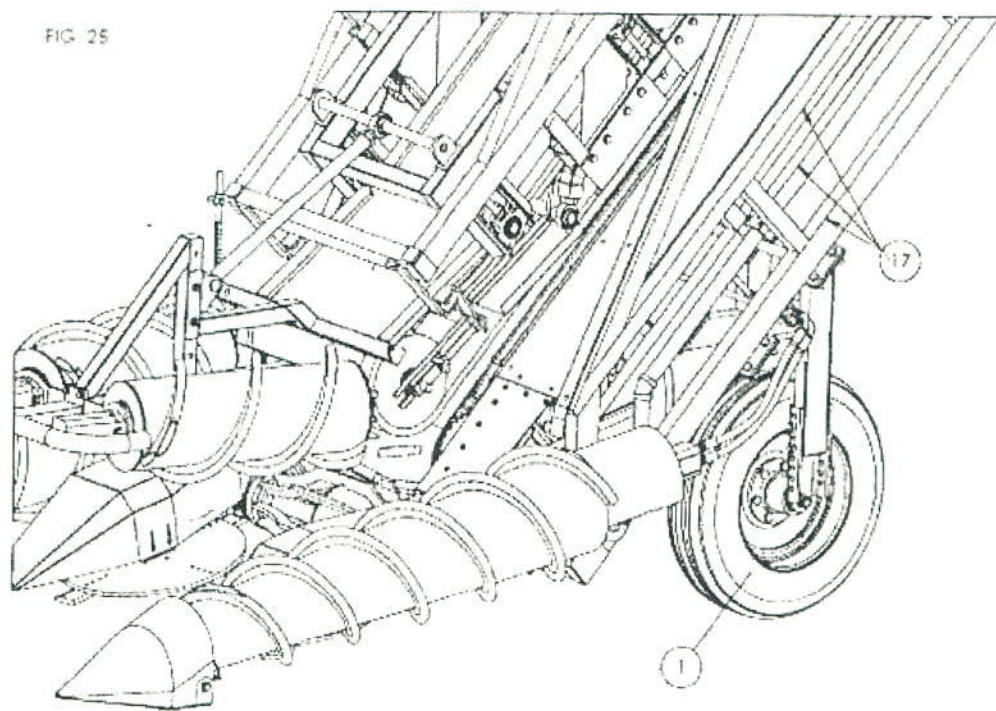
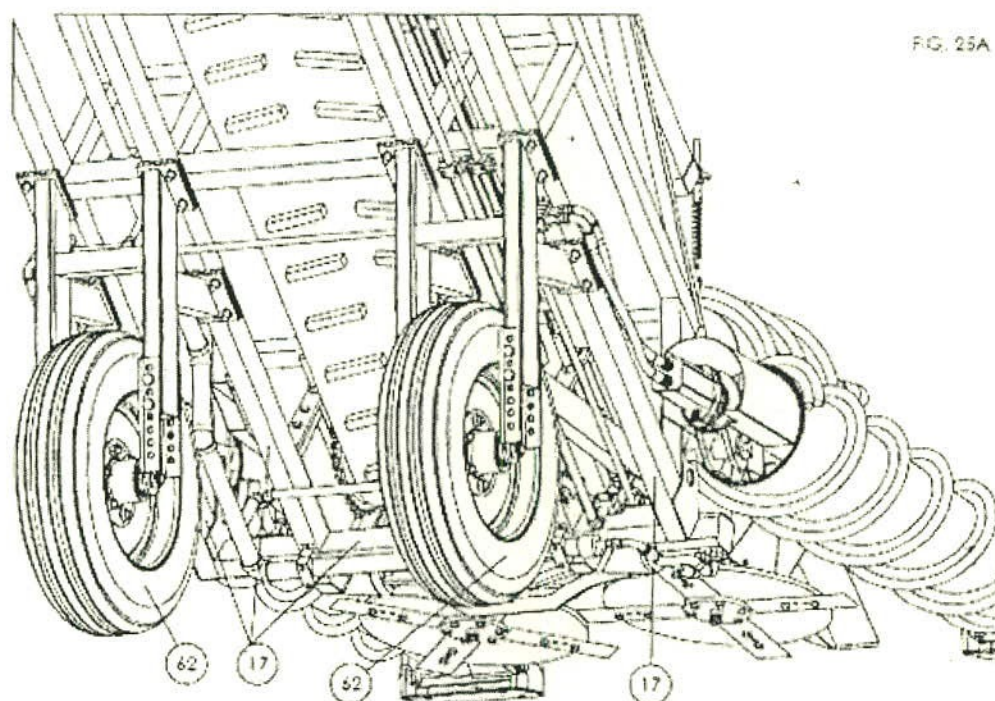


FIG. 25



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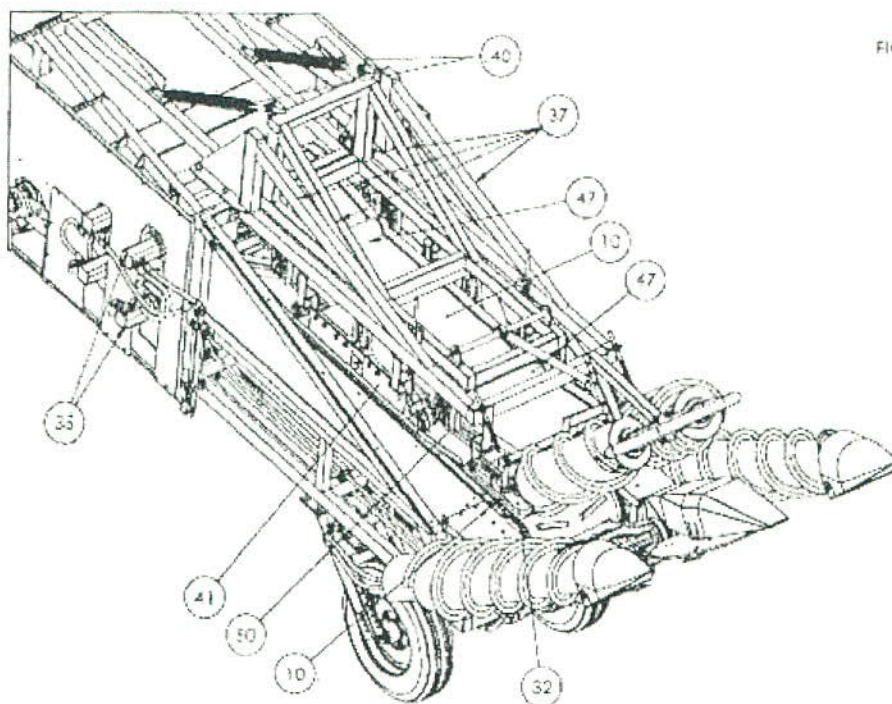


FIG. 26

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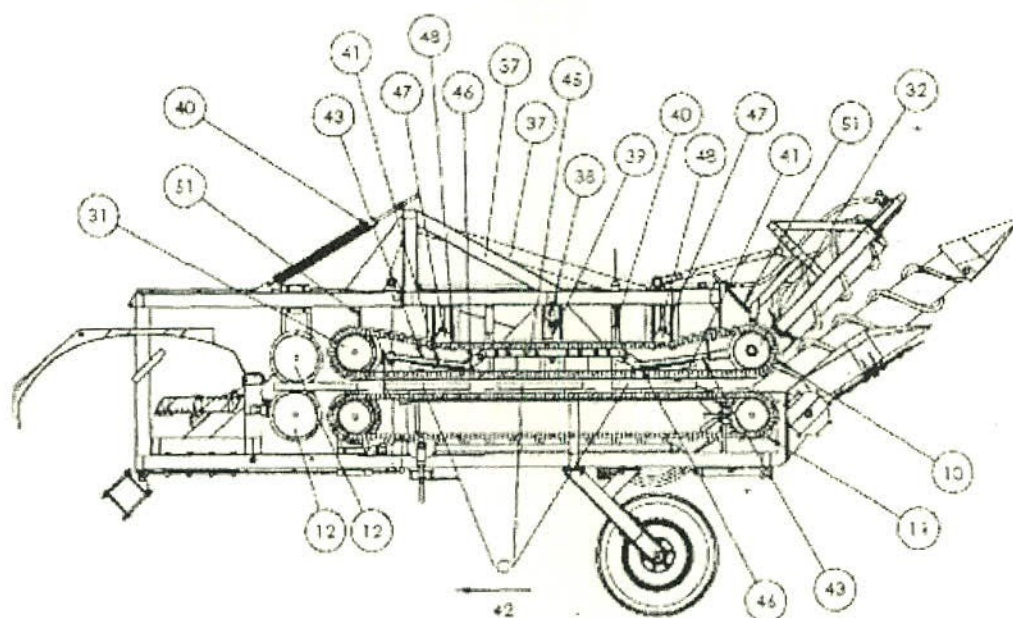


FIG. 27

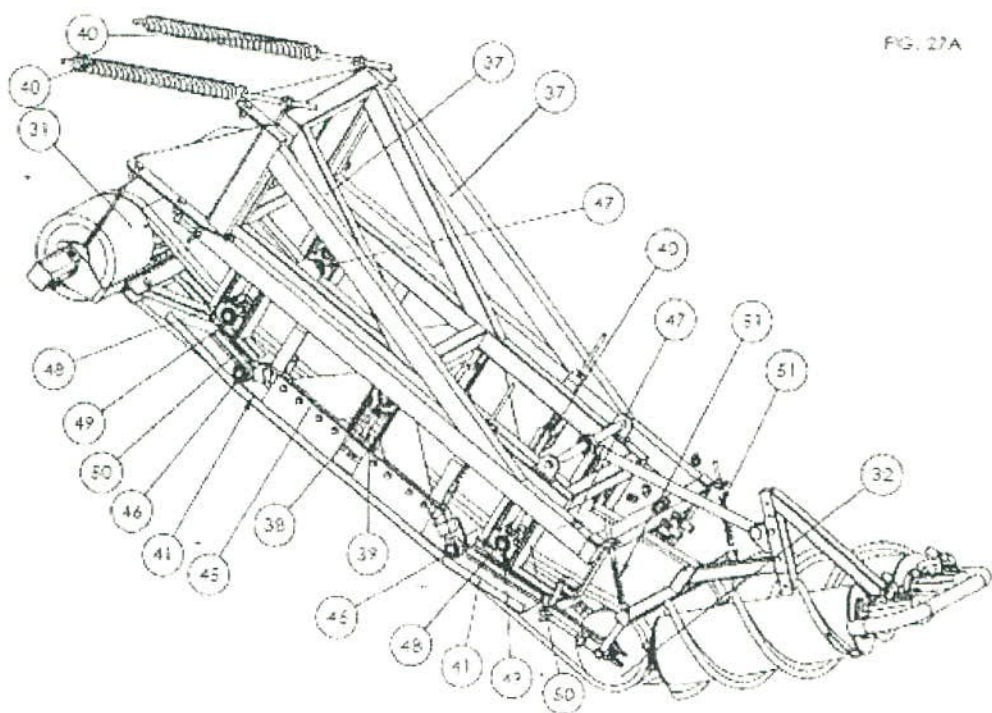


FIG. 27A

Fig. 27B

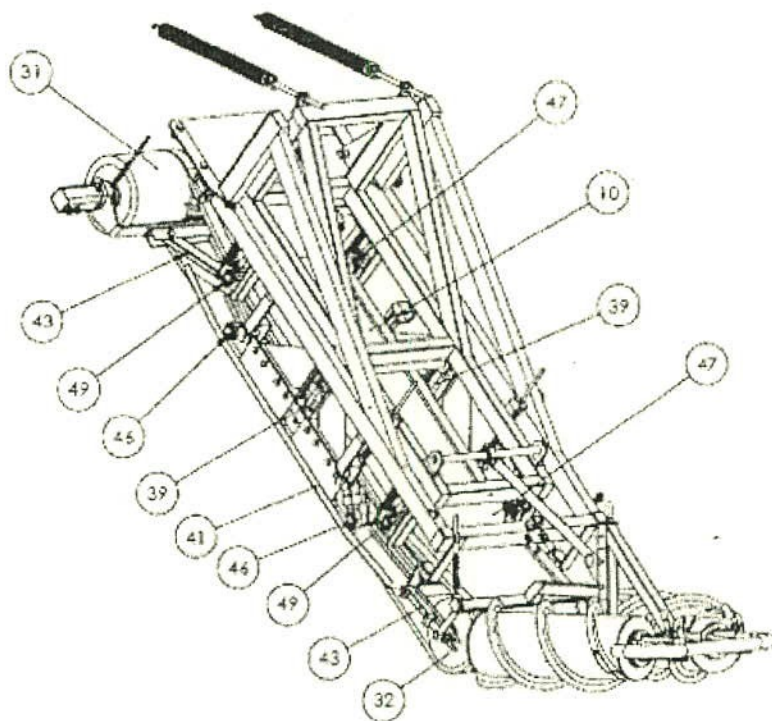
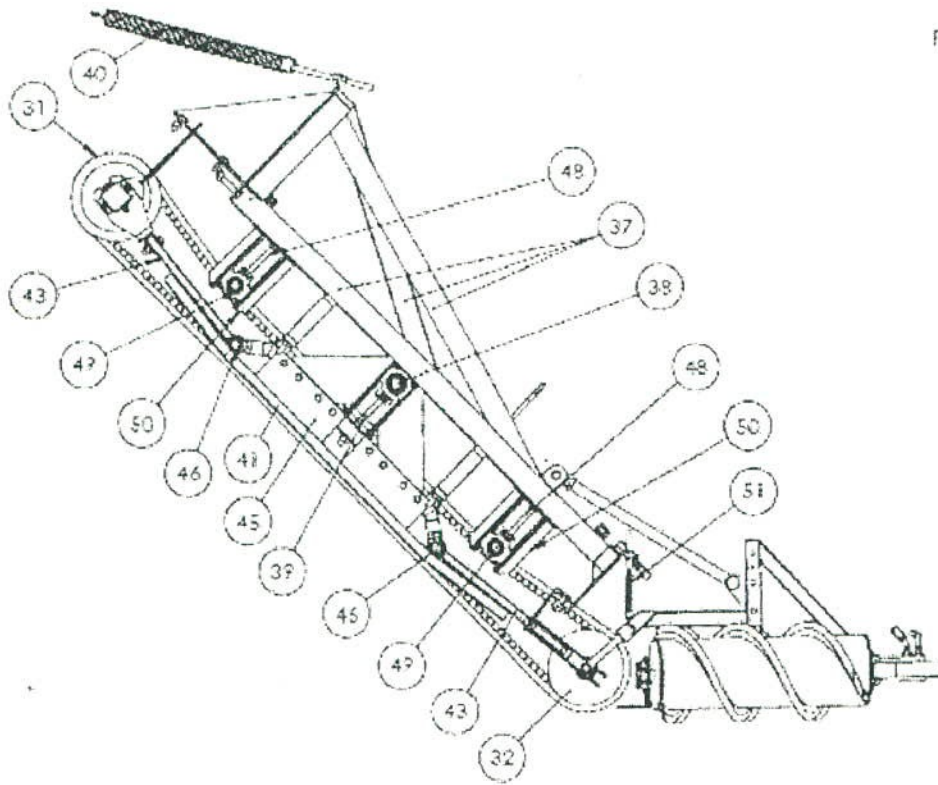


FIG. 27C



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6/10

Fig. 27D

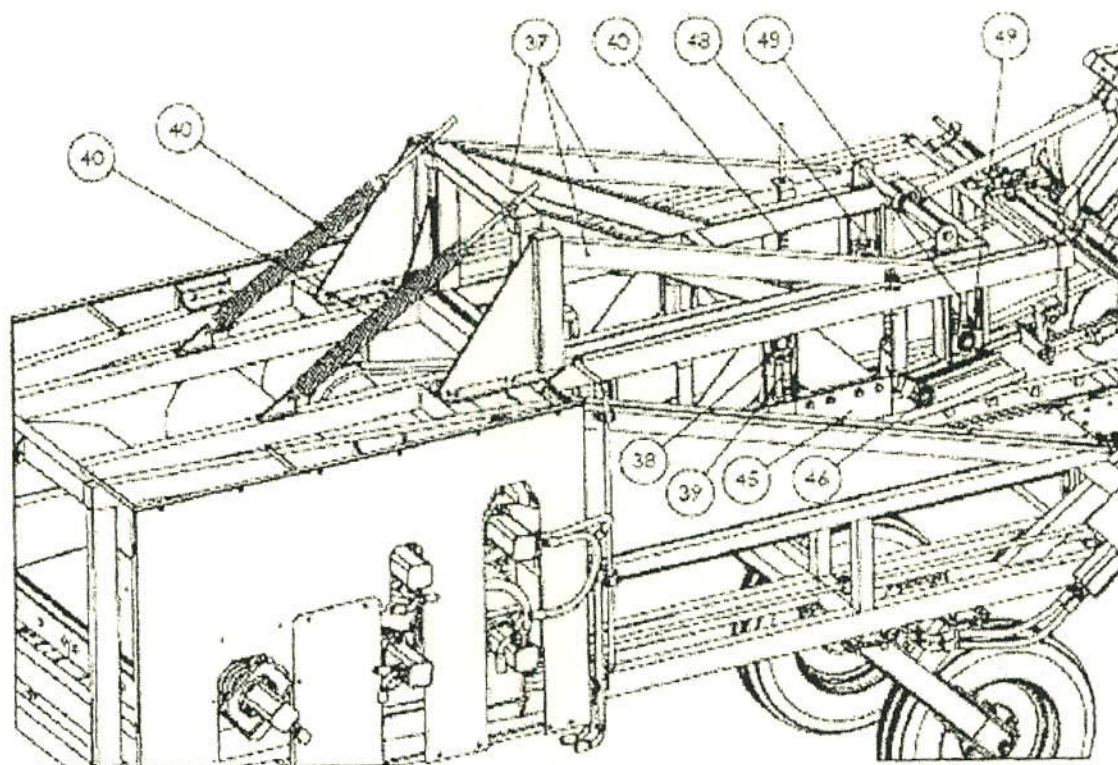
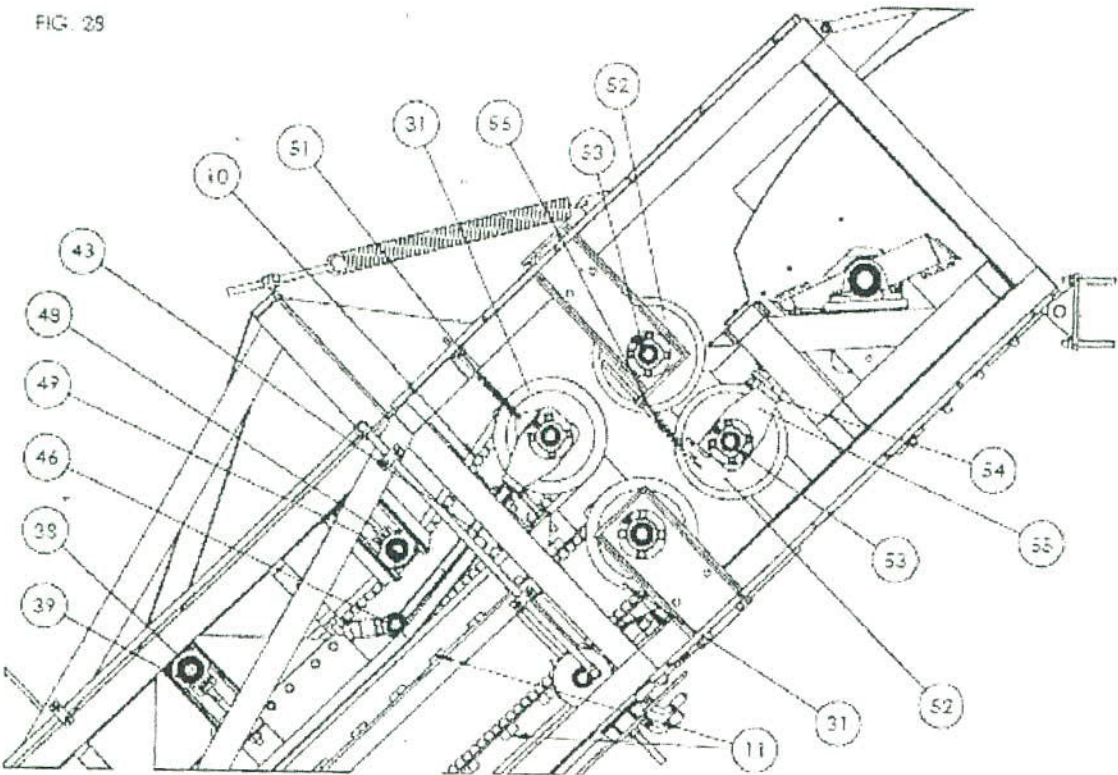


FIG. 28



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FIG. 29

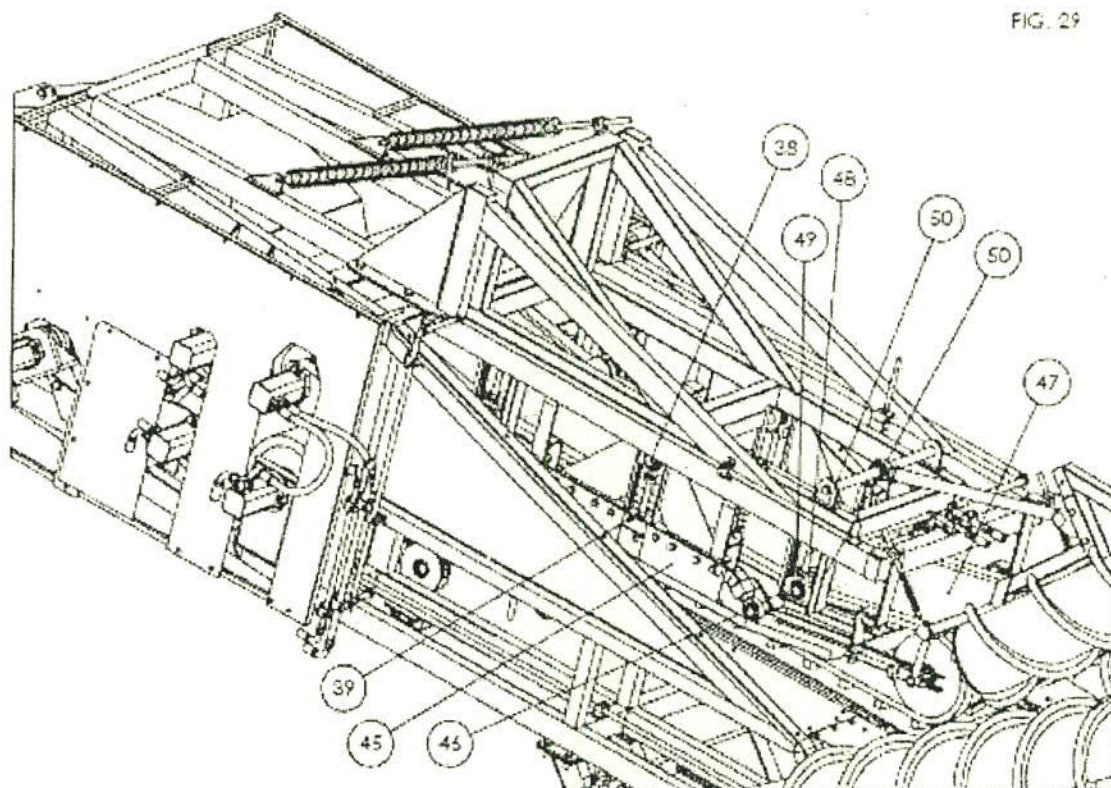
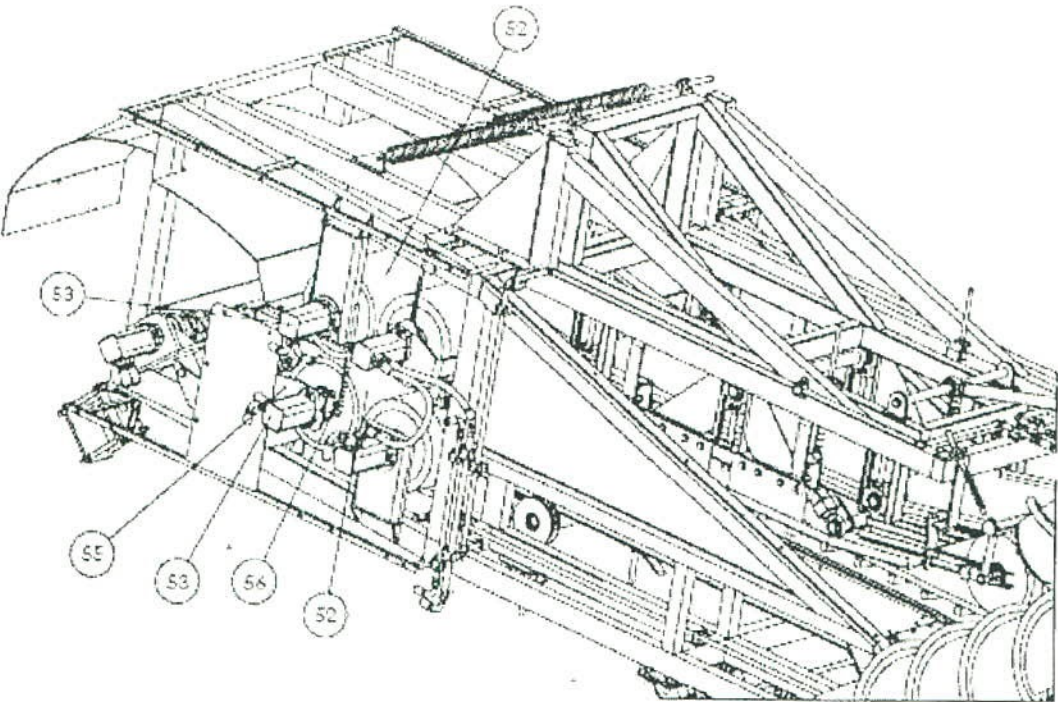


FIG. 30



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FIG. 31

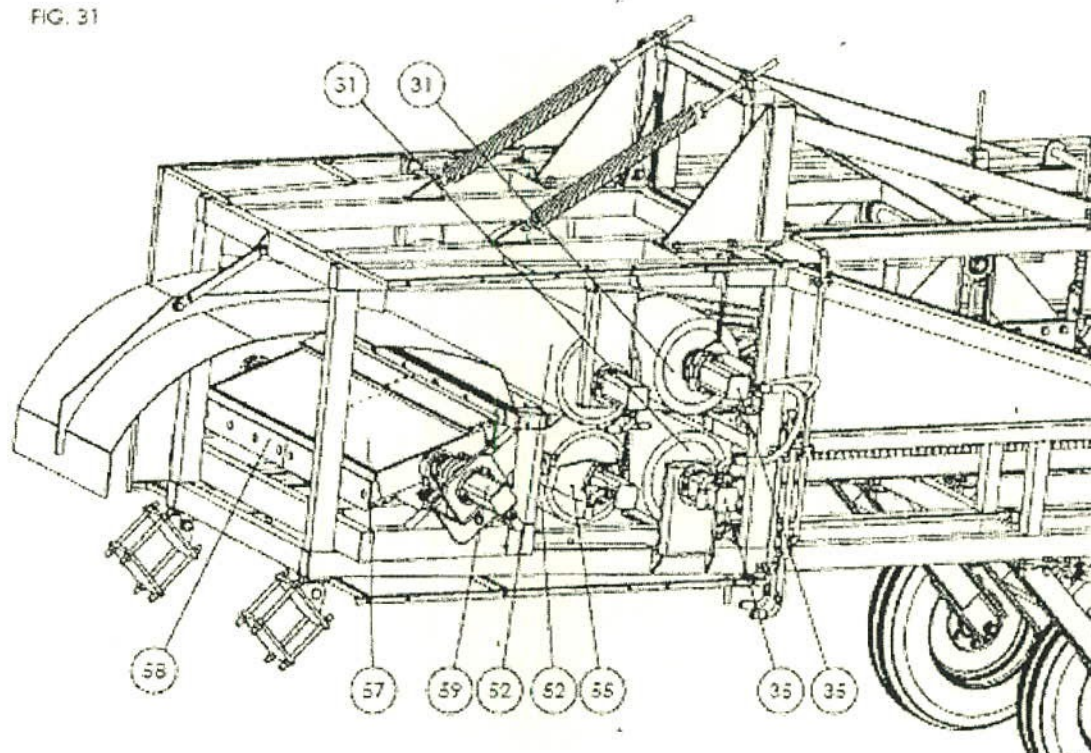


FIG. 32

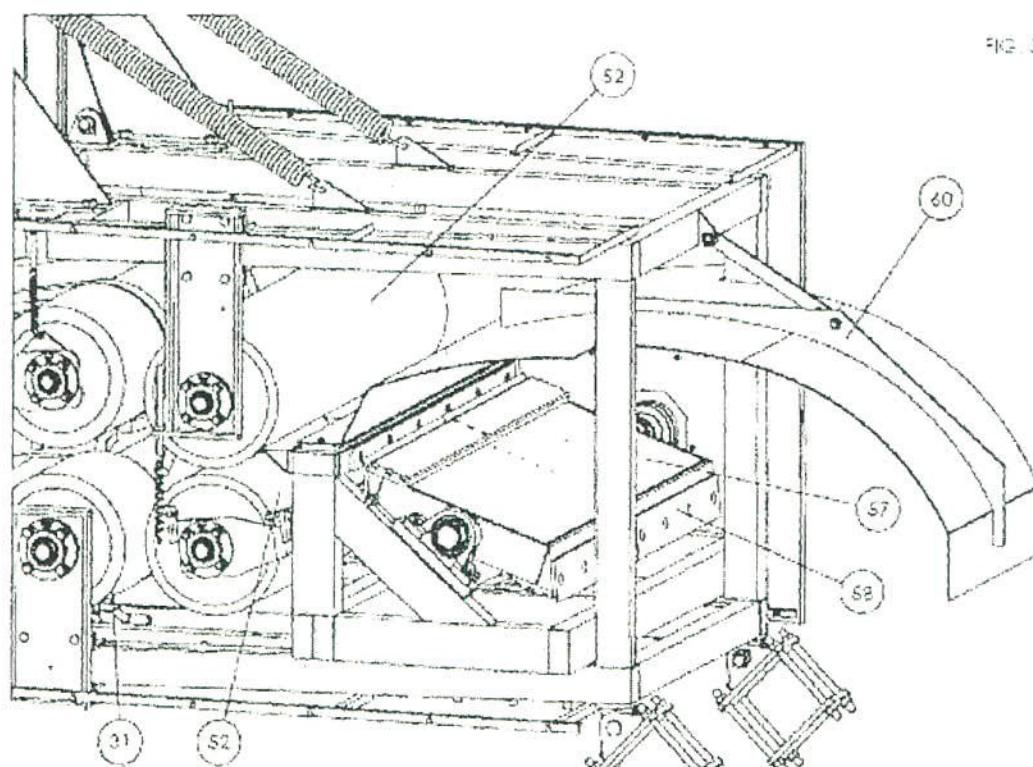
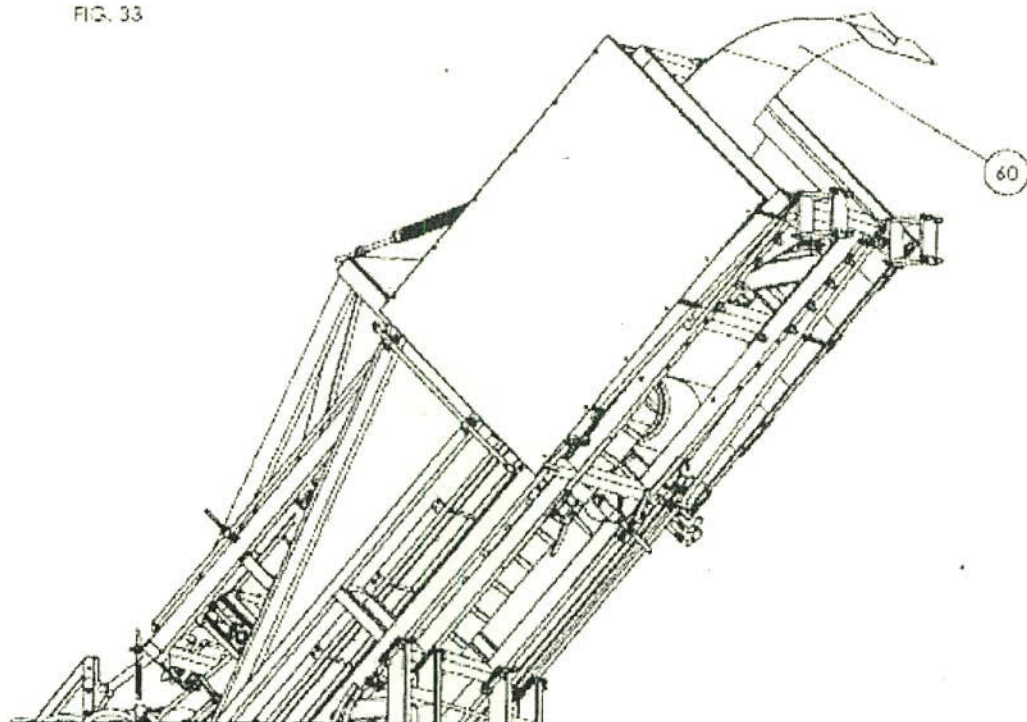


FIG. 33



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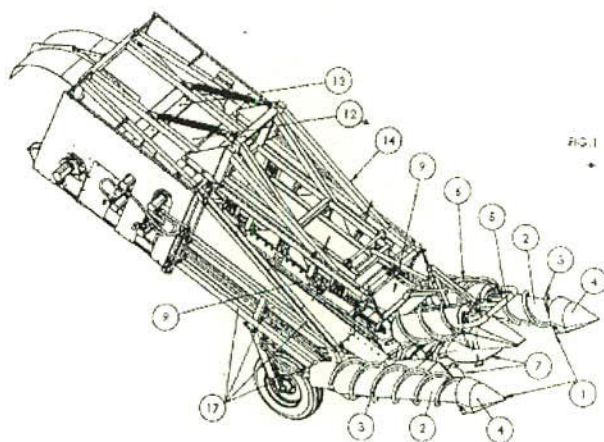
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(54) Title: CONVEYORS MODULE FOR SUGAR-CANE HARVEST AND HARVESTING PROCESS



(57) Abstract: The present invention relates to a harvesting conveyors module, particularly appropriate for sugar cane harvesting, comprising a lifting mechanism (1) arranged horizontally and able to be vertically moved; a base cutting mechanism (7); a deflector mechanism (6) arranged above the lifting mechanism (1) and configured to deflect and aid the displacement of cutted stems to a pulling mechanism (9), said pulling mechanism comprising conveyors, an upper conveyor (10) and a lower conveyor (11); a lifting foil (8) placed near to the lower end of the conveyors (10, 11); a transferring mechanism (12) appropriate to receive the stems from pulling mechanism (9) and transfer them to a chopper mechanism (13), said chopper mechanism (13) being arranged in sequence to the said transferring mechanism (12), and a stretcher mechanism (14) acts on the upper conveyor (10) of the pulling mechanism. The invention also relates to a process for sugar cane harvesting with a module, such process minimizing the forces applied onto the root.

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"CONVEYORS MODULE FOR SUGAR CANE HARVEST AND HARVESTING PROCESS"

The present invention relates to a module for sugar cane harvesting, which is attachable to a tractor or a complete harvester, self-propellant. The invention also relates to a process for cane harvesting.

BACKGROUND ART

The feeding of the cane harvester consists of the process of removing the sugar cane stems from plantation and its introduction into the equipment, in an ordered parallel arrangement.

The cane stems, inside the sugar cane plantation, can be oriented in many arrangements, varying between a vertically orderly position, in the erect cane fields, up to a randomicaly messed up arrangement in the strongly lying down cane fields. Frequently there are both cases inside the same stripe of land which indicates that the harvest equipment must have skills to process both configurations.

The harvesting processes currently existing require that the stems be ordered in parallel to each other, both as in harvest of chopped cane as in whole cane. In the first case the parallel ordering is needed to get a uniform chopping length, and in the second case, the parallel ordering is needed to get an economically acceptable charge density.

The mechanized harvesting processes from background art harvesters, particularly of the Australian chopped cane harvesters (see Figure A - Australian chopped cane harvester) begins with the tips cutting, optional operation, when executed, releases the material in the ground, or when off, it feeds the tips together with the stems. After removing the tips, the stems are bent by the action of a static or rotary deflector and, following, two discs with peripheral knives execute the basal cutting, releasing the stems from the clumps, which allows them to lie down over the ground or over the nearby still standing stems. As the harvester moves forward, and with the aid of the cutting discs of base, the stems reach a lifting roll mechanism followed a cleaning rolls sequencing that drives them up to the chopper. When the cane is harvested without previous burning, and without removing the tips, the synchronous chopper cuts leaves and tips in fragments, which are pneumatically separated by a blowing air upward stream produced by an axial flow extractor.

DRAWBACKS OF THE HARVESTERS FROM BACKGROUND ART:

The prior art harvesters, particularly the Australian chopped cane harvesters, find difficulties to harvest multiple lines of lied down, very tangled

canes. These canes are identified by the producers as canes of low "harvestability". However, these cases have a tendency to become more frequent due to the good vegetative growth, in that progressively more productive varieties are developed. The figures B and C show examples of tangled stems. Entangle of curved canes produces an interaction or link between stems in contact that difficult its removal.

The figure D shows the active working forces upon stems, when removing them by the prior art chopped cane harvester. The said device is called line separator, or helical separator, or lollipop. It is observed from figure B that line separators are in a position near to the vertical and push the stems in the direction of the harvester displacement, up to align them longitudinally in the direction of the movement.

When the stems are difficult to slide over line separators, one generates flexing forces P_h and P_v applied upon an intermediary point of the stem, wherein said forces often has enough magnitude to cause stem breaking or root plucking.

Moreover, the chopped cane harvesters push and lie down the stems to be aligned longitudinally (combed) in a too close position from ground surface, allowing them to receive contamination from soil mineral impurities moved by the basic cutter. This big soil volume is partially cleaned from stems as they passes through the cleaning rolls, provoking a big power demand and reducing the sucrose extraction efficiency.

OBJECTIVES AND ADVANTAGES OF INVENTION:

The object of the present invention is reducing the losses of raw material and the power demand, by the use of a new harvesting module.

Figure E shows a new harvesting principle obtained with the module in accordance with the present invention. The new principle effects the removal of the stems from plantation applying forces F_h and F_v , straightly on stem base, in order to produce a force configuration as illustrated in Figure E. This configuration of forces is more simple and less aggressive to stem resistance than that one shown in Figure D, which represents the principle used in chopped cane harvesters from prior art. The charge condition in Figure E shows predominantly traction forces applied at the end of stem instead of flexing charges applied upon an intermediary point of said stem, as shows the figure D. In the case of chopped cane harvesters of the prior art, the line separators push (combs) the stems in the direction of the harvester displacement, up to align them longitudinally in the direction of the movement.

To capture a stem it is necessary to know its location in the

distribution of the plantation. The only point of a stem the location of which is known, is the point of stem insertion in the ratoon. This point is where the base cutting happens. In the module according to the invention, the stem is captured and pulled from this point, and, hence, the removal process becomes quite indifferent to the falling degree of the canes. As the removal process goes forward pulling the stems towards a common point, the parallel ordering will spontaneously happen.

The objective of the invention is reached through a harvesting conveyors module, which comprises a lifting mechanism arranged horizontally and able to be vertically moved; a base cutting mechanism; a deflector mechanism arranged above the lifting mechanism and configured to deflect and aid the displacement of the cut stems to a pulling mechanism, said pulling mechanism comprising conveyors, an upper conveyor and a lower conveyor; a lifting roll situated near the lower end of the conveyors; a transferring mechanism appropriated to receive the stems from the pulling mechanism and transfer them to a chopper mechanism, said chopper mechanism being arranged in sequence to said transferring mechanism, and wherein a stretcher mechanism acts at the upper conveyor of the pulling mechanism.

Hence, the module according to the present invention provides a substantial reduction in the harvesting losses, avoiding stem breakings and root plucking.

Another advantage of the module according to the present invention is the fact that the removal process of the stems from plantation is few dependent of the falling degree of the canes, as the stems are cut near to the root.

The process according to the present invention comprises the following steps:

Process for harvesting the erect sugar cane:

A deflector inclines the cane longitudinally effecting a minimum force at the root of said cane; cut discs cut the cane; a lifting roll lifts the end of the cane and transfers it to conveyors; and the conveyors of a pulling mechanism pull the cane, and a transfer mechanism transfers the cane to a chopper mechanism which cuts the cane in pieces.

Process for harvesting the laterally bent sugar cane:

A cut disc cuts the cane without effecting any effort at the root of said cane, and the cane, consequently, falls on the upper surface of a metallic cone of the lifting mechanism; the other end of the cane, consequently, climbs up and touches the lower surface of a deflector mechanism cylinder; the helicoids of the lifting mechanism and the helicoids of the deflector mechanism, through rotation, move the

cane up to the conveyors of a pulling mechanism; and the conveyors of the pulling mechanism pull the cane up to a transferring mechanism, and the transferring mechanism transfers the cane to a chopper mechanism which cuts the cane in pieces.

Process for harvesting the laterally lied down sugar cane:

5 A metallic cone of a lifting mechanism lifts a little the cane, without effecting any effort at the root of said cane; a cut disc cuts the cane, and the cane, consequently, falls on the upper surface of the lifting mechanism; the other end of the cane, consequently, climbs up and touches the lower surface of a cylinder of a deflector mechanism; the helicoids of the lifting mechanism and the helicoids of the
10 deflector mechanism, through rotation, move the cane up to the conveyors of a pulling mechanism; and the conveyors of the pulling mechanism pull the cane, and a transferring mechanism transfers the cane to a chopper mechanism which cuts the cane in pieces.

15 Process for harvesting the lied down longitudinally forward or backwards sugar cane:

The cut disc cuts the cane effecting a minimum force at the root of said cane; a lifting roll lifts the end of the cane and transfers it to conveyors of a pulling mechanism; and the conveyors of the pulling mechanism pull the cane, and a transferring mechanism transfers the cane to a chopper mechanism which cuts the
20 cane in pieces.

The invention will be, next, more in detail described, by way of example, on basis of the attached figures:

FIGURE 1 - perspective view of a preferred embodiment of the conveyors module according to the present invention;

25 FIGURE 2 - lateral view of the module of the figure 1;

FIGURE 3 - upper view of the module of the figure 1;

FIGURE 4 - front view of the module of the figure 1;

FIGURE 5 - lower view of the module of the figure 1;

30 FIGURE 6 - perspective front view of a preferred embodiment of the lifting mechanism according to the present invention;

FIGURE 7 - perspective rear view of the lifting mechanism of the figure 6;

FIGURE 8 - lateral view of the lifting mechanism of the figure 6;

35 FIGURE 9 - perspective view of a preferred embodiment of the deflector mechanism according to the present invention;

FIGURE 10 - lateral view of the deflector mechanism;

FIGURE 11 - upper view of the deflector mechanism;

FIGURE 12 - front view of a preferred embodiment of the base cutting mechanism in accordance with the present invention;

FIGURE 13 - front view of the base cutting mechanism of figure 12 without the protection plates;

FIGURE 14 - upper view of the base cutting mechanism of figure 12 without the plates of protection and without the deflector mechanism;

FIGURE 15 - perspective view of the base cutting mechanism of figure 12 without the protection plates;

FIGURE 16 - lower view of the base cutting mechanism of figure 12;

FIGURE 17 - lower view of a lifting roll in accordance with the present invention;

FIGURE 18 - lower view of the lifting roll of figure 17 and of a pulling mechanism according to the invention;

FIGURE 19 - lateral view of a preferred embodiment of the pulling mechanism in accordance with the present invention;

FIGURE 20 - perspective view of the pulling mechanism of figure 19;

FIGURE 21 - perspective view of the pulling mechanism of figure 19 without the upper conveyor;

FIGURE 22 - perspective view of the pulling mechanism of figure 19 without the upper conveyor and without the stretcher mechanism;

FIGURE 23 - perspective rear view of the module supporting frame in accordance with the present invention;

FIGURE 24 - lower view of the complete supporting frame of the module in accordance with the present invention;

FIGURE 25 - front view of the lower part of the module supporting frame in accordance with the present invention;

FIGURE 25th - rear view on the lower part of the module supporting frame in accordance with the present invention;

FIGURE 26 - perspective view of a preferred embodiment of the stretcher mechanism in accordance with the present invention;

FIGURE 27 - lateral view of the stretcher mechanism of figure 26;

FIGURES 27A to 27D - views of the stretcher mechanism of

figure 26;

FIGURE 28 - lateral view of a preferred embodiment of the transferring mechanism in accordance with the present invention and of the upper part of the stretcher mechanism of figure 26;

5 FIGURE 29 - upper view of the stretcher mechanism of figure 26;

FIGURE 30 - perspective view of a preferred embodiment of the transferring mechanism and of the superior part of the stretcher mechanism of figure 26;

10 FIGURE 31 - perspective view of the transferring mechanism of figure 30 and of a preferred embodiment of the chopper mechanism;

FIGURE 32 - perspective view of the chopper mechanism of figure 31; and

15 FIGURE 33 - lower view of the exit plate of the chopper mechanism.

Figures 1 to 5 show the general views of the module in accordance with the present invention, whereas the figures 6 to 33 detail all the mechanisms that compose the module.

20 Figures 1 to 5 show a preferred embodiment of the module in accordance with the present invention, wherein it is observed a lifting mechanism 1 which comprises two revolving metallic cones 2 with respective helicoids 3 arranged on its surface. The tips 4 of the metallic cones 2, preferably, are not revolving and are kept touching the ground, lifting the sugar cane stems lied down on the ground transversely to the direction of the module displacement. Nowadays, due to bigger productivity of
25 cane plantation, the stems achieve bigger heights and many of them frequently laid down transversely on the ground and need to be lifted before cutting. Additionally, the stems that remain erect in the plantation are lied down longitudinally by a deflector 5 of a deflector mechanism 6 for afterward harvesting. Hence, with all lifted stems or stems bent longitudinally in the direction of the module displacement, a base cutting
30 mechanism 7 cuts the stems near root. Following, the deflector mechanism 6 and a lifting roll 8 transfer the stems to a pulling mechanism 9, which holds tight the stems between its conveyors, upper conveyor 10 and lower conveyor 11. Said conveyors transport the stems up and transfer them to a transferring mechanism 12, which in turn, transfers them to a chopper mechanism 13. A stretcher mechanism 14 supports and
35 stretches the upper conveyor 10, as well as regulates the distance between said conveyors 10 and 11.

Then, after the module effects all the working steps, the straw is moved by a flow of air and the pieces of cane of approximately 20 cm are dumped in a bucket truck.

Lifting Mechanism (see figures 6 to 8):

5 Figures 6 to 8 detail the lifting mechanism 1 that comprises the revolving metallic cone 2 with the helicoid arranged on its surface 3 and with a tip 4, preferably, not revolving, and which slides touching the ground during the operation of the module. The cone 2 is operated by a motor 15, preferably a hydraulic motor, and a mechanism oscillating axle 16 is fixable in the module supporting frame 17 (see figure 10 1). The oscillating axle 16 makes possible the cone be lifted and lowered, in way to follow the terrain variation.

Base Cutting Mechanism (see figures 12 to 16 and 19):

The base cutting mechanism 7 comprises preferably, two cutting devices oppositely placed to each other, each device being driven by a motor 15 18 and comprising a disc 19 where cutting knives 20 are fixed, said discs having an inclination forward preferably of 12°. The motors 18 are protected by protection plates 21 and each cutting device is fixed by a rod 22 and the module structure 17.

Figures 13 to 16 do not show the protection plates 21.

Deflector Mechanism (see figures 9, 10 and 11):

20 The deflector mechanism comprises a deflector 5 and, preferably, two revolving metallic cylinders 23 with a helicoids 24 arranged on its surface, said cylinders being operated, respectively, by a motor 25 and arranged, preferably, horizontally. The deflector mechanism structure 26 is fixed by rods 27 to the module structure.

25 Hence, in the case of lied down canes transversely to the direction of module displacement, the metallic cone 2 lifts the cane, without displacing the stem in the direction of the movement, in way to minimize the force applied in the root, and then cutting knives 20 cut off said cane, making it falling down over the metallic cone 2. Therefore, the end of the cane, where the cutting happens, climbs up, 30 making the cane to touch the lower part of the metallic cylinder 23. Thus, with an end of the cane supported on the upper part of the cone 2, and another end touched at the lower part of the cylinder 23, said cane is moved backwards, through the rotation of the helicoids 3 and 23, until it reaches the conveyors 10 and 11 of the pulling mechanism 9, which pull the cane and transfer it to the transferring mechanism 12, which in turn, 35 transfers the cane to the chopper mechanism 13. In case of bent canes, the same steps described above take place, wherein in this case the canes do not need to be

lifted by metallic cones 2, since they are bent and are not laterally lied down.

In case of erect canes, the deflector 5 inclines the cane longitudinally, without effecting any effort at the root of said cane, the cut knives 20 cut the cane, and the lifting roll 8 lifts the end of the cane and transfer it to the conveyors 10 and 11 of the pulling mechanism, which transfer the cane to the transferring mechanism 12, which in turn transfers it to the chopper mechanism 13. In case of canes lied down longitudinally forward or backward, the same previously described steps take place for the erect canes.

In case of erect canes or longitudinally lied down canes, the cones 2 and the cylinders 23 of deflector mechanism 6 has not function.

Lifting Roll (see figures 9, 16, 17 and 18):

The lifting roll 8 is positioned near to the lower end of the upper 10 and lower 11 conveyors, is driven preferably, by a hydraulic motor 28 and is supported at the ends by bearings 29 assembled on a frame 30.

Pulling mechanism (see figures 10, 18 to 22, 24, 26 and 31):

The pulling mechanism comprises preferably, two conveyors, an upper conveyor 10 and a lower conveyor 11, said conveyors being assembled, each one, preferably, in a upper roll 31 and a lower roll 32, each conveyor comprising, in the center, at the internal surface, a longitudinal rib 33 with transverse grooves, said rib acting in a chamfer at the middle of the rolls 31 and 32, so that the conveyors do not move out from the rolls. One of the rolls of each conveyor, preferably the upper rolls 31, are operated by a hydraulic motor 35, while the lower rolls 32 are driven.

It is still observed in the figures that the lower conveyor presents clefts 36 at the outer surface, which serves to increase the friction with the canes and, therefore, improving the displacement of said canes.

In the figures 21 and 22, the upper conveyor 10 is not shown, in order to facilitate the visualization of the lower conveyor 11.

Stretcher Mechanism (see figures 10, 26, 27, 27A, 27B, 27C, 27D, 28 and 29):

The stretcher mechanism 14 comprises a movable structure 37 with a roller-bearing 38 that articulates the whole structure of the mechanism 37, in such bearing is disposed a screwed tuning rod 39 for the adjustment of the distance between upper 10 and lower 11 conveyors. The bearing 38 and springs 40 make possible the structure to oscillate and return back to its position. A plate 41, with ends bent up, is fixed in the structure 15 of the mechanism 37 and spans in the whole width of the upper conveyor 10. The plate 41 leans in the internal lower surface of the upper

conveyor 10 and is used to avoid the deformation of the conveyor 10, when the sugar cane stems C are being pressed and transported between said conveyors 10 and 11 (see figure 27). The arrow 42 indicates the displacement of the stems.

It is still observed from figures that the structure 37 has
5 oscillating arms 43 with an end fixed on the center of the rolls 31 and 32 of the upper conveyor 10, and the other end fixed on a rod 45, which is assembled in the screwed rod 39 and presents kneecaps 46 at the ends. The stretcher mechanism has also rollers 47 fixed in screwed rods 48 for tension tuning, such rollers pushing down the upper surface of superior conveyor 10, keeping said conveyor 10 stretched. The rollers
10 are installed in roller-bearing 49, which are assembled in the respective structures 50, where also the screwed rods 48 are assembled.

Hence, when the conveyors 10 and 11 of the pulling mechanism 9 pulls the sugar cane stems C, the lower roll 32, together the lower oscillating arm 43 raised up, and the stem passes, and the plate 41 keeps the lower
15 part of the conveyor 10 stretched, without deformation. When the stem finishes the passage between the conveyors, the upper roll 31 and the oscillating arm 43 stand up, and the stem C is transferred to the transferring mechanism 12. Repositioning springs 51 act in the rolls 31 and 32, so that said rolls return to the respective positions. When the stems C pass, the structure 37 also oscillates in the bearing 38, and the springs 40
20 guarantee the return of said structure to its position.

Transferring Mechanism (see figures 28, 30 and 31).

The transferring mechanism 12 comprises two rolls 52 driven, respectively, by a motor 53, said rolls 52 being arranged in parallel and revolving in opposite way, and being that one of the rolls is mobile and can be offset from another
25 roll through a distance variation device 54. Said distance variation device 54 comprises articulating arms 55, where the movable roll is fixed, and springs 56.

Chopper Mechanism (see figures 31, 32 and 33):

The chopper mechanism 13 comprises a body 57 with at least a cutting knife 58, wherein said body is revolved by a motor 59. A gutter 60, with an
30 approximately circle shape, drives the cut pieces of cane.

Module Supporting Frame (see figures 23, 24, 25 and 25A):

The figures show the module supporting frame 17 wherein the wheels 62 are assembled.

Further to the embodiments previously presented, the same
35 inventive concept can be applied to other alternatives or possible uses of the invention, as for example, instead of hydraulic motors, pneumatic motors can be used. Moreover,

the deflector mechanism can be simplified and, instead of the convergent cylinders, it can be constructed by a plate or bars.

Therefore, it will be comprised that the present invention should be interpreted in a comprehensive way, being its scope determined by the terms of the
5 attached claims.

CLAIMS

1. A harvesting conveyors module, particularly appropriated for sugar cane harvesting, wherein comprises a lifting mechanism (1) arranged horizontally and able to be vertically moved; a base cutting mechanism (7); a deflector mechanism (6) arranged above the lifting mechanism (1) and configured to deflect and aid the displacement of the cutted stems to a pulling mechanism (9), said pulling mechanism comprising conveyors, an upper conveyor (10) and a lower conveyor (11); a lifting roll (8) placed near the lower end of the conveyors (10, 11); a transferring mechanism (12) appropriate to receive the stems from the pulling mechanism (9) and transfer them to a chopper mechanism (13), said chopper mechanism (13) being arranged in sequence to said transferring mechanism (12), and a stretcher mechanism (14) acts in the upper conveyor (10) of the pulling mechanism.

2. A lifting mechanism (1) wherein comprises at least a revolving metallic cone (2) with a helicoid (3) arranged on its surface (3) and with a tip (4), preferably, not revolving, said cone being operated by a motor (15), and having an oscillating axle (16) which is a fixable in the module supporting frame (17).

3. A base cutting mechanism (7) wherein comprises, preferably, two cutting devices oppositely situated to each other, each device being operated by a motor (18) and comprising a disc (19) where cutting knives (20) are fixed, said discs (19) having an inclination forward, preferably by 12°.

4. A deflector mechanism (6) wherein comprises, a deflector (5) and, preferably, two revolving metallic cylinders (23) with a helicoid (24) arranged on its surface, said cylinders being operated, respectively, by a motor (25) and being arranged, preferably, horizontally.

5. A pulling mechanism (9) wherein comprises, preferably, two conveyors, an upper conveyor (10) and a lower conveyor (11), said conveyors being assembled, each one, preferably, in a upper roll (31) and a lower roll (32), and being at least one of the rolls of each conveyor operated by a motor (35).

6. A pulling mechanism (9) as claimed in claim 5, wherein the upper rolls (31) are operated and the lower rolls (32) are driven, and the inferior conveyor (32) has clefts (36) on its outer surface.

7. A pulling mechanism (9) as claimed in claim 5, wherein each conveyor comprises in the center, in the internal surface, a longitudinal rib (33) with transverse grooves, such rib acting in a chamfer placed at the center of rolls (31, 32).

8. A lifting roll (8), wherein is situated near the lower end of the upper (10) and lower (11) conveyors and is operated, preferably, by a hydraulic motor

(28).

9. A stretcher mechanism (14), wherein comprises a movable structure (37), the structure having oscillating arms (43), each arm (43) presenting an end fixed on the center of a roll (31, 32) of the upper conveyor (10) and the other end fixed on a bar (45) through kneecaps (46); the mechanism comprising also rollers (47) that act in the upper surface of the upper conveyor (10), stretching said conveyor, springs of repositioning the movable structure (40) and springs of repositioning the rolls (51).

10. A stretcher mechanism (14) as claimed in claim 9, wherein the rollers are installed in roller bearing (49), which are assembled in the respective structures (50) which have a screwed rod for adjusting the tension (48).

11. A stretcher mechanism (14) as claimed in claim 9, wherein comprises additionally a roller bearing (38) that articulates the whole structure of the mechanism (37), in the bearing being disposed a screwed rod (39) for adjusting the distance between the upper conveyor (10) and the lower conveyor (11), and a plate with bent ends up (41) fixed on the structure of the mechanism (37), is disposed leaning in the bottom internal surface of the superior conveyor (10).

12. A transferring mechanism (12) wherein comprises two rolls (52) operated, each one, by a motor (53), said rolls (52) being arranged in parallel and revolving in opposite senses, and being one of the rolls movable and can move away from another roll through a distance variation device (54, 55, 56).

13. A transferring mechanism (12) as claimed in claim 12, wherein the distance variation device (54, 55, 56) comprises articulating arms (55), where there is fixed the movable roll (52) and springs (56).

14. A chopper mechanism (13) wherein comprises a body (57) with at least a cutting knife (58), and said body being rotated by a motor (59).

15. A process for harvesting the erect sugar cane, using a conveyors module as defined in the claim 1, wherein comprises, sequentially, the following steps:

a) a deflector (5) inclines the cane longitudinally, without moving the stem in the direction of the movement, in way to minimize the forces applied in the root;

b) cutting discs (19) cut the cane;

c) a lifting roll (8) lifts the end of the cane and transfers it to conveyors (10,11); and

d) the conveyors (10,11) of a pulling mechanism (9) pull the

cane, and a transferring mechanism (12) transfers the cane to a chopper mechanism (13), which cuts the cane in pieces.

16. A process for harvesting the laterally bent sugar cane, using a conveyors module as defined in the claim 1, wherein comprises, sequentially, the following steps:

a) a cutting disc (19) cuts the cane without effecting any effort at the root of said cane, and the cane, therefore, falls on the upper surface of a metallic cone (2) of the lifting mechanism (1);

b) the other end of the cane, consequently, climbs up and touches the lower surface of a cylinder (23) of a deflector mechanism (6);

c) the helicoids (3) of the metallic cone (2) and the helicoids (24) of the cylinder (23), through rotation, move the cane up to the conveyors (10, 11) by a pulling mechanism; and

d) the conveyors (10, 11) of the pulling mechanism pull the cane up to a transferring mechanism (12), and the transferring mechanism (12) transfers the cane to a chopper mechanism (13), which cuts the cane in pieces.

17. A process for harvesting laterally lied down sugar cane, using a conveyors module as defined in the claim 1, wherein comprises, sequentially, the following steps:

a) a metallic cone (2) of a lifting mechanism (1) lifts a little the cane, without moving the stem in the direction of the movement, in way to minimize the forces applied in the root;

b) a cutting disc (19) cuts the cane, and the cane, consequently, falls on the superior surface of the metallic cone (2);

c) the other end of the cane, consequently, climbs up and touches the lower surface of a cylinder (23) of a deflector mechanism (6);

d) the helicoids (3) of the metallic cone (2) and the helicoids (24) of the cylinder (23), through rotation, move the cane up to the conveyors (10, 11) of a pulling mechanism (9); and

e) the conveyors (10, 11) of the pulling mechanism pull the cane, and a transferring mechanism (12) transfers the cane to a chopper mechanism (13), which cuts the cane in pieces.

18. A process for harvesting sugar cane lied down longitudinally forward or backwards, using a conveyors module as defined in the claim 1, wherein comprises, sequentially, the following steps:

a) the cutting disc (19) cuts the cane without effecting any effort

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at the root of said cane;

b) a lifting roll (8) lifts the end of the cane and transfers it to conveyors (10, 11) of a pulling mechanism (9); and

c) the conveyors (10, 11) of the pulling mechanism (9) pull the
5 cane, and a transferring mechanism (12) transfers the cane to a chopper mechanism (13), which cuts the cane in pieces.

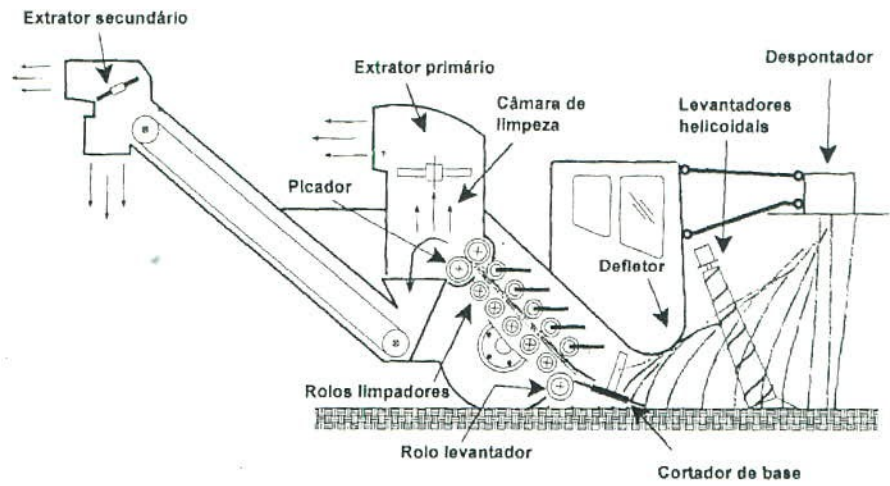


Figura A



Figura B

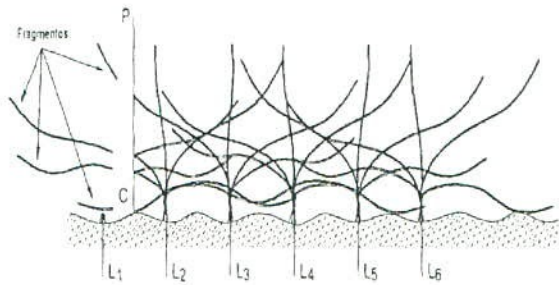


Figura C

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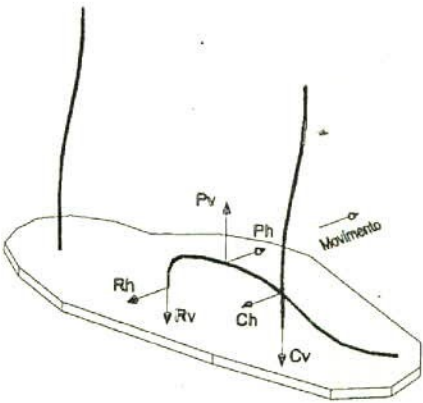


Figura D

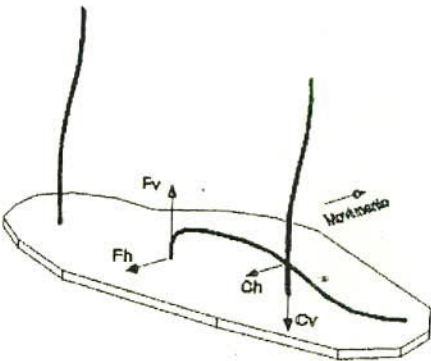
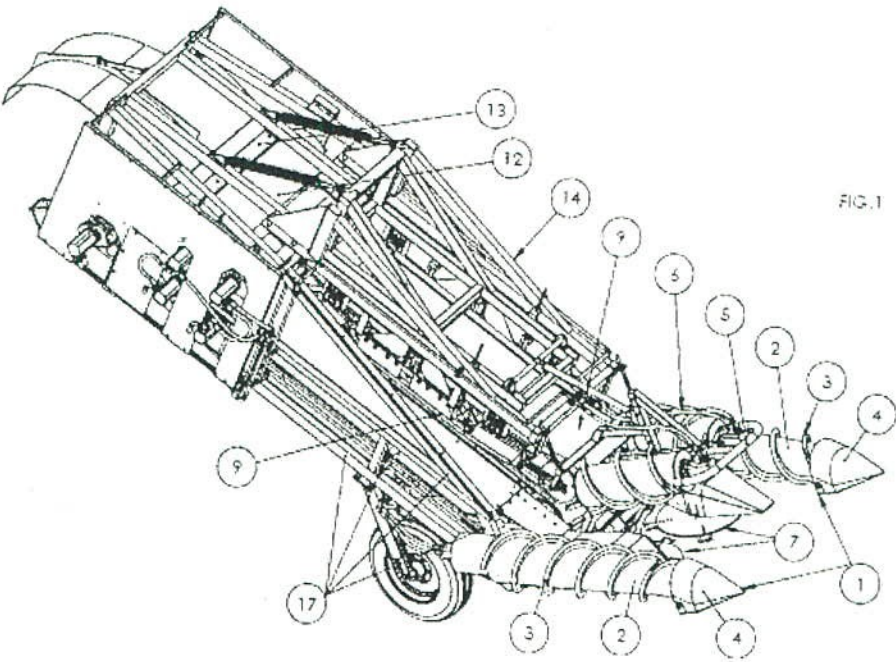


Figura E



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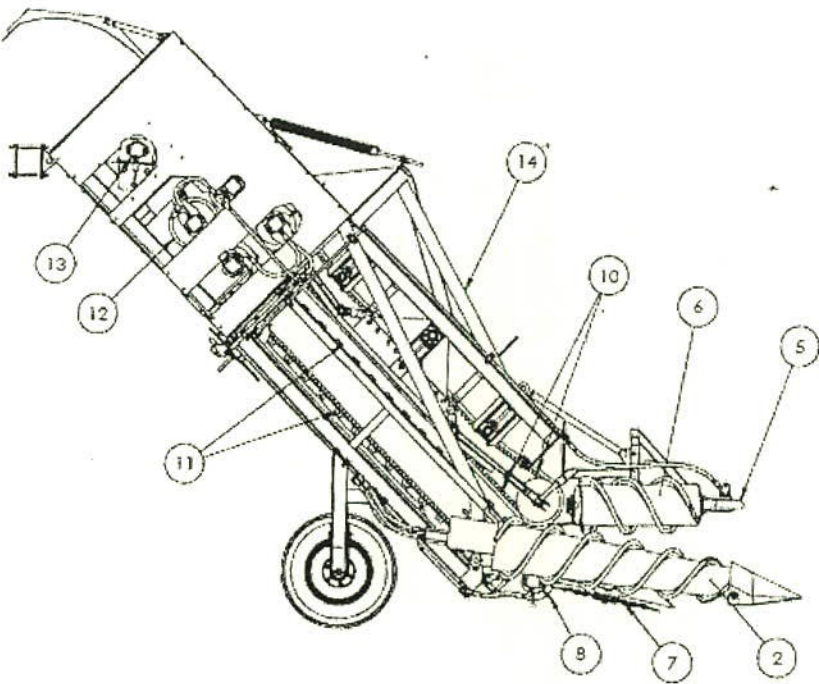
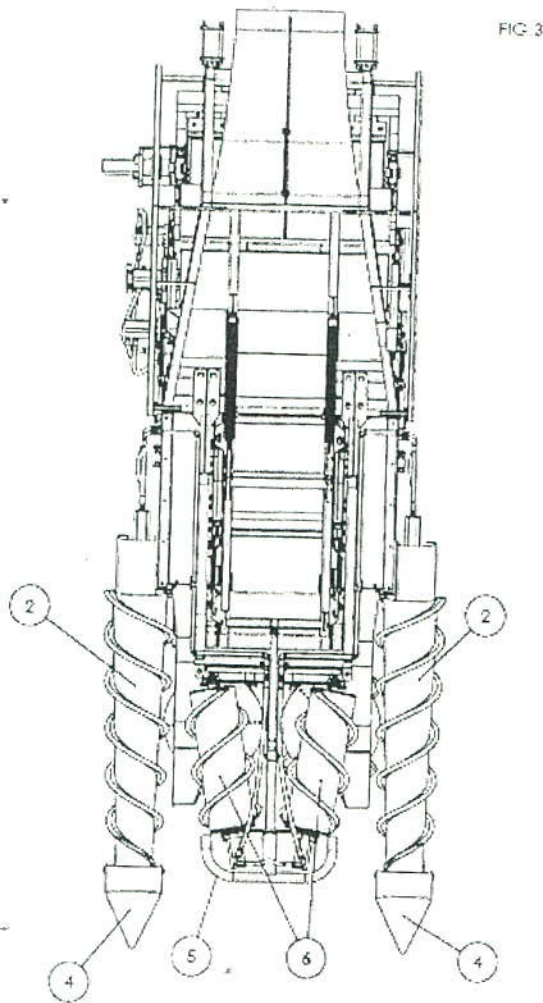
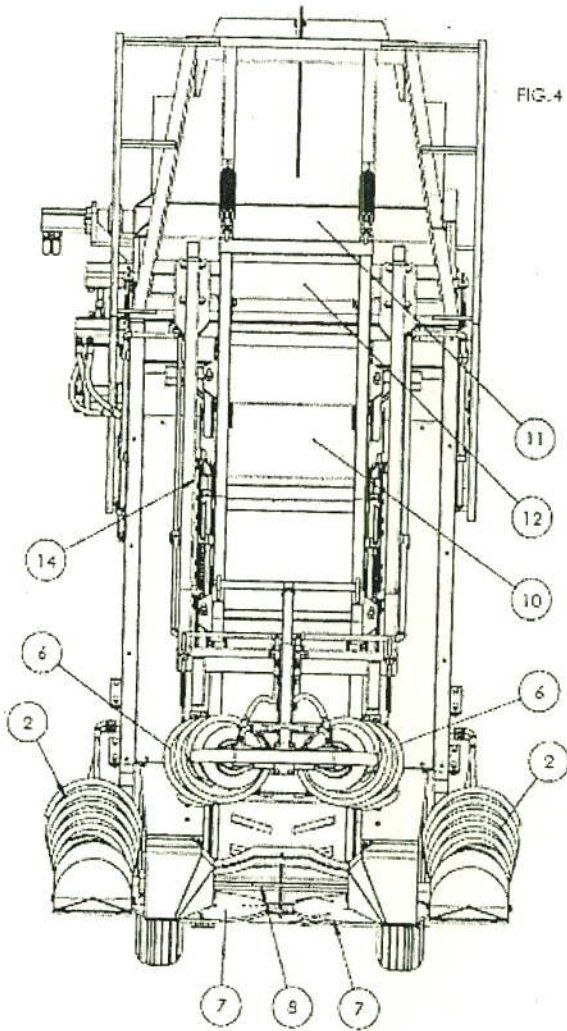
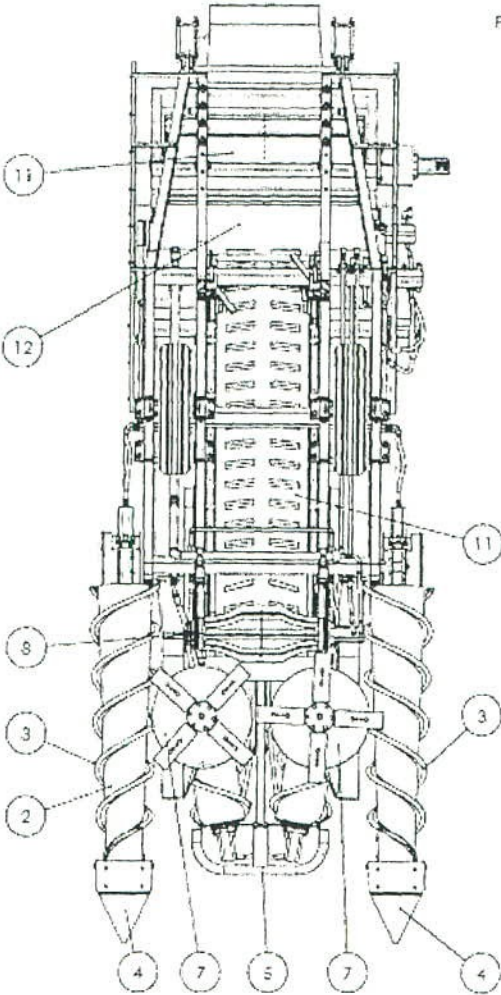


FIG. 2

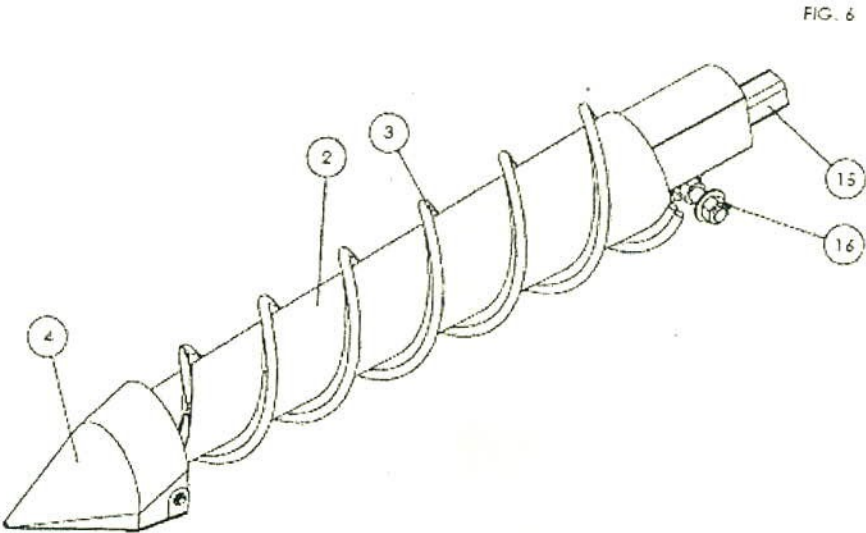


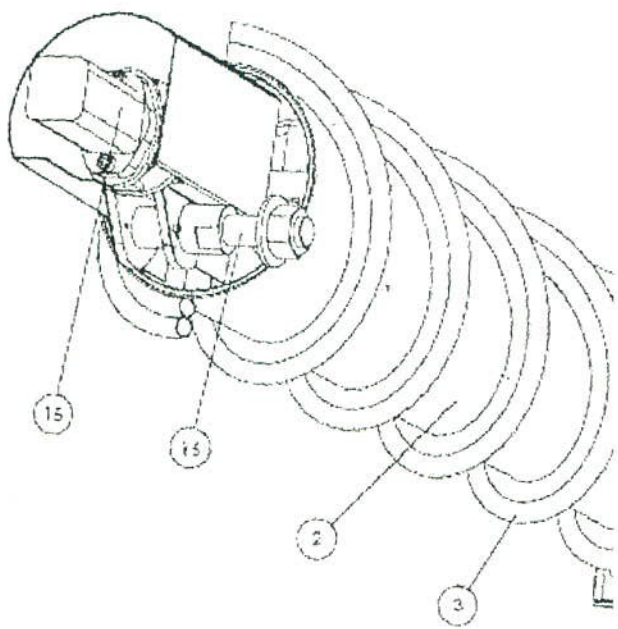
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FIG. 8

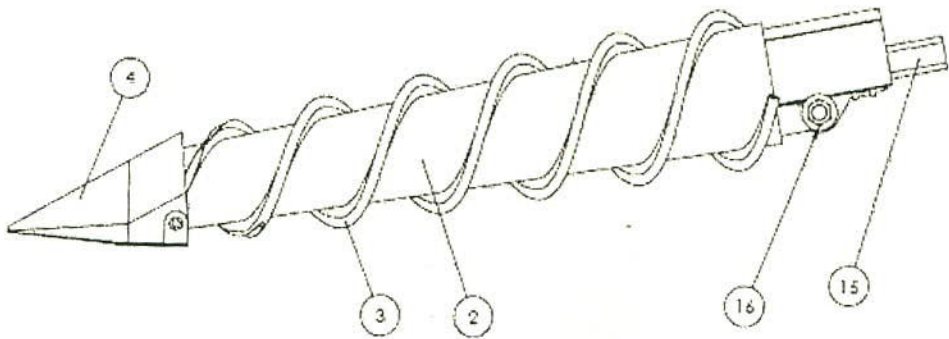
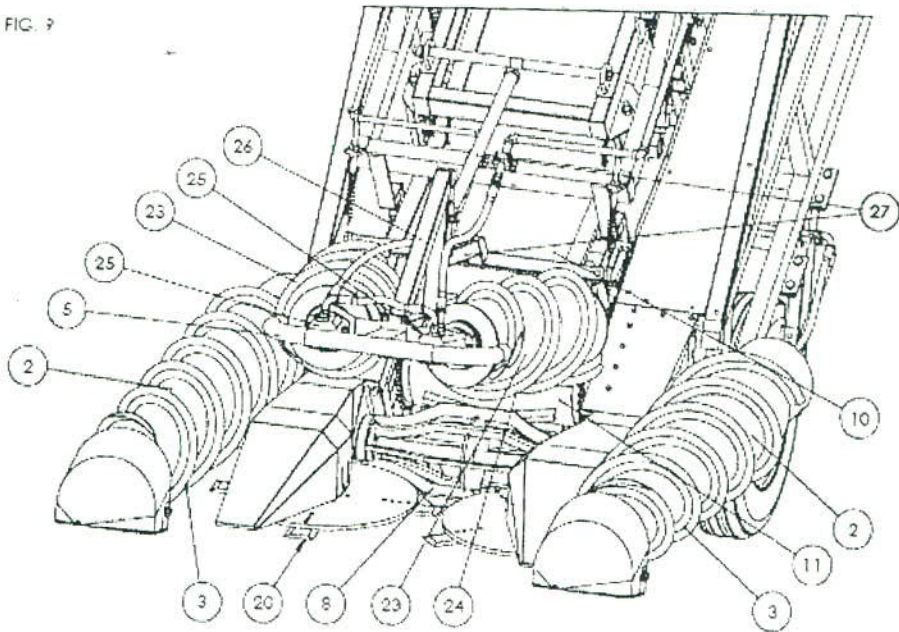


FIG. 9



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FIG. 10

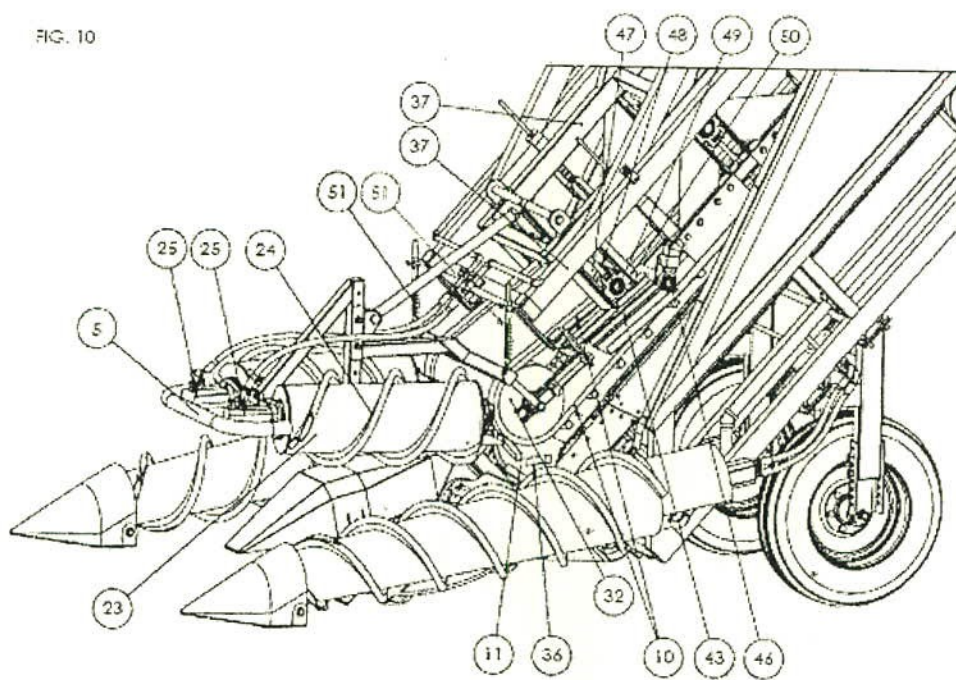
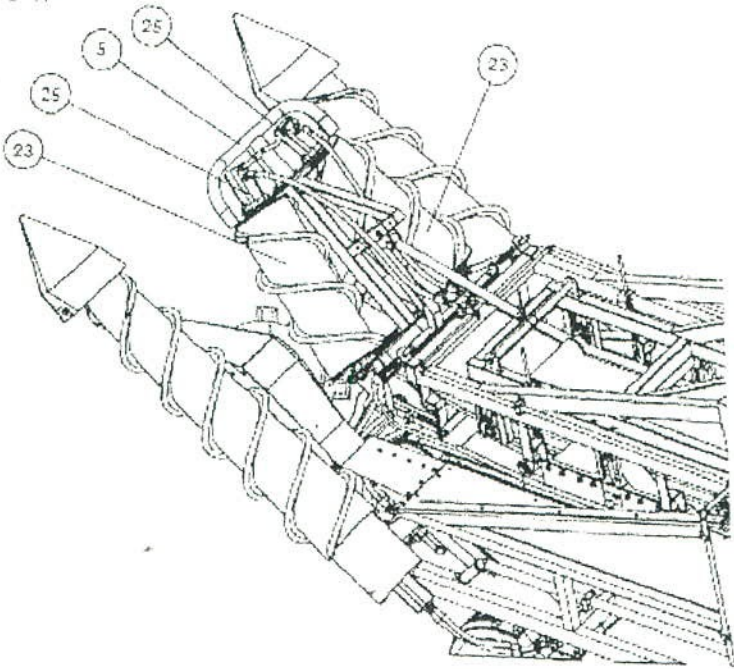
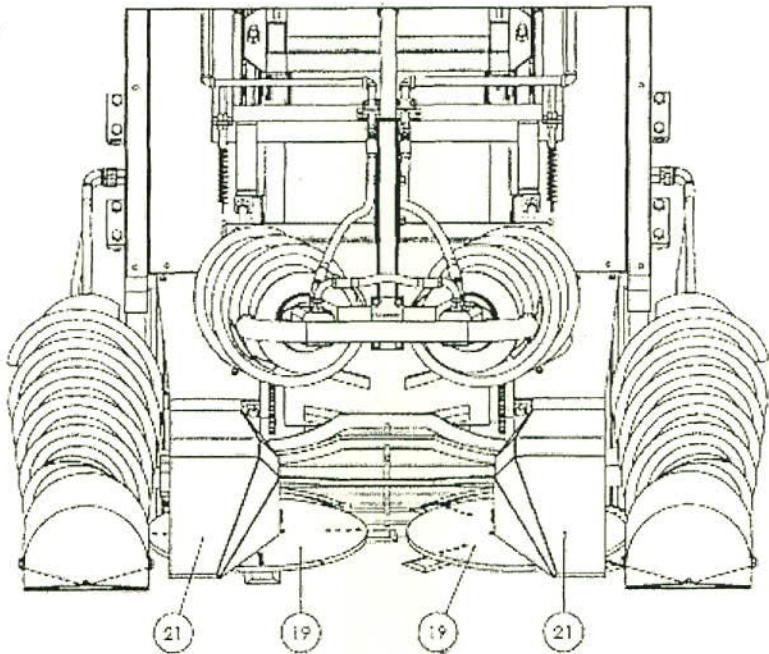


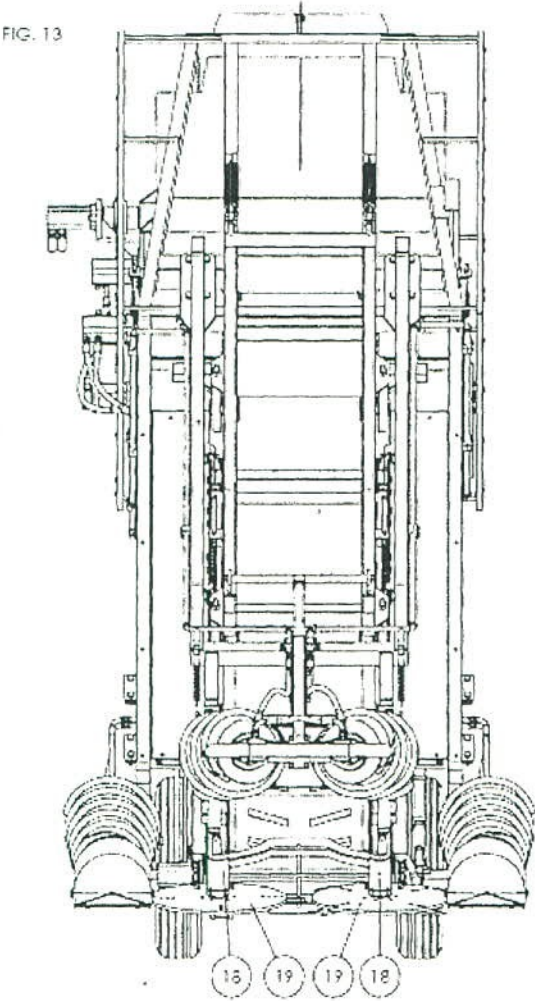
FIG. 11



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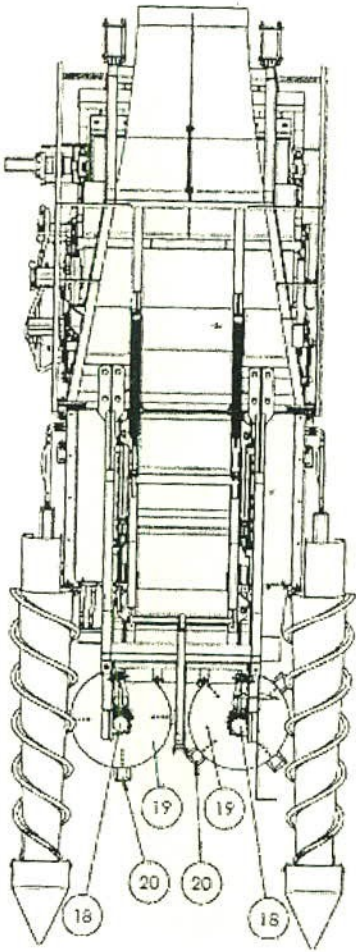
FIG. 12





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FIG. 14



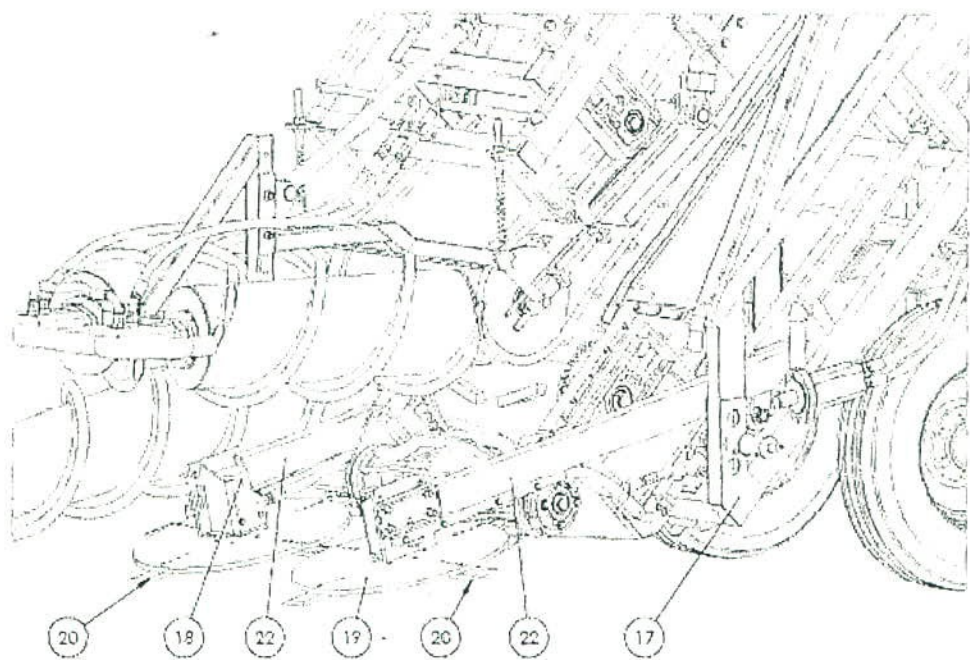
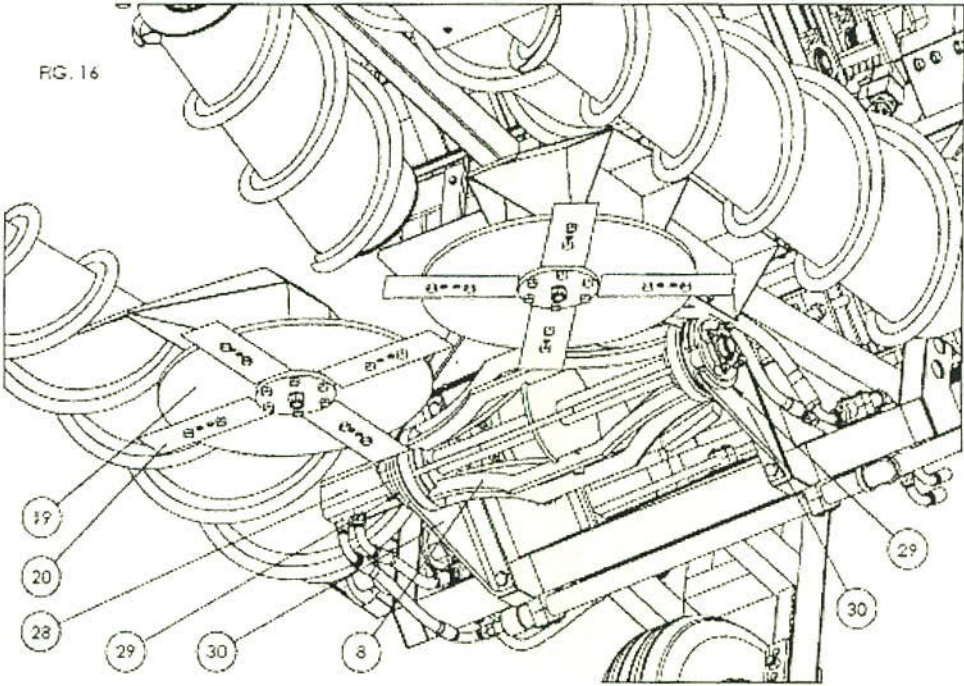
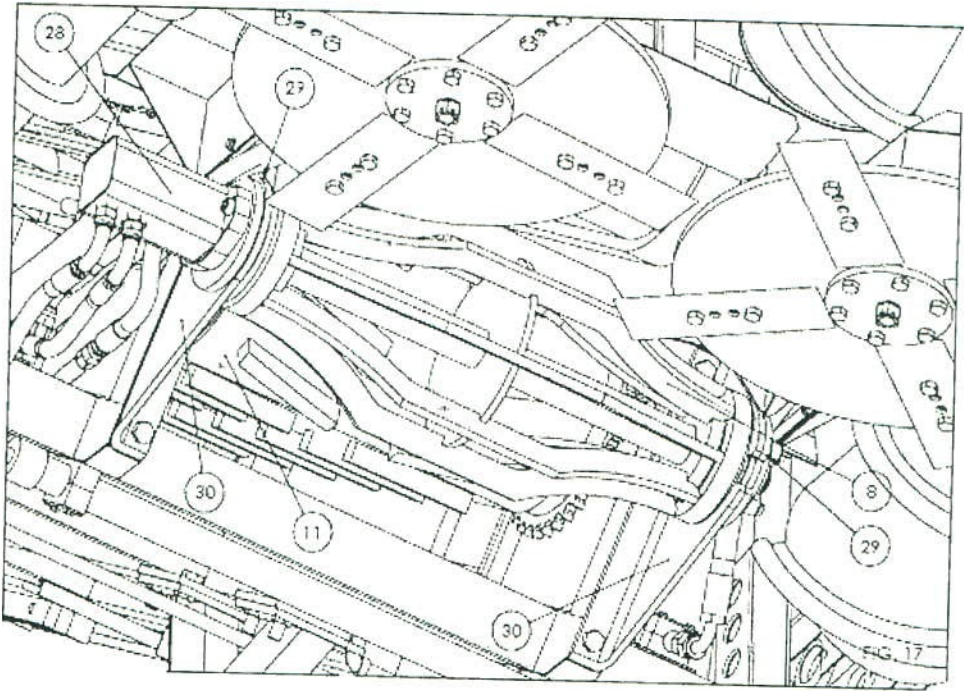


FIG. 15

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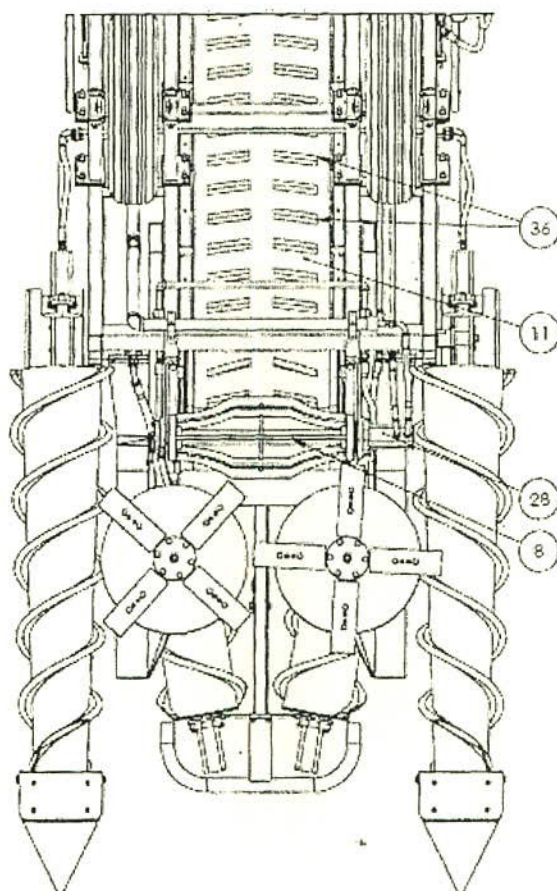
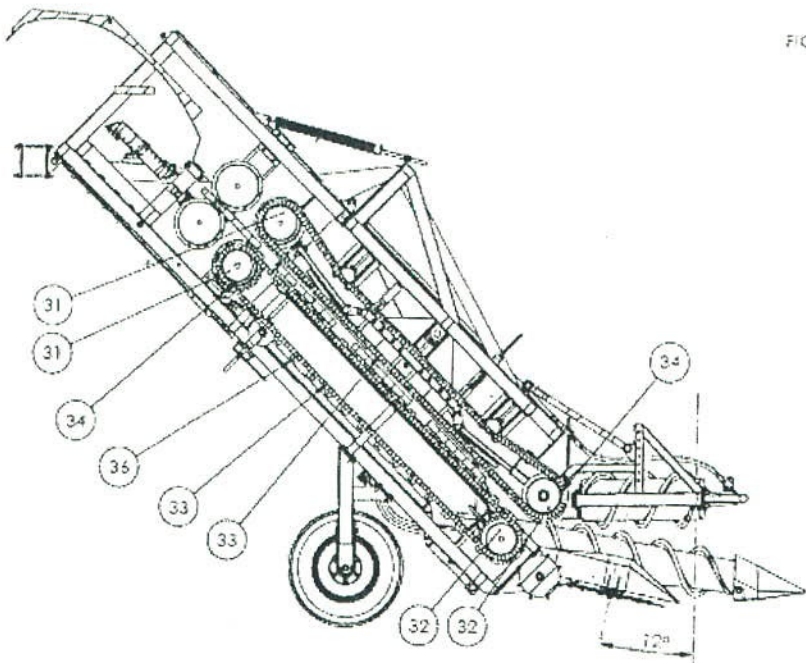


FIG. 18



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FIG. 20

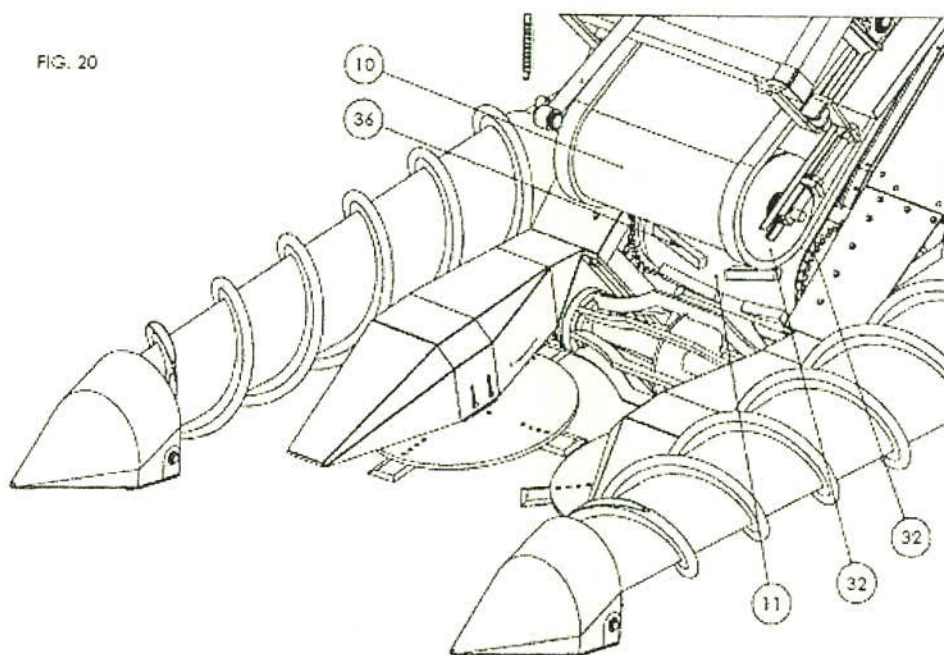
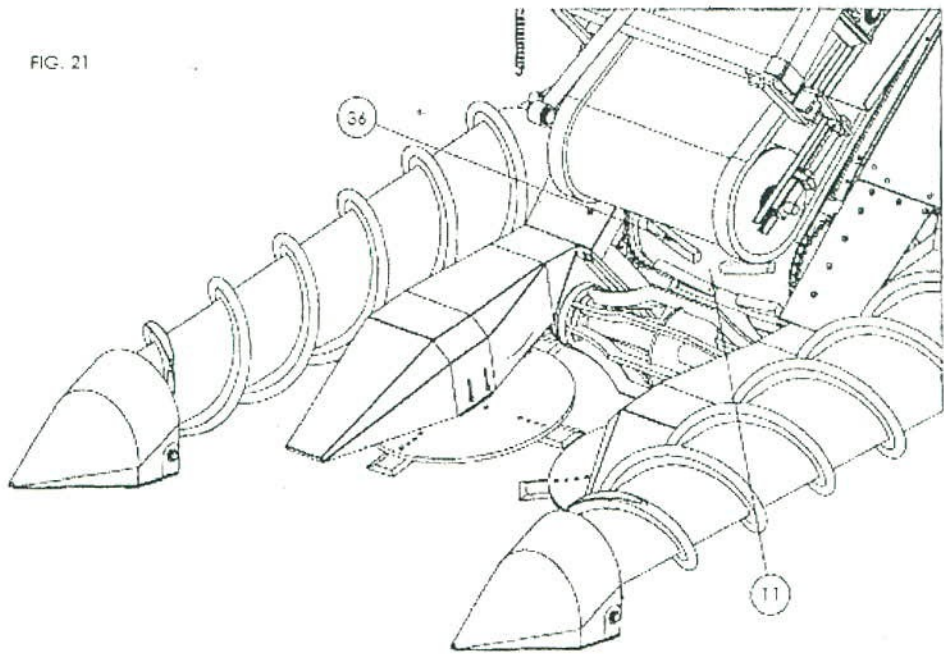


FIG. 21



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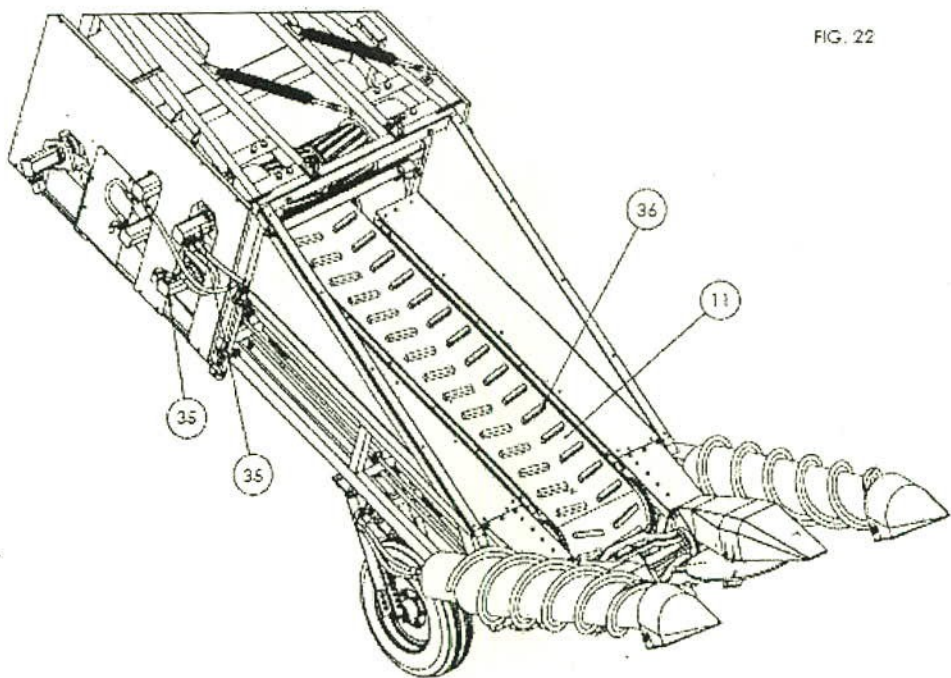
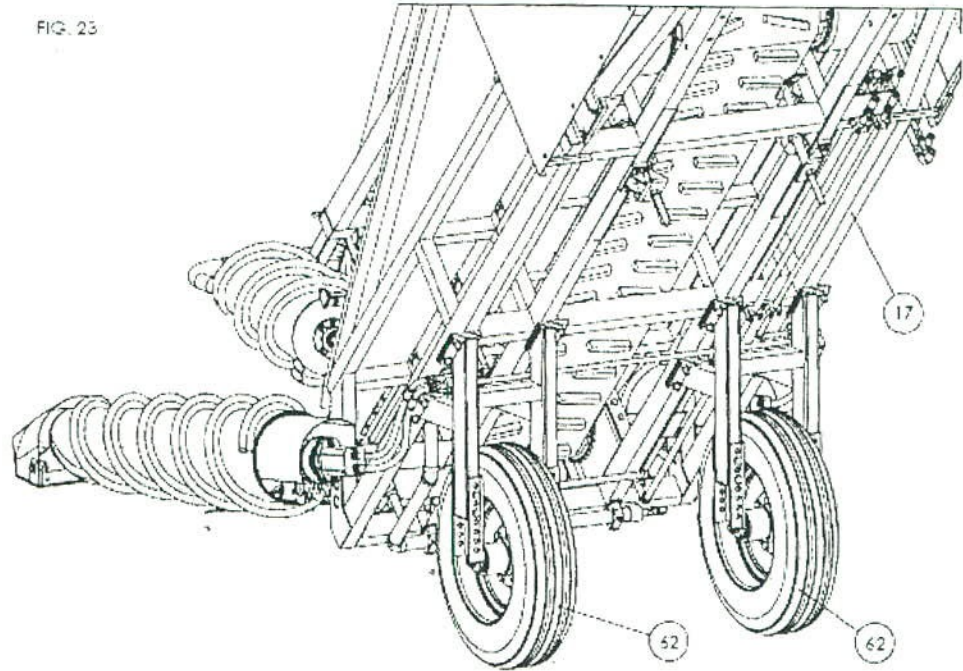


FIG. 22

FIG. 23



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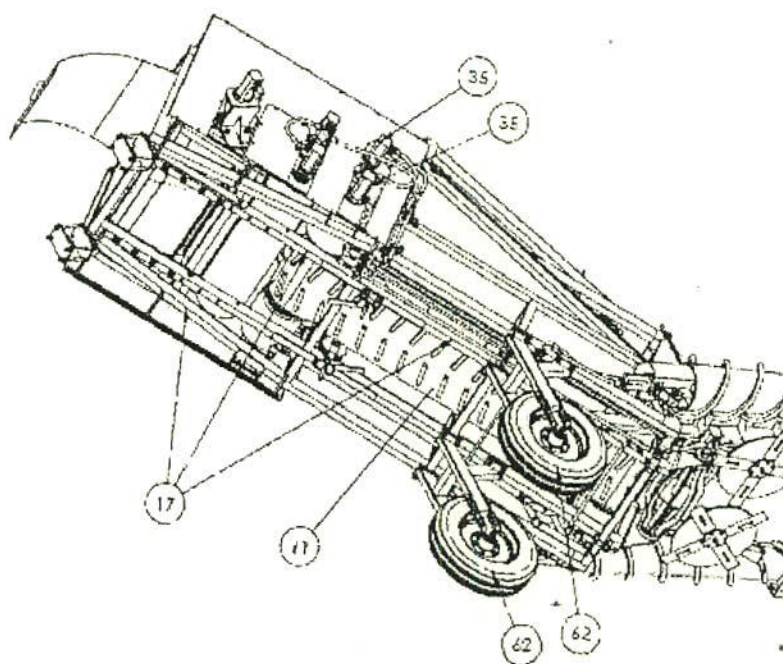
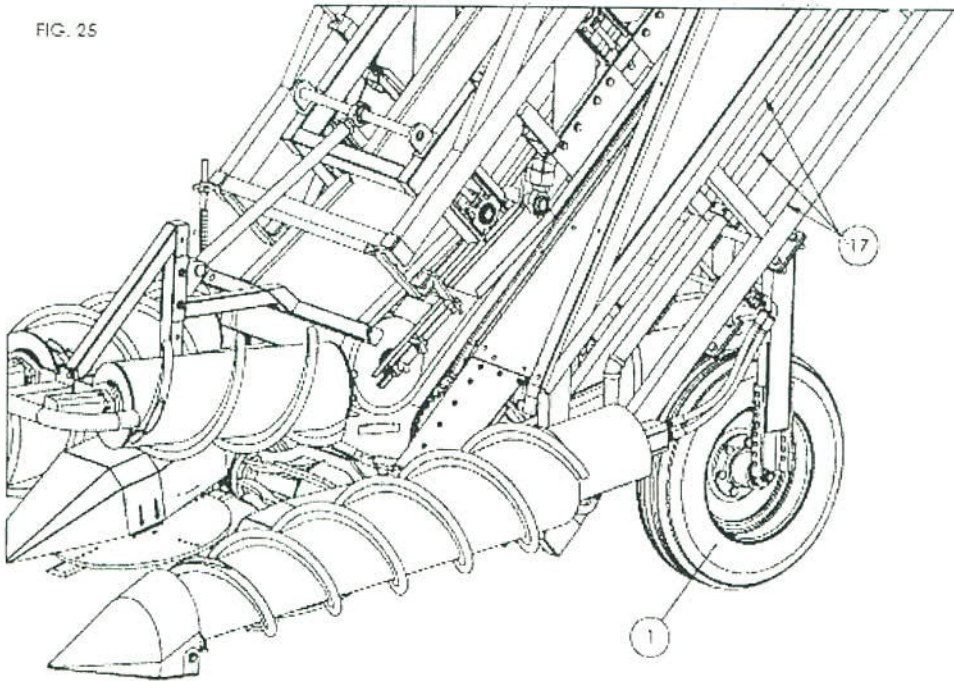
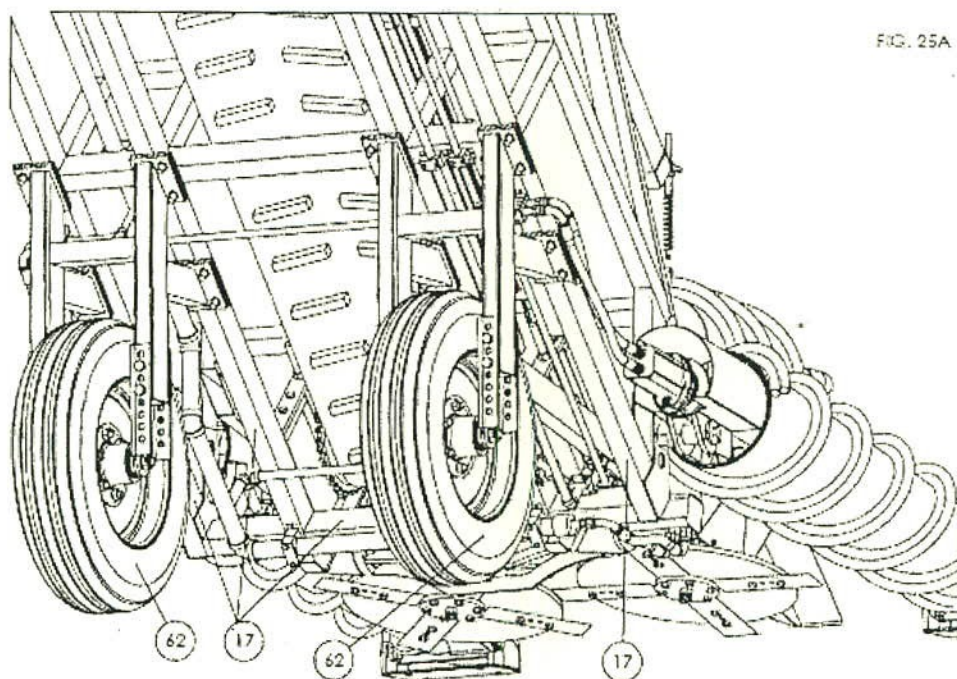


FIG. 25



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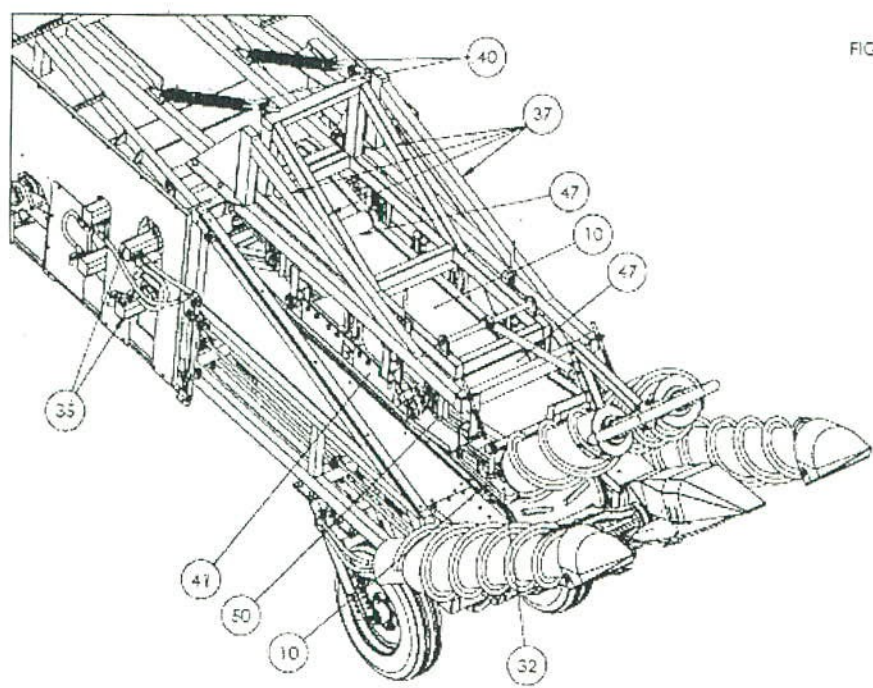


FIG. 26

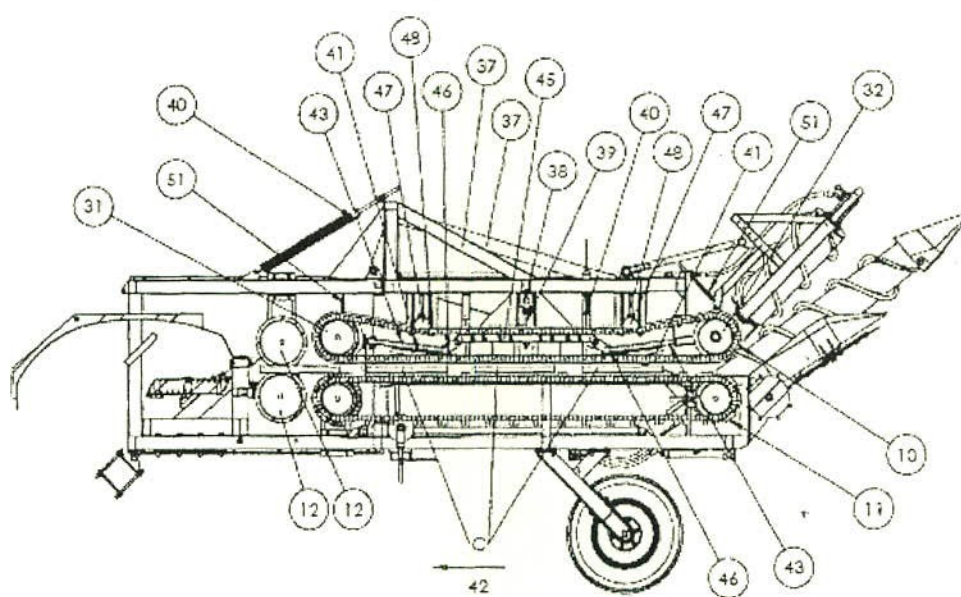
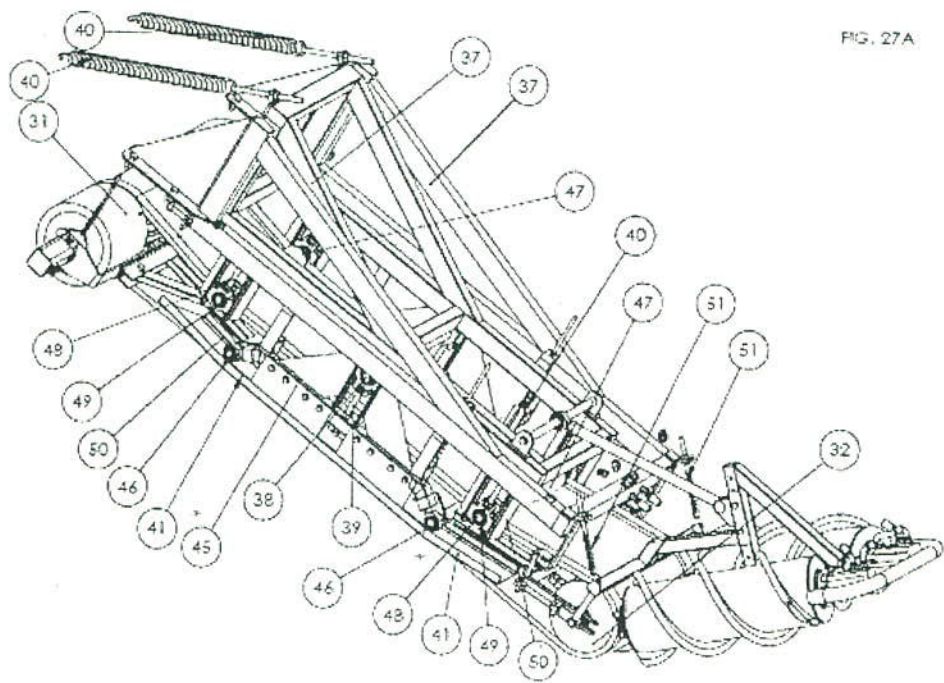


FIG. 27



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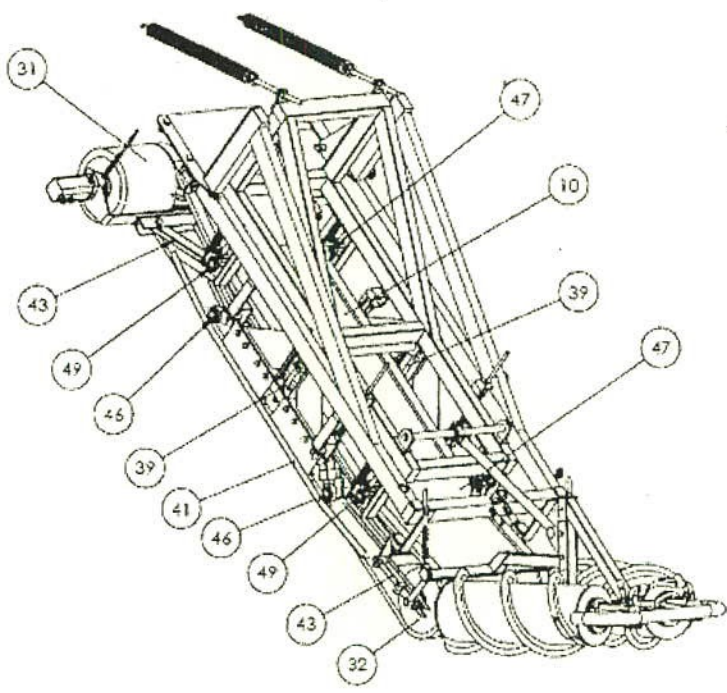


FIG. 273

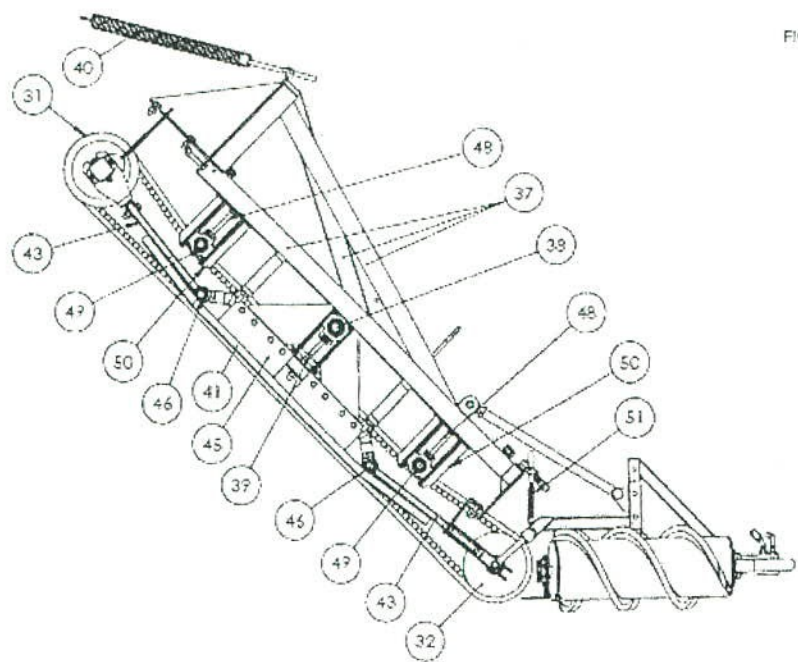


FIG. 27C

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FIG. 27D

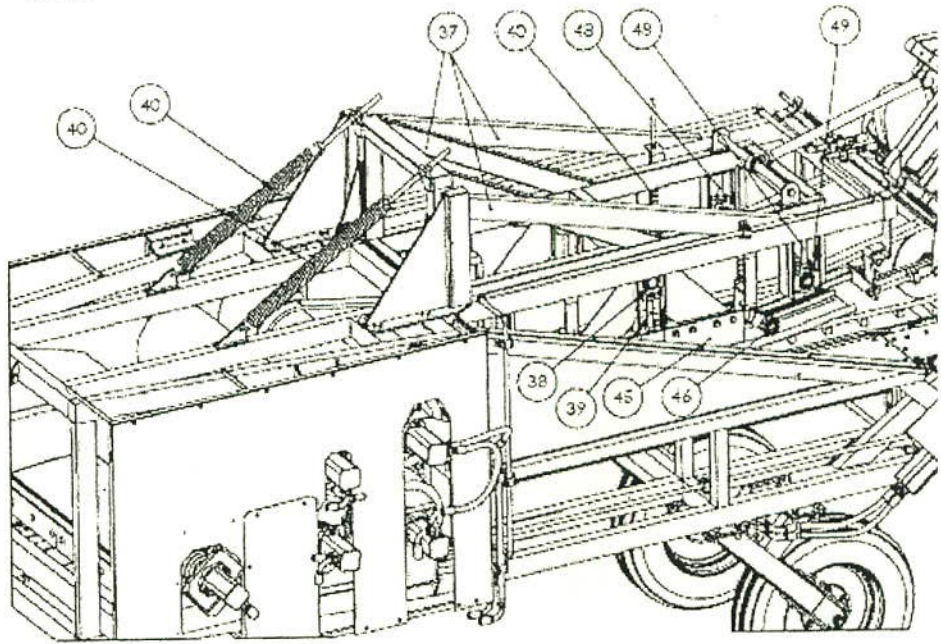
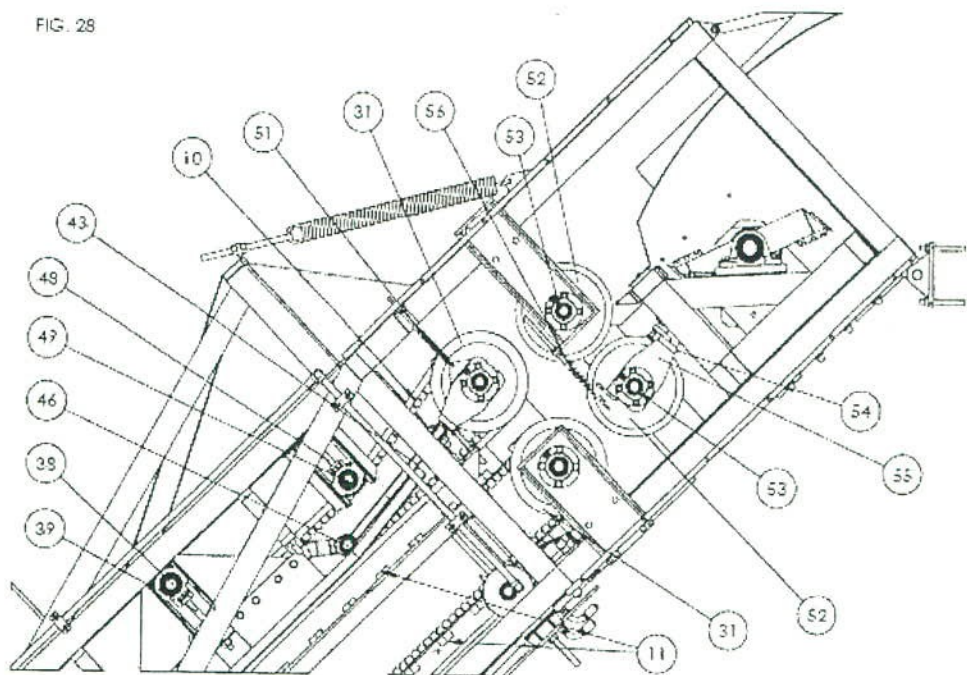


FIG. 28



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FIG. 29

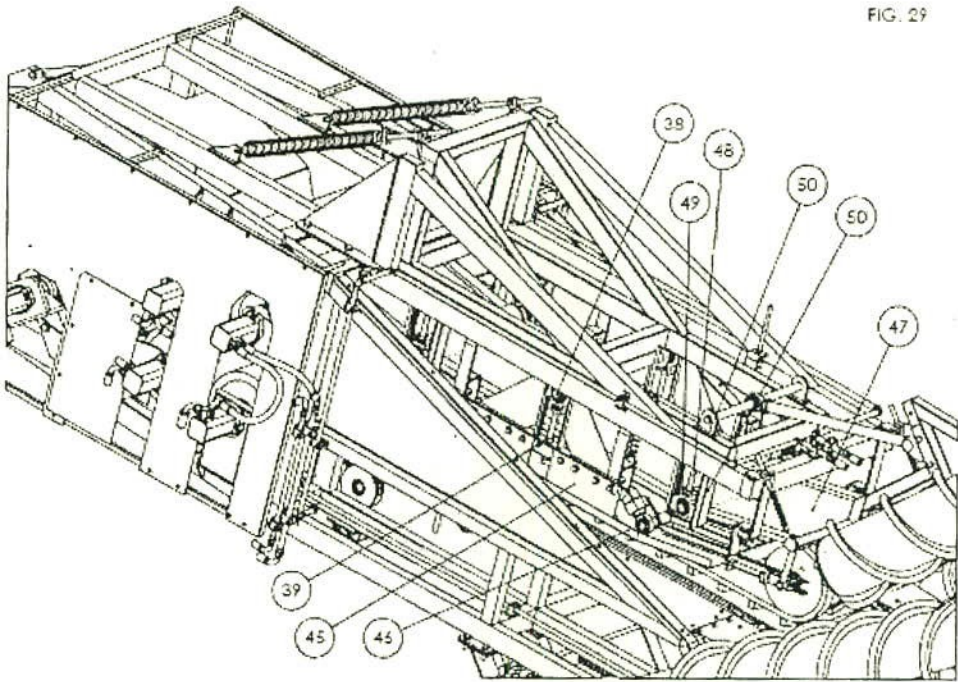
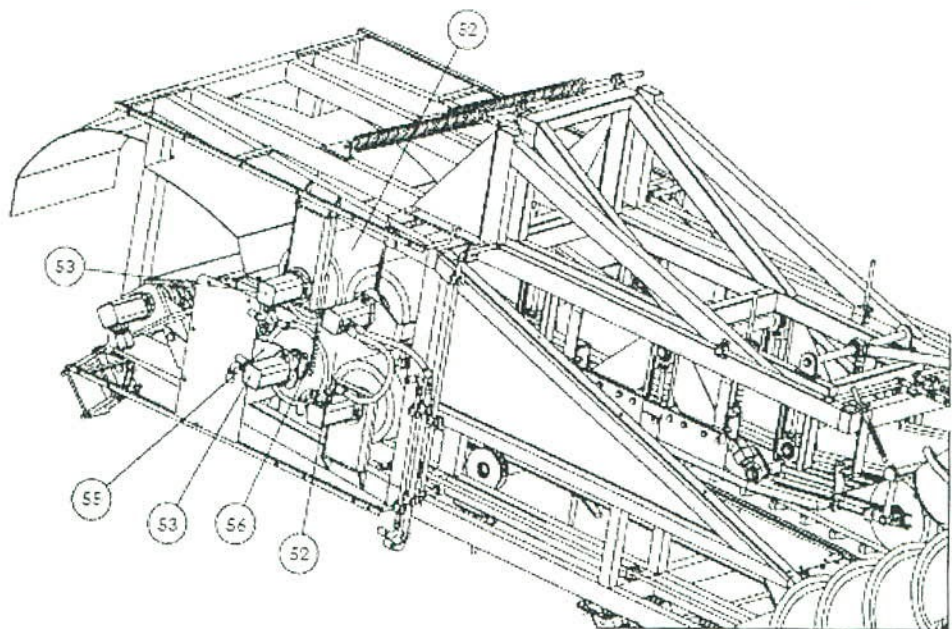
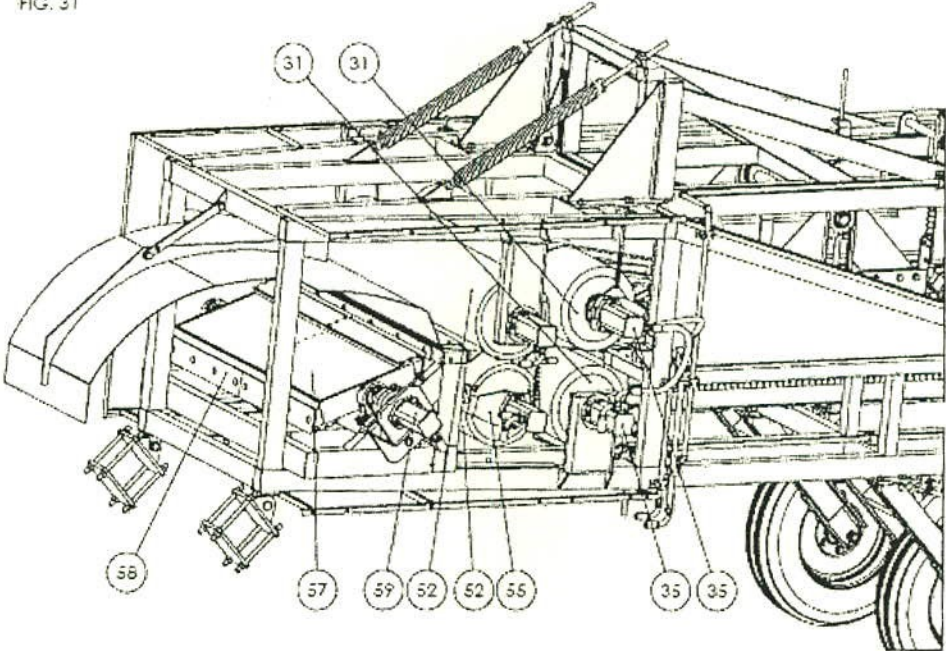


FIG. 30



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FIG. 31



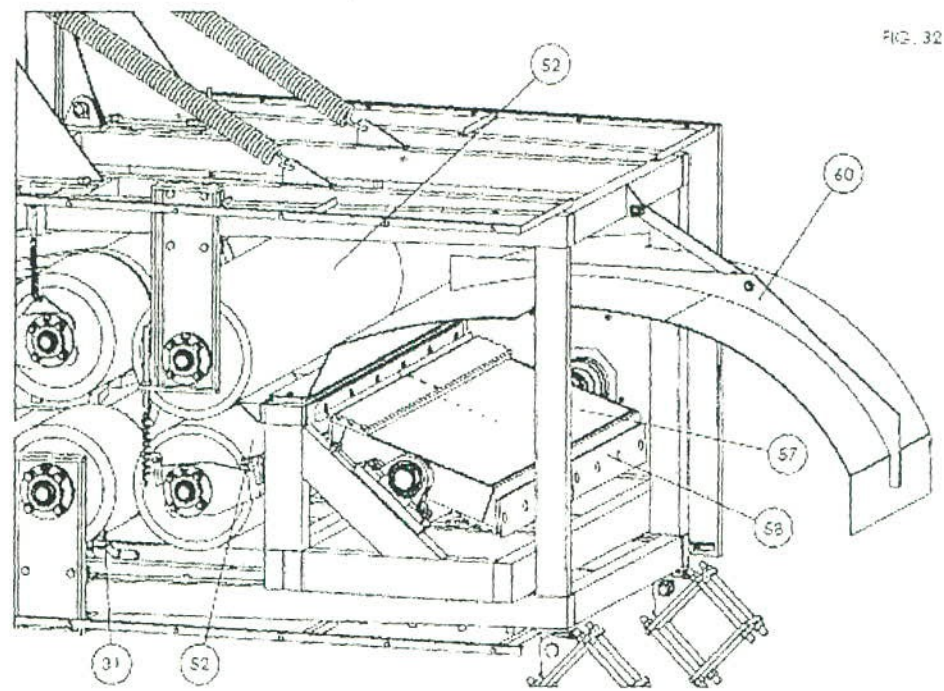
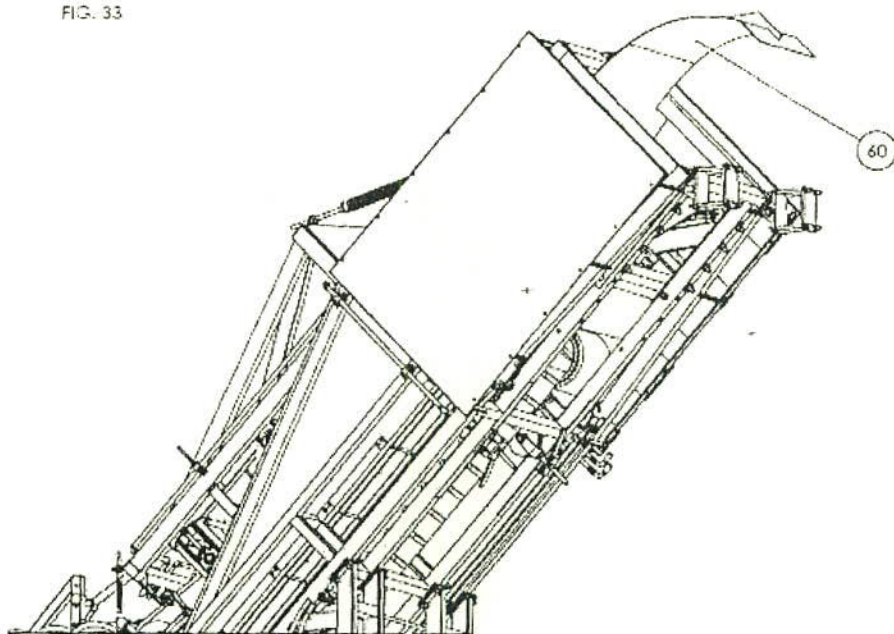


FIG. 33



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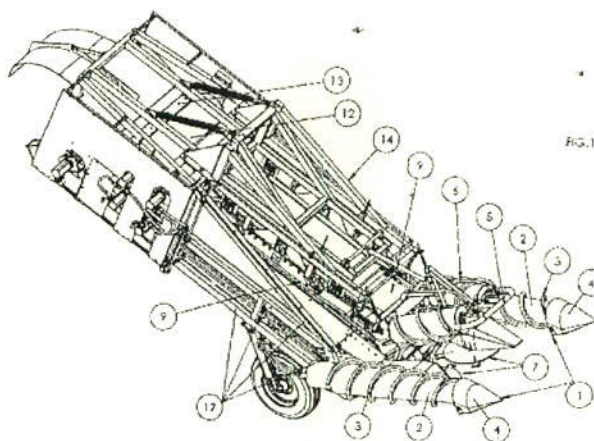
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(54) Title: CONVEYORS MODULE FOR SUGAR-CANE HARVEST AND HARVESTING PROCESS



(57) Abstract: The present invention relates to a harvesting conveyors module, particularly appropriate for sugar cane harvesting, comprising a lifting mechanism (1) arranged horizontally and able to be vertically moved; a base cutting mechanism (7); a deflector mechanism (6) arranged above the lifting mechanism (1) and configured to deflect and aid the displacement of cutted stems to a pulling mechanism (9), said pulling mechanism comprising conveyors, an upper conveyor (10) and a lower conveyor (11); a lifting foil (8) placed near to the lower end of the conveyors (10, 11); a transferring mechanism (12) appropriate to receive the stems from pulling mechanism (9) and transfer them to a chopper mechanism (13), said chopper mechanism (13) being arranged in sequence to the said transferring mechanism (12), and a stretcher mechanism (14) acts on the upper conveyor (10) of the pulling mechanism. The invention also relates to a process for sugar cane harvesting with a module, such process minimizing the forces applied onto the root.

WO 2013/003924 A3

INTERNATIONAL SEARCH REPORT

International application No

PCT/BR2012/000229

A. CLASSIFICATION OF SUBJECT MATTER

INV. A01D45/10

ADD.

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

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Minimum documentation searched (classification system followed by classification symbols)

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

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 317 352 A (RALPH SADLEIR FALKINER) 14 August 1929 (1929-08-14) claim 1; figures 1-3 page 1, lines 7-11, 53-57, 70-73 page 2, lines 73-83, 89-129	1,15
A	US 3 462 922 A (PHILLIPS CARMEN S ET AL) 26 August 1969 (1969-08-26) column 2, lines 22-39, 50-62; figures 1-2 column 3, lines 1-40	1,15
A	US 5 157 904 A (OTTEN HILLRICH [DE] ET AL) 27 October 1992 (1992-10-27) abstract; figures 1-3	1,15

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"T" 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 invention

"X" 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 alone

"Y" 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

20 December 2012

Date of mailing of the international search report

07/01/2013

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
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Authorized officer

Guillem Gisbert, I

8/27

INTERNATIONAL SEARCH REPORT

International application No.
PCT/BR2012/000229

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)	
This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons: 1. ☐ Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely: 2. ☒ Claims Nos.: 2-14, 16-18 because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically: see FURTHER INFORMATION sheet PCT/ISA/210 3. ☐ Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).	
Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)	
This International Searching Authority found multiple inventions in this international application, as follows: 1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims. 2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees. 3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.: 4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: Remark on Protest ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee. ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation. ☐ No protest accompanied the payment of additional search fees.	

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 2-14, 16-18

1. The present application contains 18 claims, of which 13 are independent, namely independent claims 1-5, 8-9, 12, 14-18. There are so many independent claims, and they are drafted in such a way that the claims as a whole are not in compliance with the provisions of clarity and conciseness of Article 6 PCT, as it is particularly burdensome for a skilled person to establish the subject-matter for which protection is sought. The non-compliance with the substantive provisions is to such an extent, that the search was performed taking into consideration the non-compliance in determining the extent of the search (PCT Guidelines 9.19 and 9.25). 1.1 The search was based on the subject-matter that, as far as can be understood, could reasonably be expected to be claimed later in the procedure, and the corresponding claims, namely 1, 15.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2) declaration be overcome.

9/11/11

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/BR2012/000229

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 317352	A	14-08-1929	NONE	
US 3462922	A	26-08-1969	NONE	
US 5157904	A	27-10-1992	AU 641876 B2	30-09-1993
			AU 7528291 A	21-11-1991
			BR 9102016 A	24-12-1991
			DE 4015894 A1	21-11-1991
			MX 172052 B	30-11-1993
			US 5157904 A	27-10-1992

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference OS-964-12	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/BR2012/000229	International filing date (day/month/year) 03/07/2012	(Earliest) Priority Date (day/month/year) 04/07/2011
Applicant ASSOCIAÇÃO BRASILEIRA DE LUZ SINCROTRON - ABTLUS		

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 5 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, 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. 1

- ☒ 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/BR2012/000229

Box No. II * Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 2-14, 16-18
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No

PCT/BR2012/000229

A. CLASSIFICATION OF SUBJECT MATTER

INV. A01D45/10

ADD.

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)

A01D

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 317 352 A (RALPH SADLEIR FALKINER) 14 August 1929 (1929-08-14) claim 1; figures 1-3 page 1, lines 7-11, 53-57, 70-73 page 2, lines 73-83, 89-129 -----	1,15
A	US 3 462 922 A (PHILLIPS CARMEN S ET AL) 26 August 1969 (1969-08-26) column 2, lines 22-39, 50-62; figures 1-2 column 3, lines 1-40 -----	1,15
A	US 5 157 904 A (OTTEN HILLRICH [DE] ET AL) 27 October 1992 (1992-10-27) abstract; figures 1-3 -----	1,15



Further documents are listed in the continuation of Box C.



See patent family annex.

* 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

"T" 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 invention

"X" 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 alone

"Y" 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

20 December 2012

Date of mailing of the international search report

07/01/2013

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Guillem Gisbert, I

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/BR2012/000229

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 317352	A	14-08-1929	NONE	

US 3462922	A	26-08-1969	NONE	

US 5157904	A	27-10-1992	AU 641876 B2	30-09-1993
			AU 7528291 A	21-11-1991
			BR 9102016 A	24-12-1991
			DE 4015894 A1	21-11-1991
			MX 172052 B	30-11-1993
			US 5157904 A	27-10-1992

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 2-14, 16-18

1. The present application contains 18 claims, of which 13 are independent, namely independent claims 1-5, 8-9, 12, 14-18. There are so many independent claims, and they are drafted in such a way that the claims as a whole are not in compliance with the provisions of clarity and conciseness of Article 6 PCT, as it is particularly burdensome for a skilled person to establish the subject-matter for which protection is sought. The non-compliance with the substantive provisions is to such an extent, that the search was performed taking into consideration the non-compliance in determining the extent of the search (PCT Guidelines 9.19 and 9.25). 1.1 The search was based on the subject-matter that, as far as can be understood, could reasonably be expected to be claimed later in the procedure, and the corresponding claims, namely 1, 15.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2) declaration be overcome.

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800.176.089-2

-/-

Industria y Comercio
SUPERINTENDENCIA

RECIBO DE CAJA

No. 14 - 000057

Bogotá D.C., Enero 02 de 2014 - 12:35:26

RECIBIDO DE : CUESTA Y ASOCIADOS LTDA

NI 800.075.616

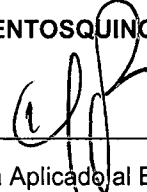
*** Soporte del Pago ***

TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PAGO	VR PAGO
CONSIGNACION	BANCO DE BOGOTA	062754387	532936143	02/01/2014	1.628.000.00

*** Conceptos Pagados ***

CANT.	RENTISTICO	CONCEPTO	Vr.UNDITARIO	Vr.CONCEPTO
1	50005-01-01 SOLICITUDES	1 TRAMITES DE SOL. DE PATENTE DE INVENCIÓN	515.000.00	515.000.00
				\$515.000.00

SON: **QUINIENTOSQUINCE MIL PESOS MONEDA CORRIENTE***

Responsable: 

Recibo de Caja Aplicado al Expediente No. _____

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 14-000189- -00000-0000

Fecha: 2014-01-02 12:51:37

Tra. 11 PATENTE IYII

Act. 411 PRESENTACION

Dep. 2020 DIR.NUEVASC

Eve: 379 FASENACIONALII

Folios: 87

Sede Centro: Carrera 13 No. 27 - 00 Pisos 3,4,5 y 10 Bogotá, D.C.- Colombia

Web: www.sic.gov.co e-mai: info@sic.gov.co Conmutador: (571) 5870000 Fax: (571) 5870284 Línea: 018000-910165 Call Center: (571) 6513240

, Enero 2 de 2014 - 12:35:27

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800.176.089-2

-/-

Industria y Comercio
SUPERINTENDENCIA

RECIBO DE CAJA

No. 14 - 000065

Bogotá D.C., Enero 02 de 2014 - 12:39:32

RECIBIDO DE : CUESTA Y ASOCIADOS LTDA

NI 800.075.616

RE

*** Soporte del Pago ***

TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PAGO	VR PAGO
RECIBO DE CA	999999999	58	02/01/2014		128.000.00
RECIBO DE CA	999999999	62	02/01/2014		120.000.00

*** Conceptos Pagados ***

CANT. RENTISTICO	CONCEPTO	Vr.UNDITARIO	Vr.CONCEPTO
8 50005-01-01 SOLICITUDES	1607 REIVINDICACION PATENTE UNITARIA ADICIONAL A LAS 10 INIC	31.000.00	248.000.00
			\$248.000.00

SON: **DOSCIENTOS CUARENTA Y OCHO MIL PESOS MONEDA CORRIENTE***

Responsable: _____

Recibo de Caja Aplicado al Expediente No. _____

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 14-000189-00000-0000

Fecha: 2014-01-02 12:51:37 Dep. 2020 DIR.NUEVASCR
Tra. 11 PATENTEIYII Eve: 379 FASENACIONALI
Act. 411 PRESENTACION Folios: 87

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Web: www.sic.gov.co e-mail: info@sic.gov.co Conmutador: (571) 5870000 Fax: (571) 5870284 Línea: 018000-910165 Call Center: (571) 6513240

Enero 2 de 2014 - 12:39:33



No. 14-000189- -00000-0000

Fecha: 2014-01-02 12:51:37
Tra. 11 PATENTEIYII
Act. 411 PRESENTACION

Dep. 2020 DIR.NUEVASCR
Eve: 379 FASENACIONALII
Folios: 87 84

PATENTE DE INVENCION ☐

MODELO DE

- ☐ Indicación que se solicita una patente.
 - ☐ Datos de identificación del solicitante o de la persona que presenta la solicitud
 - ☐ Descripción de la invención
 - ☐ Dibujos de ser estos pertinentes
 - ☐ Comprobante de pago de las tasas establecidas (De ser el caso formato de descuento)
- Completa ☐ Incompleta ☐

PATENTE DE INVENCION PCT ☐

MODELO DE UTILIDAD PCT ☐

Art.33 Decisión 486/00, Circular Única

- ☐ Indicación que se solicita una PCT
 - ☐ Copia de la solicitud en español, tal como fue presentada inicialmente (capítulo descriptivo, reivindicatorio, resumen)
 - ☐ Dibujos de ser estos pertinentes
 - ☐ Comprobante de pago de las tasas establecidas (de ser el caso formato de descuento)
- Completa ☐ Incompleta ☐

DISEÑO INDUSTRIAL ☐

(Art. 119 Decisión 486/00)

- ☐ Indicación que se solicita Diseño industrial
 - ☐ Datos de identificación del solicitante o de la persona que presenta la solicitud
 - ☐ Representación gráfica y fotográfica del Diseño industrial o muestra del material que incorpora el diseño
 - ☐ Comprobante de pago de las tasas establecidas
- Completa ☐ Incompleta ☐

ESQUEMA DE TRAZADO ☐

(Art. 92 Decisión 486/00)

- ☐ Indicación que se solicita un esquema de trazado
 - ☐ Datos de identificación del solicitante o de la persona que presenta la solicitud
 - ☐ Representación gráfica de un esquema de trazado
 - ☐ Comprobante de pago de las tasas establecidas
- Completa ☐ Incompleta ☐