

12 **EUROPEAN PATENT APPLICATION**

21 Application number: 83303475.4

51 Int. Cl.³: D 01 G 15/76

22 Date of filing: 15.06.83

43 Date of publication of application:
27.12.84 Bulletin 84/52

64 Designated Contracting States:
CH DE FR GB IT LI

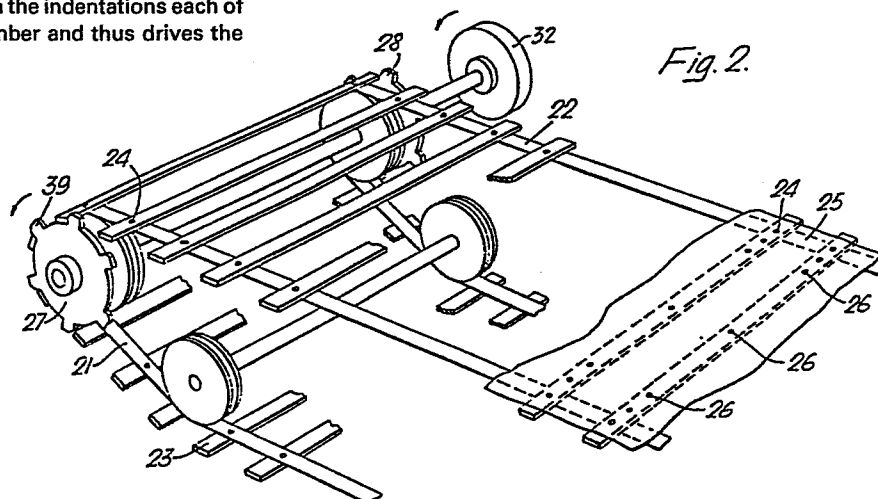
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54 Improvements relating to carding engines.

57 A belt system for conveying waste from beneath textile processing apparatus. An endless belt is formed by two endless longitudinal tension members (21, 22) to which are secured a series of parallel cross members (23). The framework so formed is loosely covered by a flexible carrier material (25). The belt engages rollers comprising indented wheels (27, 28), the cross members being received in the indentations each of which in turn engages a cross member and thus drives the belt.



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IMPROVEMENTS RELATING TO CARDING ENGINES

This invention relates to belt systems for conveying waste from beneath textile processing apparatus.

There are many textile processes wherein considerable waste is produced, much of the waste falling below the processing apparatus. One example is in the carding of cotton, wherein sand, seed, other trash and short fibres are released from the cotton feed stock during the carding operation, much of this waste either falling or being directed to beneath the carding engine. Part of this waste is sticky and if allowed to accumulate beneath the carding engine blockage of the undercard area will occur.

Many undercard cleaning systems have been proposed in the past, some relying on the establishment of air currents beneath the carding engine in order to blow or suck the waste to a receiving zone, some relying on trap doors and other mechanically movable means openable to allow accumulated waste to be transferred into a collection zone and others relying on a conveyor belt system for physically moving waste falling onto the belt to a collecting zone. All of these systems have their disadvantages. The undercard region is generally complex in shape and crowded with equipment. If any waste material becomes caught below the card then the effect of the air current is to accumulate waste on the

caught material and significant blockages can eventually occur. Trap door systems are mechanically complex and expensive and can only be of limited efficiency. Conveyor belts may be considered potentially the best solution,
5 but belt systems previously proposed have been expensive, have been difficult to guide laterally of the carding engine and have required considerable down time of the carding engine when repair or replacement of the belt system has been necessary. Furthermore, air currents below
10 the carding engine have a tendency to roll waste material along the belt in a direction opposite to the direction of travel of the belt, and waste accumulating in this way can cause blockages.

The present invention seeks to solve the problem of
15 providing a simple and inexpensive belt system for conveying waste from beneath textile processing apparatus.

According to the present invention a belt system for conveying waste from beneath textile processing apparatus comprises an endless belt passing around rollers one of
20 which is a drive roller, the belt comprising a plurality of substantially parallel cross members extending laterally of the belt, and carrier material covering the cross members and secured thereto, and the drive roller having an indented circumference, the indentations being spaced to
25 receive part of successive ones of the cross members and to apply driving force to the belt as the drive roller rotates.

A belt system as aforesaid can be manufactured very inexpensively. Drive on to the cross members is positive
30 and the belt is easy to guide laterally. If the belt becomes worn or damaged individual parts thereof can be replaced without the necessity of replacing the whole belt. such maintenance work can be carried out in a very straight forward and rapid manner, without necessitating long down
35 time for the apparatus from which cleaning is being effected.

The carrier material may also form the tension member of the belt and may be formed with strengthening means, for

example, reinforced selvages, for this purpose. More preferably however, the belt includes two laterally spaced apart flexible tension members each extending the full length of the belt, the cross members being secured to the tension members and the carrier material covering the framework formed by the tension members and cross members and secured thereto. The only element of the belt wherein any particular strength is then required is the tension members, to which the driving force for the belt is transmitted through the cross members. In particular the flexible carrier material is not subject to any strain whatsoever due to the application of driving force, in contrast to other belt systems that have been used. Accordingly an extremely cheap canvas or other flexible material can be used for the carrier. The carrier material may loosely cover the framework formed by the tension members and cross members, the carrier material then tending to sag and form pockets in the open parts of the framework. This effect increases the efficiency of collection and retention of material by the belt and to a large extent prevents air currents moving collected waste along the belt surface.

Conveniently each roller comprises two axially spaced indented wheels, the indentations in the two wheels being axially aligned. Thus the cross members are driven at two spaced points in order to improve the balance of the belt. Each roller conveniently also includes two axially spaced guide wheels each coaxial with the indented wheels, the outer circumference of each guide wheel engaging a respective one of the tension members. The required pitch circle of the tension members is positively maintained by such arrangements, without dependence on the nature of the engagement of the cross member with the indented wheels.

Preferably each indentation has a circumferential extent that is greater than the width of each cross member,

and the pitch between adjacent indentations is greater than the pitch between adjacent cross members in each case by a factor such that at any given time only one indentation is in driving contact with a cross member.

5 By adopting such an arrangement interference-free engagement of each cross member with the indentations as the cross member approaches the roller is obtained.

Longitudinal guidance of the belt, at least on the upper run thereof wherein waste is collected, can be
10 effected very simply and lateral wandering of the belt can be virtually eliminated. In one preferred arrangement guide means extend longitudinally alongside both sides of the collecting run of the belt, the ends of the cross members being engageable with the guide means as the belt is
15 guided thereby.

In order that the invention may be better understood a specific embodiment of belt system in accordance therewith will now be described in more detail by way of example only, with reference to the accompanying drawings
20 in which:-

Figure 1 is a schematic side elevation of a carding engine incorporating a belt system according to the invention;

Figure 2 is an isometric view of part of the belt
25 system of Figure 1; and

Figure 3 is a cross-section on the line III-III of Figure 1.

Referring now to Figure 1 a carding engine comprises a floor mounted sub-frame 1 including four upright pillars
30 2. At each side of the carding engine a side frame assembly 3 is supported on the two pillars. The side frames carry bearing assemblies for a main carding cylinder 4 that is preceded by a feed roller 5 and takerin 6, and it is followed by a doffer 7, stripper
35 roll 8 and crush rolls 9. Each of these cylinders and rollers extend between the side frames at the two sides

of the carding engine. Each side frame assembly and the sub-frame at the respective side of the card is generally closed by a cover arrangement not shown in the drawings. It will be understood that Figure 1 merely conveys one
5 typical arrangement of carding engine and that the invention is applicable to all types of carding engine, whether they be single cylinder cards or duo-cards, and is also applicable to other types of textile processing apparatus.

10 The invention is concerned with a belt system for conveying waste from beneath the processing apparatus, and such system is shown schematically in Figure 1 as comprising a belt 10 extending around a driving roller 11 and around guide rollers 12. The upper run of the belt
15 collects waste material falling from the carding engine and as the belt passes over the roller at the end of the upper run the waste is deposited from the belt onto the transversely extending conveyor 13 by which it is taken for collection. The conveyor 13 may be of any form, or may be
20 replaced by a suitable pneumatic extraction system in this region, and the handling of the waste falling from the belt 10 forms no part of the present invention.

Figures 2 and 3 show the construction of the belt and rollers. The belt comprises two laterally spaced apart
25 flexible tension members 21 and 22, each extending the full length of the belt in an endless loop. Any material that is strong in tension and sufficiently flexible to pass around the rollers without buckling is suitable for the tension members, for example thin spring steel, a
30 suitable plastics material, or a conventional thin belt. A plurality of parallel cross members 23 extends laterally of the belt at regular spaced intervals, each member being secured to both tension members 21 and 22 by rivets 24 or other suitable securing means. Each cross member may
35 be of any suitably strong material such as steel strip, wood, aluminium, or a suitable plastics. The framework

formed by the tension members and cross members is covered by a flexible carrier material 25 draped loosely over the framework and secured to each of the cross members by suitable securing means 26, which may for example be pins, clips, or staples depending on the material selected for the cross members. The carrier material is not subject to any stress resulting from the driving of the belt and may be made from a light-weight fabric such as canvas. The material is desirably sufficiently loose for it to sag downwardly between adjacent cross members, effectively forming pockets in which waste material falling onto the belt is retained and so prevented from being blown lengthwise along the belt.

The drive roller 11 around which the belt passes comprises two axially spaced wheel assemblies 27 and 28. Figure 3 shows a cross-section through the wheel assembly 28, it being understood that the assembly 27 is similar, but of opposite hand. Both wheel assemblies are supported on a shaft 29 extending the full width of the carding engine and supported in bearings 30 on side plate assemblies 31. One end of the shaft 29 carries a drive pulley 32 and the shaft also carries a hollow drum 33 positioned centrally of the shaft and retained in axial position by circlips 34, one at each end of the drum.

Each wheel assembly comprises an indented wheel 35 secured to rotate with the shaft 29 by a key 36, and a guide wheel 37 freely rotatable on the shaft and axially retained between the coupling 36 and a circlip 38. The indentations in the indented wheels at the top sides of the carding engine are axially aligned and each indentation 39 has a circumferential extent that is greater than the width of each cross member 33. In addition, the pitch between adjacent indentations is greater than the pitch between adjacent cross members and these relationships are chosen to be such that at any given time, the forwardmost indentation in the direction of rotation is in

driving contact with a cross member. For all the following indentations the driving flank of the indentation will be an increasing distance behind the trailing side of the cross member. In this way, as each
5 cross member approaches the indented wheel it moves into an indentation in the wheel without interference.

The outer circumference of the guide wheel 37 engages the tension member 22 and supports this on a given pitch circle as the belt moves around the wheel assembly. The
10 pitch circle is chosen to be such that the cross members lie at approximately half the depth of an indentation in the indented wheel when fully in engagement with such indentation. The outer circumference of the guide wheel 37 is formed with a groove 39a in order that the rivets
15 24 may travel over the guide wheel without interference. The drum 33 pushes the pockets of the fabric outwardly as the belt passes around the roller, to assist in depositing the waste onto the conveyor 13.

Figure 3 also shows part of the idler pulley 12
20 adjacent to the drive pulley 11. Each idler pulley comprises two guide wheels 40, one at each end of a common shaft 41 extending across the width of the carding engine. Each guide wheel 40 is capable of rotating around the shaft 41 and each has an outer circumference 42 that is
25 engageable with the respective tension member 22 or 21, the surface 42 being grooved in similar manner to that of the guide wheel 37.

Figure 3 also shows guide plates 43 and 44 extending the full length of the carding engine adjacent to the
30 upper and lower runs respectively of the belt. It will be understood that similar guide members extend alongside the upper and lower runs of the belt at the opposite side thereof. The ends of the cross members 23 lie adjacent to the guide members at the respective sides of the
35 carding engine and are engageable therewith if the belt should wander from its central track. The guides

thus retain the belt in its central track. Bottom guides 45, 46 are also provided to prevent the bag from sagging in its upper and lower runs.

5 The cheapness and simplicity of the belt system of the invention will be appreciated from the foregoing description. The pocket effect produced by the sagging of the carrier material is advantageous in that collected waste will tend to remain in the pocket and not be blown therefrom by the air currents that are experienced
10 in the undercard region. The waste is thus less likely to come into contact with any fixed part of the undercard, on which it may lodge and commence to accumulate additional waste material. If the carrier material should become damaged then it will be seen that it is a simple
15 matter to strip off the old carrier material and replace it with new material, even while the belt continues to move at a slow speed. Carrier replacement can thus be effected with no down time of the carding engine. Should one of the cross members become damaged it is again a simple
20 matter to replace this.

It will be understood that the belt construction, the rollers forming the drive system and the guide means may all be varied from those specifically illustrated in the drawings.

CLAIMS:

1. A belt system for conveying waste from beneath textile processing apparatus, comprising an endless belt passing around rollers one of which is a drive roller, the belt comprising a plurality of substantially parallel
5 cross members extending laterally of the belt, and carrier material covering the cross members and secured thereto, and the drive ^{roller} having an indented circumference, the indentations being spaced to receive part of successive ones of the cross members and to apply driving force to the
10 belt as the drive roller rotates.

2. A belts system according to clam 1 in which the belt includes two laterally spaced apart flexible tension members each extending the full length of the belt, the cross members being secured to the tension members and the
15 carrier material covering the framework formed by the tension members and cross members and secured thereto.

3. A belt system according to claim 2 in which the carrier material loosely covers the framework so as to form pockets between adjacent cross members.

20 4. A belt system according to any one of claims 1 to 3 in which each roller comprises two axially spaced indented wheels, the indentations in the two wheels being axially aligned.

5. A belt system according to claim 4 insofar as
25 dependent on claim 2 or claim 3 in which each roller includes two axially spaced guide wheels each coaxial with the indented wheels, the outer circumference of each guide wheel engaging a respective one of the tension members.

6. A belt system according to claim 5 in which one
30 indented wheel and one guide wheel are mounted together as a pair at each side of the belt, with the indented wheel being axially outermost, and the cross members extending axially outwardly beyond the indented wheel.

7. A belt system according to claim 5 or claim 6
35 in which each guide wheel is mounted so as to be able to

rotate independently of each indented wheel.

8. A belt system according to any one of the preceding claims in which each indentation has a circumferential extent that is greater than the width
5 of each cross member, and the pitch between adjacent indentations is greater than the pitch between adjacent cross members, in each case by a factor such that at any given time only one indentation is in driving contact with a cross member.

10 9. A belt system according to any one of the preceding claims and including guide means extending longitudinally alongside both sides of at least one run of the belt, the ends of the cross members being engageable with the guide means, so that the belt is guided thereby.

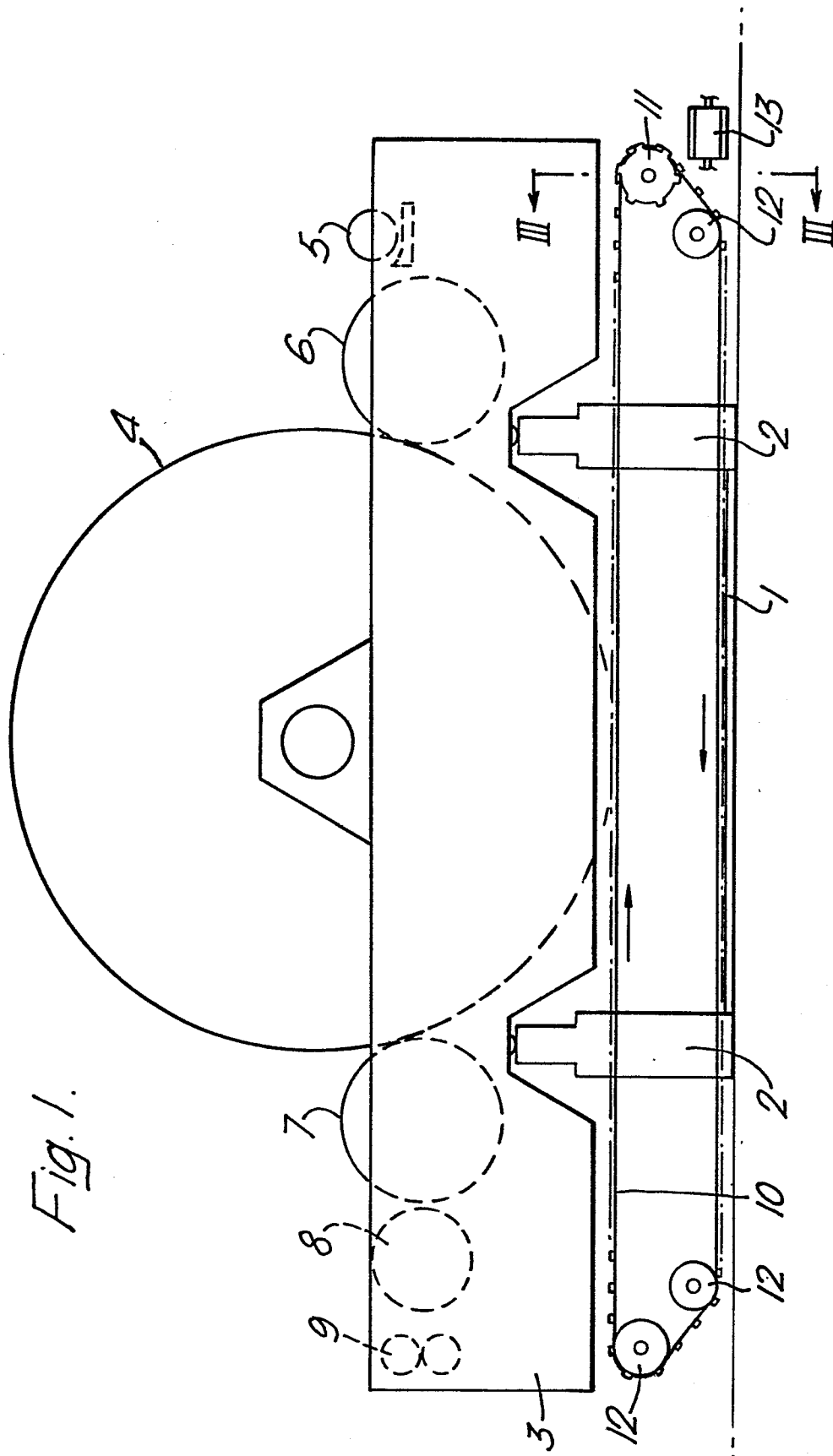


Fig. 2.

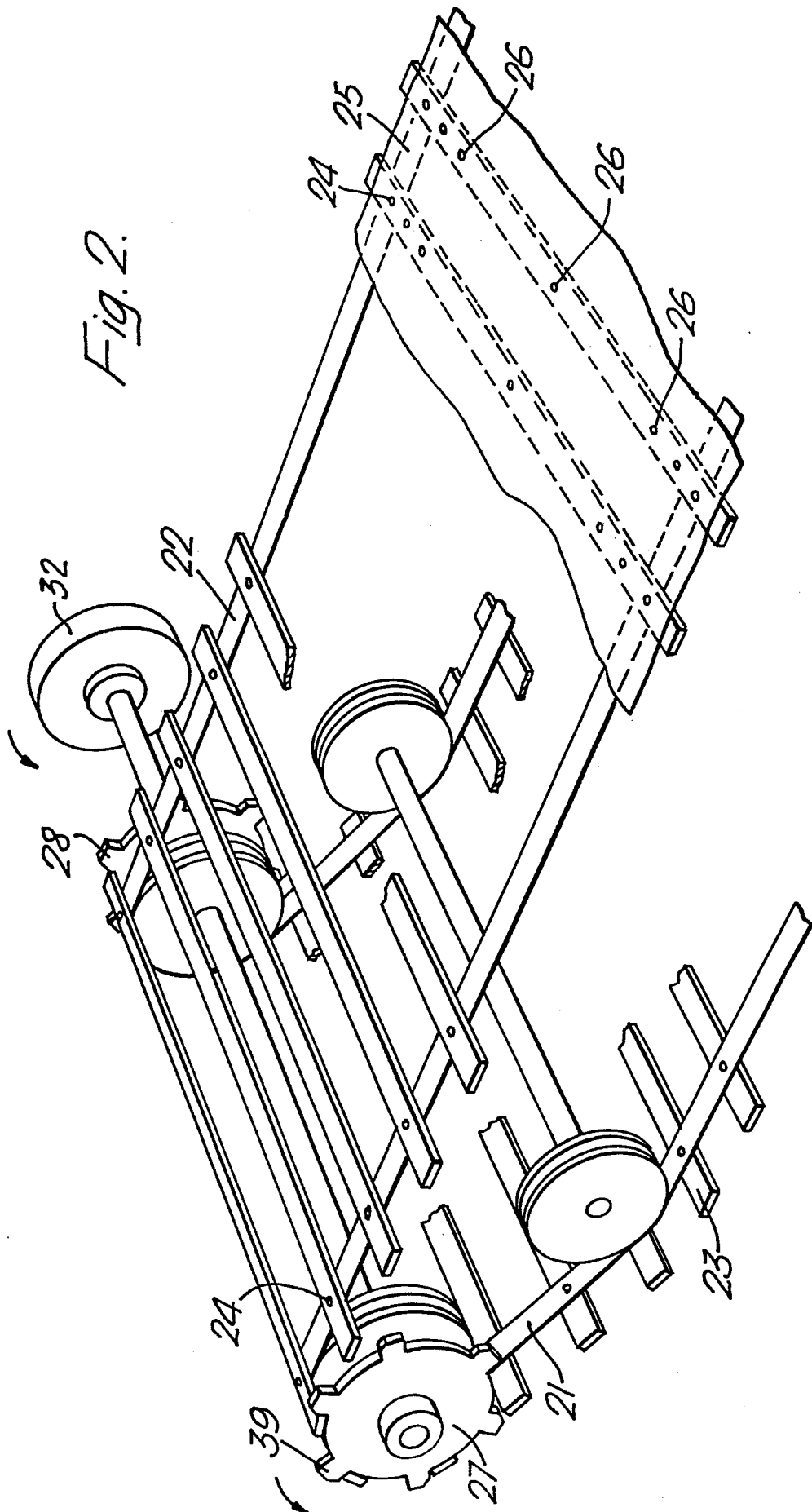
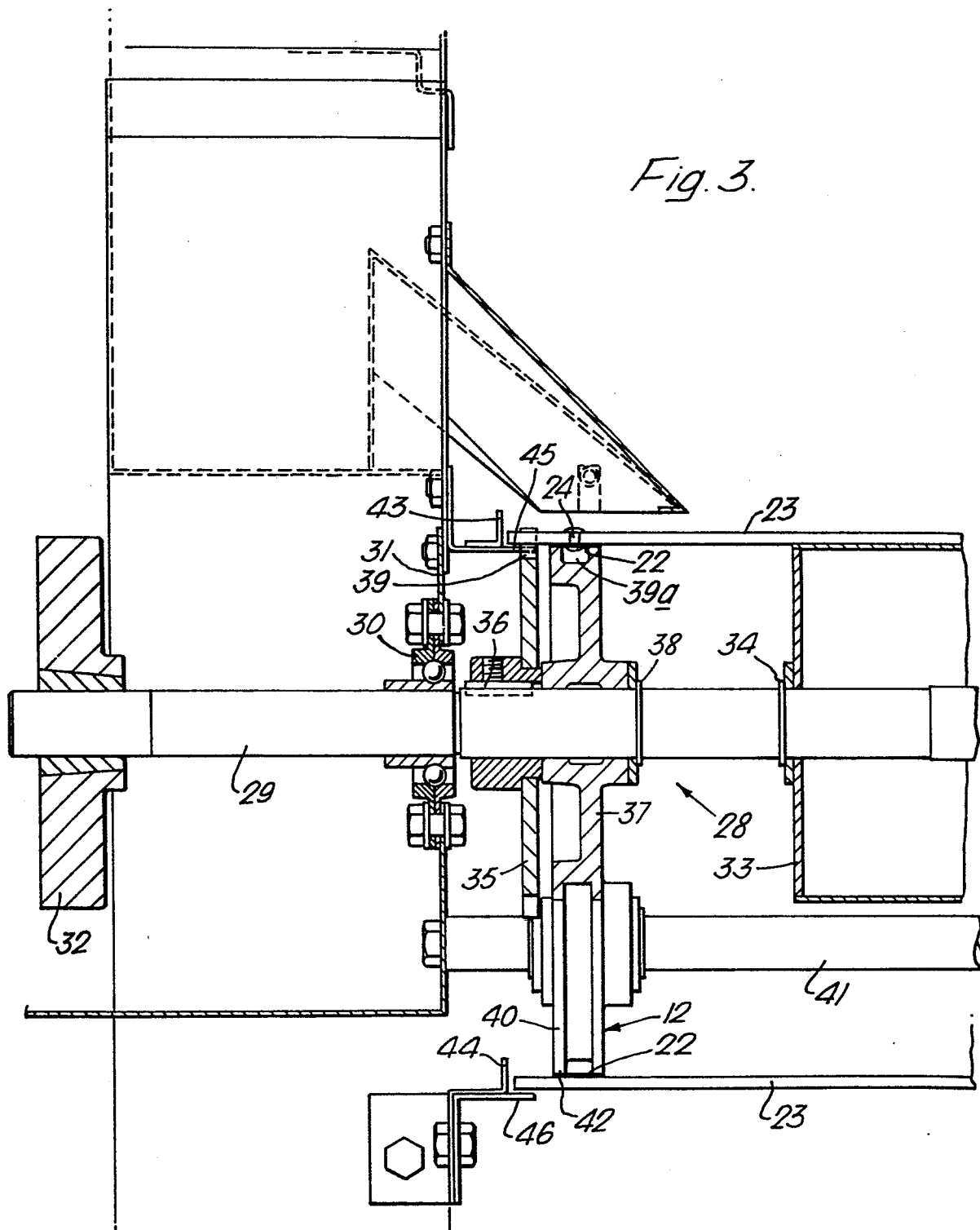


Fig. 3.





European Patent
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EUROPEAN SEARCH REPORT

0128979

Application number

EP 83 30 3475

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Y	US-A-1 642 235 (FLIEDNER J.) * page 1, lines 57-76; figures 1,2 *	1,2,4,5	D 01 G 15/76
Y	DE-C- 133 934 (KNOCHE H.) * Page 1, left-hand column, paragraph 2; figure *	1	
A	GB-A- 401 056 (R. GREG & COMPANY LTD.)		
A	DE-C- 903 917 (A. KOLTERMANN)		
A	US-A-3 376 610 (E.F. WILLIAMS)		TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
A	DE-C- 91 321 (F. HADRICH et al.)		D 01 G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 28-02-1984	Examiner MUNZER E.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			