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(71) Applicant: **INSTITUUT VOOR BEWARING EN
VERWERKING VAN LANDBOUWPRODUCTEN**
Bornsesteeg 59 P.O. Box 18
NL-6700 AA Wageningen(NL)

(72) Inventor: **Robben, Johan Bernard Hendrik**
Holthuizerdreef 23
Huissen(NL)

(72) Inventor: **Leutscher, Hendrik Jakob**
Edeseweg 129
NL-6721 JT Bennekom(NL)

(72) Inventor: **Ogink, Johannes Joseph Maria**
Gruttoweide 30
NL-6708 BH Wageningen(NL)

(72) Inventor: **Van Der Wees, Joannes**
Zonnekruidstraat 23
NL-6666 XK Heteren(NL)

(74) Representative: **van der Beek, George Frans et al.**
Nederlandsch Octrooibureau Johan de Wittlaan 15 P.O.
Box 29720
NL-2502 LS Den Haag(NL)

(54) **A packaging apparatus for packaging articles in heat sealable material.**

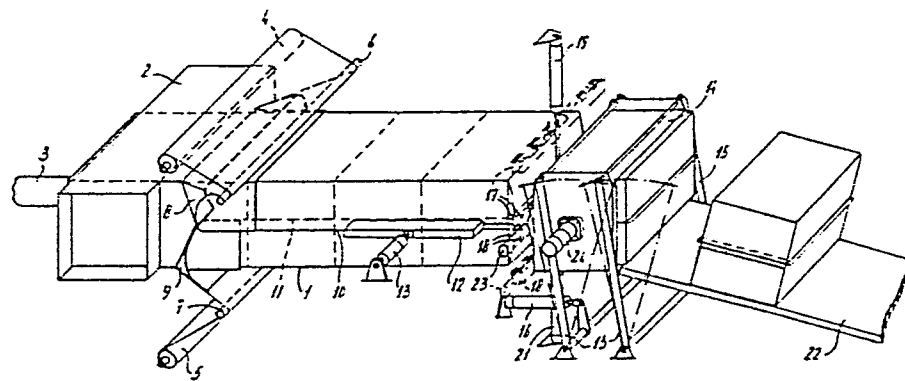
(57) An apparatus for packaging articles, in particular fibre material compressed to bales, in heat sealable sheet material comprises a mandrel case (1) for a row of articles to be packaged and a transport means (3) to move these articles stepwise to the discharge end of the mandrel (1). Further the apparatus includes means (4,5,8 and 9) to feed at least one web of sheet material to the mandrel case (1) and to fold this web tube-shaped about the mandrel case. Longitudinal sealing jaws (12) and transverse sealing jaws (17,18) are mounted next to and in front of the mandrel case (1) respectively to weld together overlapping longitudinal edges and transverse edges of the tube of sheet material. A receptacle (14) comprising clamping members (24) is mounted adjacent the discharge end of the mandrel case (1). This receptacle may be moved between a transverse position, a pulling through position and a welding position. The mandrel case (1) takes care that before the transverse sealing

jaws (17,18) move to each other first the tube of sheet material is pulled forwards along a sufficient distance to be able to form the transverse end wall of the package. Besides the mandrel case 1 avoids expansion of the material to be packaged before it is completely closed in the package.

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fig-1



A packaging apparatus for packaging articles in heat sealable material.

The invention relates to a packaging apparatus for packaging articles in heat sealable material, in particular plastic sheet material, said apparatus comprising a substantially horizontal mandrel case for articles in line to be packaged, conveying means
5 for stepwise conveying the articles towards the delivery end of said case, web feeding means for feeding at least one web of sheet material towards the mandrel case, folding means for folding said web about the mandrel case, longitudinal sealing means for sealing overlapping longitudinal edges of the web together and for thus
10 forming a tube of sheet material, and transverse sealing means arranged at the delivery end of the mandrel case extending perpendicularly to the longitudinal sealing means. A similar apparatus has been described in U.S. Patent Specification No. 2,747,346.

Of common knowledge are apparatuses or machines destined for
15 forming bags and filling the bags with particles, which known apparatuses or machines include a substantially vertical metal filling tube as well as a feeding mechanism for feeding a sheet material and folding the sheet material about said filling tube. Furthermore there are known sealing jaws for adhering the overlapping
20 edges of the sheet material to each other by sealing, as well as sealing jaws for closing the lower extremity of the of sheet material tube and pulling said tube down. As soon as a part of the tubelike sheet material has been closed and the same has been pulled down over a distance corresponding to one bag a metered
25 quantity of particles, such as peanuts or salted biscuits, are dropped into the bag through the filling tube. The sealing jaws meanwhile returned to their starting position again cause the formation of a seal joint thereby simultaneously sealing the upper edge of the just filled bag and the lower edge of that part of
30 the sheet tube situated just above. Usually there will have been provided moreover a severing mechanism for severing the filled and completely closed bag from the tube of sheet material now closed at the lower edge. The thus severed bag will drop down for instance

onto a discharge conveyor. The use of such an apparatus is restricted to packaging products that can be fed by gravity through a vertical filling tube. The known apparatus is not suitable for forming packages enwrapped with sheetlike material
5 or relatively large blocklike bodies delivered by means of a horizontal system such as so-called bales of fibre material.

In the apparatus known from the U.S. Patent Specification No. 2,747,346 the transverse sealing jaws will pull the tube of sheet material present on the mandrel tube forwards upon closure
10 of said jaws in order to enable the formation of a vertical end wall. This pulling forward of the sheetlike material by means of the sealing jaws may even provoke an unchecked discharge of sheet-like material toward the sealing location whereby cracks may occur in the sheet-like material and the thus formed seal
15 joint may be of inferior quality. In case this known apparatus is used for packaging an expansible material, such as compressed bales of fibre material, an other drawback resides therein that upon discharge from the mandrel the material will expand before it will be completely enwrapped in the plastic sheet material.

20 The object of the invention is to provide an apparatus of the above-mentioned type in which the above discussed drawbacks are avoided.

To achieve this object, close to the delivery end of the mandrel case there is provided a receptacle including clamping
25 means, said receptacle being movable between a transfer position in which a packaged article may be pushed from the receptacle by means of an article pushed out of the mandrel case, a pulling through position in which an article retained in the case has been moved over a distance corresponding to at least the height of one
30 article and a sealing position in which the transverse sealing jaws may cause a seal joint to be formed between the parts of the tube of sheet material forced together.

It should be remarked that the sealing position and the transfer position may coincide.

35 The apparatus according to the invention is suitable in particular for integration with the device for compressing fibre

material into bales as has been described in the Dutch Patent Application No. 78,09933.

For moving the receptacle into the said different positions the receptacle may be connected to at least two bars the position
5 of which may be adjusted by means of a hydraulic cylinder.

For severing a completely enwrapped article from the tube of sheet material it is preferred that there are provided two pairs of end sealing jaws and that between the jaws of one of said pairs there is provided a small knife for severing the sheet
10 material between the seal joints caused by the end sealing jaws.

The knife may be fastened to a driven chain arranged between the jaws of a pair of end sealing jaws while said pair of end sealing jaws is connected to the operating mechanism in a vertically resilient condition.

15 It will be evident that the knife will normally occupy a position between the jaws of a pair and that the knife with its cutting edge will be set free if these jaws are pushed back over a small vertical distance by the other pair of jaws.

For preventing a doubling of the plastic sheet material
20 when the end sealing jaws near each other, the end sealing jaws may be made to cooperate with a mechanism for tightening the sheet material.

Preferably the tightening mechanism comprises two swivel bars, part of which projects beyond the mandrel case, and each one
25 of said bars is connected to a sealing jaw by means of a transmission and may be swiveled by moving the associated sealing jaw.

The invention will now be described in further detail having reference to the accompanying drawings.

Fig. 1 shows a diagrammatical perspective view of an
30 embodiment.

Fig. 2 shows a tightening mechanism suitable for use in the apparatus depicted in Fig. 1 for tightening the sheet material when making the transverse seal joint.

The represented apparatus is destined for packaging blocklike
35 bodies, in particular bales of fibre material, in a plastic sheet material or any other sealable material.

The apparatus includes a horizontal mandrel case 1 made of metal plate which at a right angle has been integrated with a compression chamber 2 for the compression into bales whereby the bales formed in the compression chamber may be pushed into the
5 mandrel case by means of a hydraulic cylinder 3.

The compression chamber forms part of for instance a compression device such as disclosed in the Dutch Patent Application No. 78,09933. However, the invention is not restricted to packaging bales of fibre material.

10 Both above and underneath the mandrel case 1 there has been provided a roll 4 and 5, respectively, for supplying a web of sheet material. The webs drawn from these rolls run in succession over a guide roller 6 and 7, respectively, and shoulders 8 and 9, respectively. A web of sheet material drawn over a shoulder is folded
15 into an U-shape. The dimensions of the shoulders have been selected such that the U-shaped webs will fittingly come in engagement with the mandrel case 1 the longitudinal edges 10, 11 of the webs assuming an overlapping condition.

On both sides of the mandrel case 1 there have been arranged
20 sealing jaws 12 by means of which the overlapping edge strips of the webs of sheet material may be sealed together. These jaws may be moved by means of hydraulic cylinders 13.

At the end of the mandrel case there is a receptacle 14 which is open when viewed in the longitudinal direction of the mandrel
25 case. This receptacle has been suspended from a number of interconnected bars 15 which together form two parallelograms and which by means of a hydraulic cylinder 16 may be moved along paths of which two have been indicated in the figure in dot and dash lines.

30 At the end of the mandrel case 1 there are provided two pairs of end sealing jaws 17, 18 above each other. They may be moved up and down between a position indicated in dot and dash lines and a position indicated in full lines by means of hydraulic cylinders 19, 21. The lower jaws have been connected to the piston rod of
35 the cylinder 21 in a vertically resilient manner.

For discharging the packaged bales there has been provided a discharge path 22.

Between the lower pair of end sealing jaws 18 there has been arranged an endless chain 23 running on sprocket wheels. 5 Onto the top part of this chain there has been fastened a not shown small knife. With the aid of not shown means, for instance a toothed rack which may be moved by means of a hydraulic cylinder or a chain engaging, a sprocket wheel mounted on the shaft of one of the afore-said sprocket wheels, the chain carrying the 10 knife may be driven over a distance approximately corresponding to the width of a bale.

The receptacle 14 has been provided with a clamping cylinder 24 including a clamping plate by means of which a bale present in the receptacle may be clamped together.

15 The operation of the apparatus is as follows:

By means of the ejection cylinder 3 the mandrel case 1 is filled with a series of bales formed in the compression chamber 2. About the mandrel case a tubing of sheet material is formed with the aid of the supply rolls 4, 5, the guide rollers 6,7, the shoulders 8,9 and the side sealing jaws 12. 20

Upon actuating the clamping cylinder 24 and as a consequence thereof clamping the bale with the sheet material in a fixed position within the receptacle 14, the cylinder 16 is actuated in order to impart a hinged motion to the bars 15 to a position in 25 which the receptacle reaches the extreme right hand portion of its path (pulling through position). Due to this motion the entire tube of sheet material is pulled over a distance at least equalling the height of a bale. By means of the side sealing jaws 12 a longitudinal seal seam is caused to form. The receptacle 14 30 suspended from the bars 15 may then be retracted by means of the cylinder 16 to a so-called sealing position which may be located at a slight distance to the right from the transfer position. In this sealing position of the receptacle 14, the cylinders 19 and 21 are actuated so that the two pairs of end sealing jaws 17 35 and 18 are caused to move towards each other whereby the parts of the tubing of sheet material present between the mandrel case 1

and the receptacle 14 are pressed onto each other and are sealed together so that the transverse seal seam in the sheet material at the rear face of the bale present in the receptacle 14 and the transverse seal seam in the sheet material of the front face of the foremost bale in the mandrel case 1 are formed simultaneously. These transverse seal seams are finally separated from each other by means of the knife fastened to the chain 23.

As soon as the pairs of sealing jaws both engage the sheet material the lower sealing jaws 18 are pushed downwards counter-acting the spring action so that the knife pierces through the sheet material between the two afore-said transverse seal seams. The chain is then moved over the entire width of a bale thus causing the separation.

After returning the sealing jaws 17, 18 to their starting positions, relieving the clamping cylinder 24 and moving the receptacle 14 to the uttermost left hand transfer position the following cycle may be started by the ejection of the entirely packaged bale from the receptacle 14 onto the discharge path 22 and the supply of a further bale from the mandrel case 1 to the receptacle 14.

It is not impossible that the transfer position and the sealing position of the receptacle 14 coincide.

With reference to Fig. 2 on an enlarged scale there has been shown a mechanism cooperating with the end sealing jaws 17, 18 destined to tighten the plastic sheet material that for enabling the formation of a transverse package wall has been pulled forward sufficiently over the mandrel case 1 under the influence of the reciprocating motion of the receptacle 14. If such tightening is omitted one may run the risk that the sheet material will be doubled locally by the sealing jaws 17, 18 moving towards each other whereby at the locations of doubled sheet material no seal or a seal of inferior quality may be formed. The tightening mechanism comprises two substantially Z-shaped bars 31, 32 hingedly fastened to the vertical front edge of the mandrel case 1 which are also hingedly connected to a turntable 33 and 34, respectively, mounted on the mandrel case. These turnables are interconnected

through a hingedly arranged coupling means 35. The pair of sealing jaws 17 is connected to the turntables 33 and 34 through Bowden cables 36, 37. Upon closure of the sealing jaws 17, 18, i.e. a movement towards each other, the Bowden cable 36 will pull the
5 turntable 33 such that it will turn in the direction of the arrow. Due to the presence of the coupling means 35 the turntable 34 will also turn in the indicated arrow-direction. The Z-shaped bars 31, 32 will then be driven by the turning turntables thus causing the projecting ends to swivel outwards in the direction of the arrows
10 and to tighten the sheet material.

Upon the retracting movement of the sealing jaws the Bowden cable 37 will exert a pulling force on the turning table 34 thus causing the bars 31, 32 to swivel back to the starting position.

Within the scope of the claims several modifications are
15 possible so that for instance the moving mechanism and the clamping mechanism of the receptacle 14 and the severing mechanism for severing the sheet material may have another construction. Moreover the plastic sheet material may be replaced by paper coated with thermoplastic material.

Claims

C L A I M S

1. A packaging apparatus for packaging articles in heat sealable material, in particular plastic sheet material, said apparatus comprising a substantially horizontal mandrel case for articles in line to be packaged, conveying means for stepwise con-
5 veying the articles towards the delivery end of said case, web feeding means for feeding at least one web of sheet material towards the mandrel case, folding means for folding said web about the mandrel case, longitudinal sealing means for sealing overlapping longitudinal edges of the web together and for thus forming
10 a tube of sheet material, and transverse sealing jaws arranged at the delivery end of the mandrel case extending perpendicularly to said longitudinal sealing means, c h a r a c t e r i z e d i n t h a t close to the delivery end of the mandrel case (1) there is provided a receptacle (14) including clamping means (24), said
15 receptacle being movable between a transfer position in which a packaged article may be pushed from the receptacle by means of an article pushed out of the mandrel case, a pulling through position in which an article retained within the case has been advanced over a distance corresponding to at least the height of one
20 article, and a sealing position in which the transverse sealing jaws may cause a seal joint to be formed between parts of the tube of sheet material forced together.

2. The apparatus of claim 1, c h a r a c t e r i z e d i n t h a t the receptacle is connected to at least two bars
25 (15) the position of which may be adjusted by means of a hydraulic cylinder (16).

3. The apparatus of claim 1 or 2, c h a r a c t e r i z e d i n t h a t there are provided two pairs of end sealing jaws (17,18) and in that between the jaws of one of said pairs there
30 is provided a small knife for severing the sheet material between the seal joints caused by the end sealing jaws.

4. The apparatus of claim 3, c h a r a c t e r i z e d i n t h a t the knife is fastened to a driven chain (23) arranged between the jaws of a pair of end sealing jaws (18) and in that
35 said pair of end sealing jaws (18) is connected to the operating

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mechanism (21) in a vertically resilient condition.

5 5. The apparatus of anyone of the preceding claims,
c h a r a c t e r i z e d i n t h a t the end sealing jaws
(17,18) cooperate with a mechanism for tightening the sheet
material.

10 6. The apparatus of claim 5, c h a r a c t e r i z e d i n
t h a t the tightening mechanism comprises two swivel bars (31,32)
part of which projects beyond the mandrel case (1), and each
one of said bars is connected to a sealing jaw by means of a trans-
mission (31.37, inclusive) and may be swiveled by moving the
associated sealing jaw.

fig-1

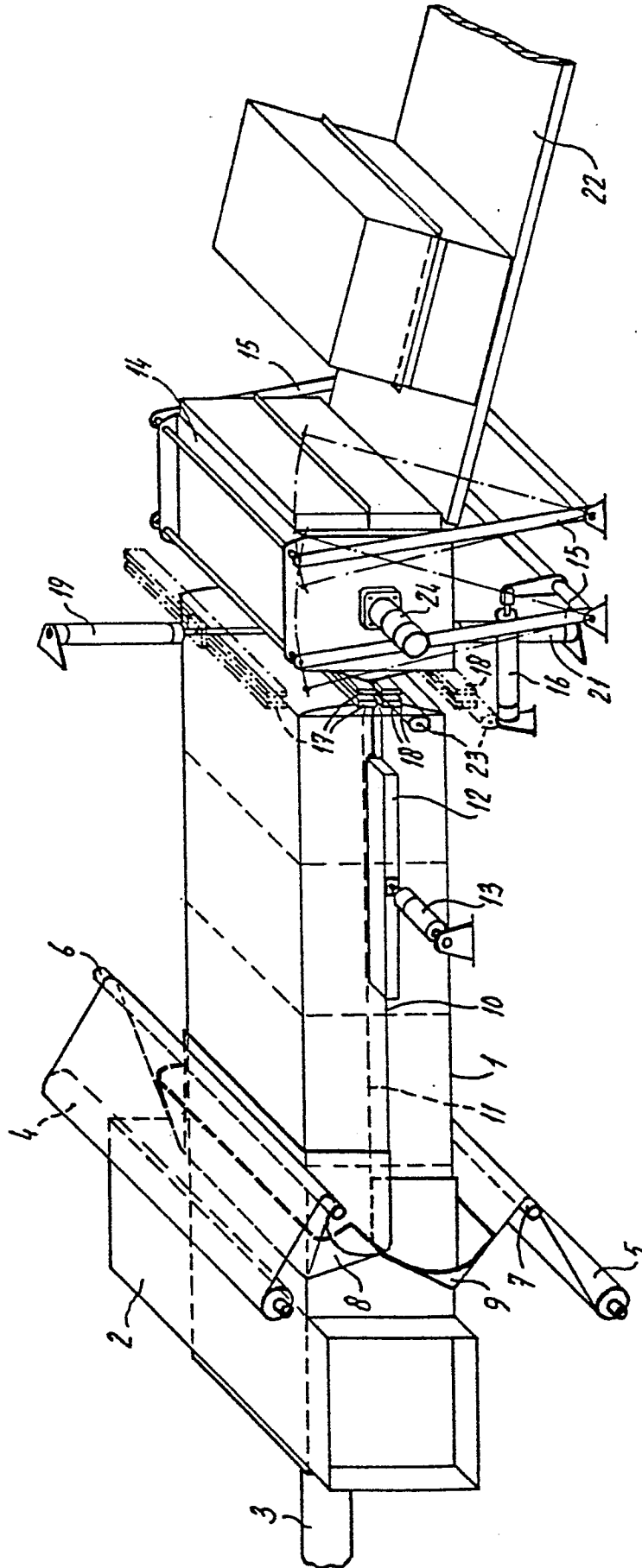
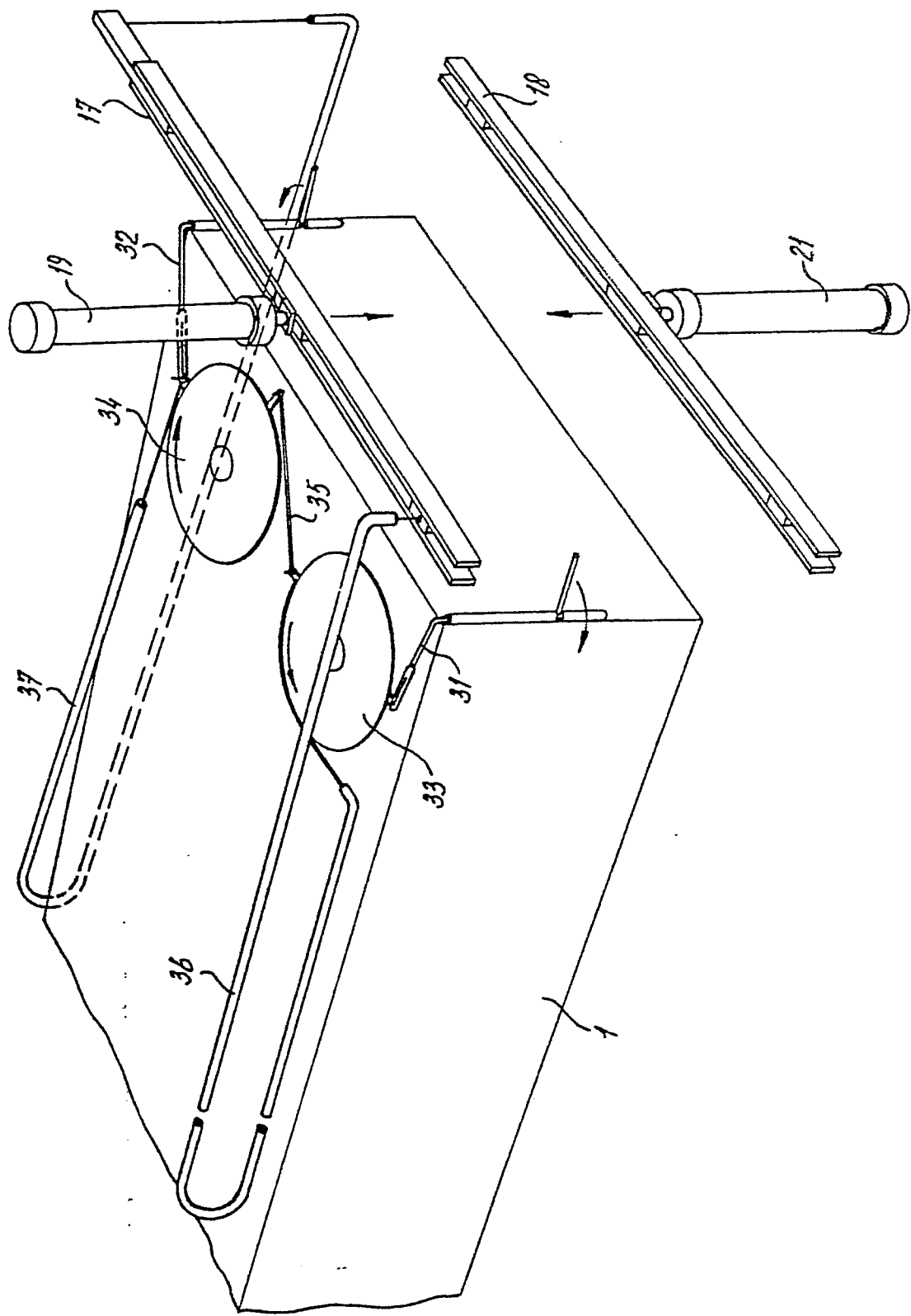


fig-2





European Patent
Office

EUROPEAN SEARCH REPORT

0014504
Application number
EP 80 20 0075

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 8)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
D, A	<u>US - A - 2 747 346 (TIGERMAN)</u> * Column 3, line 4 - column 4, line 63; column 6, line 65 - column 7, line 56; figures 13-16 *	1,3	
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A	<u>DE - A - 1 461 911 (HEISIG)</u> * Page 6, paragraph 2; figure 6 *	1	

			TECHNICAL FIELDS SEARCHED (Int. Cl. 8)
			B 65 B
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
☒ The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search The Hague		Date of completion of the search 07-05-1980	Examiner CLAEYS