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## (54) Buffer assembly for wire

(57) The invention relates to a buffer assembly (1) for a wire (2), such as for instance a metal wire, comprising:

- a holder body (3) for carrying the wire (2) windable round the holder body (3),
- guide means (8-13) placed round the holder body (3), the guiding surface of which is located at least at two mutually differing levels relative to the axis through the holder body (3), and
- means for rotating the holder body (3) and the guide means (8-13) relative to one another round the axis through the holder body (3).

The invention also relates to a rolling train in which such a buffer assembly is incorporated between a device for cleaning the metal wire with soap and the rolling device.

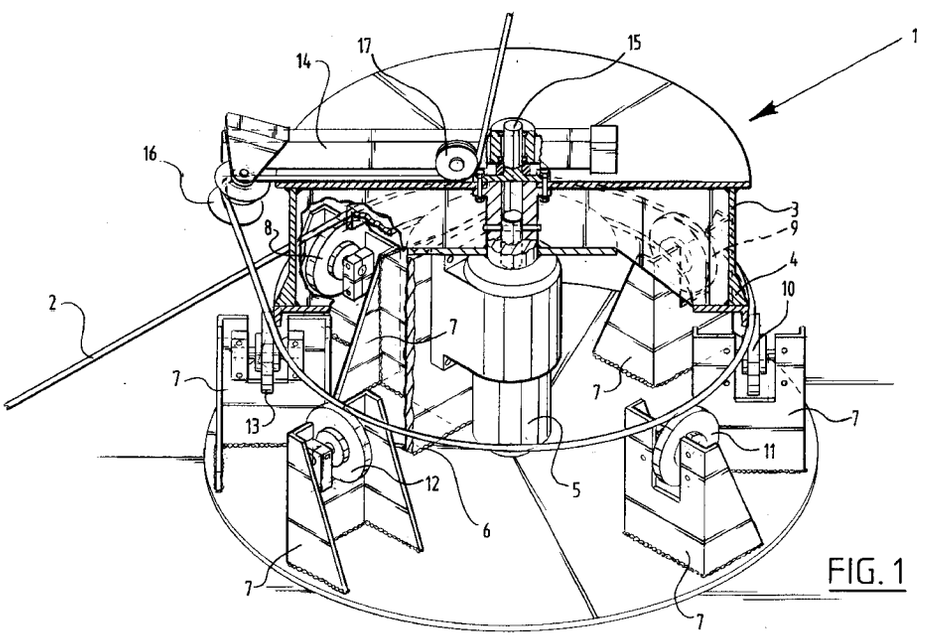


FIG. 1

EP 0 839 591 A1

## Description

The invention relates to a buffer assembly for a wire, such as for instance a metal wire. The invention also relates to a rolling train for metal wire in which the following processing stations are successively disposed:

- unwinding means for unwinding metal wire from a bundle,
- means from removing the mill scale from the metal wire,
- means from cleaning the metal wire using soap, and
- means for rolling the wire.

In the processing of metal wire to for instance steel mats for concrete reinforcement, the above stated processing stations are run through successively. In order to enable the rolling operation to take place continuously the outer end of a bundle of metal wire located at the bottom is fixedly welded to the top of a subsequent bundle of metal wire for processing. In this way the bundles of metal wire can be unwound in continuous manner. The rolled metal wire can then be supplied to a further processing unit, such as for instance a welding machine for steel wire mats. In order to prevent standstill of this further processing machine resulting from short disturbances in the rolling train, a buffer can be placed between the rolling train and the further processing machine. Such a buffer takes the form for instance of a slightly tapering drum onto which the rolled steel wire is pulled with relatively great tension. Due to the tension on the wire it will slide over the drum from a part with a comparatively large cross-section to a part with a smaller cross-section. The drawback of this buffer is the relatively large chance of malfunction, the danger of deformation of the steel wire due to the tension with which the wire has to be wound onto the drum, and increase of torsion in the wire.

The invention has for its object to provide an improved buffer device with which wire can be buffered without locking it under tension and with limited increase of the torsion in the wire. The invention also has for its object to provide a rolling train in which a buffer device is incorporated with which interruptions in the feed of the wire for processing can be dealt with more easily than in a rolling train known heretofore.

The present invention provides for this purpose a buffer assembly for a wire, such as for instance a metal wire, comprising:

- a holder body for carrying the wire windable round the holder body,
- guide means placed round the holder body, the guiding surface of which is located at least at two mutually differing levels relative to the axis through the holder body, and
- means for rotating the holder body and the guide means relative to one another round the axis through the holder body.

In preference the holder body is substantially cylindrical and the side wall of the holder body has on one of the outer ends a larger diameter than the diameter of the remaining, greater part of the substantially cylindrical holder body. The part of the cylindrical body with a larger diameter preferably transposes smoothly into the remaining cylindrical part of the holder body. Due to the underlying movement of the guiding surface and the holder body a wire wound loosely onto the holder body close to the guide means will be displaced relative to the holder body by this guiding surface such that, after one complete mutual rotation, space is at least created again on the holder body close to the guide means for receiving a following wire winding. For this purpose the guide means push against the last wire winding arranged on the holder body such that the whole package is displaced at least sufficiently to accommodate the following wire winding. In this buffer assembly the displacement in longitudinal direction relative to the holder body does not therefore take place due to the tension at which the wire winding is arranged on the holder body but because the guide means exert a force on the last arranged wire winding. Owing to this construction it is unnecessary to wind the wire windings at great tension on the holder body as is necessary in the existing buffer assemblies. This provides the advantages sought after; relatively little torsion in the buffered wire, buffering which is little susceptible to disruption, and so on. By providing the holder body with a diameter at that position where the last wire winding is always arranged on the holder body that is slightly larger than at a distance from the guide means, it becomes even easier to cause the wire windings to be displaced by the guiding surface. It is also possible to buffer the wire windings on the holder body in "stacked" manner at some distance from the guide means. This means that a plurality of wire windings can be placed one over another at some distance from the guide means.

The guide means can for instance have a helical surface. Another preferred embodiment has guide means constructed from a plurality of separate guide elements arranged at varying heights relative to the axis through the holder body. In a very advantageous preferred embodiment the guiding surfaces are formed by rotatable wheels which are placed at varying heights round the holder body and the shaft directions of which lie perpendicular to the axis through the holder body. The most advantageous embodiment of the guide means can be chosen subject to the wire for processing and the dimensions of the holder body. A helical guide means has the advantage that the wire can be supported over great length, i.e. a maximum of one wire winding. An advantage of the use of rotatable wheels is that the friction between guide means and the last wire winding remains limited.

The holder body is preferably rotatable round the

axis of the holder body by means of a motor. In preference the guide means are herein connected in stationary manner to the motor for driving the holder body. The rotating holder body enables winding of the wire onto the holder body with minimal exertion of force. Furthermore, no complex winding means are required.

The buffer assembly is provided in another preferred embodiment with an unwinding mechanism for unwinding from the holder the wire wound thereon. This unwinding mechanism can be embodied in a preferred embodiment such that it comprises an arm which is rotatable round the axis of the holder means and which has a guide for guiding the wire arranged at a distance from the point of rotation. The unwinding mechanism unwinds wire from the holder means at a distance from the guide means. This means that, of the wire windings situated on the holder body, the chronologically first arranged wire winding must be unwound by the unwinding mechanism. The rotatable arm with guide means prevents tangling or other inconvenient side-effects from occurring during unwinding of wire from the holder means, whereby unwinding would have to be interrupted.

The invention also comprises a rolling train of the type referred to in the preamble wherein a buffer assembly is disposed between the means for cleaning the metal wire with soap and the means for rolling the metal wire. This position for the buffer means can only be realized because the buffer assembly winds the wire onto the holder means with little force. The processes relatively susceptible to disruption placed prior to the buffer assembly can be temporarily interrupted without this having consequences for the rolling means and further operations optionally placed thereafter. This is particularly advantageous because the rolling means must function continuously in order to obtain a rolled wire of constant quality. The rolling means in particular can function in more constant manner in this rolling train than in the rolling train of the prior art.

The present invention will be further elucidated with reference to the non-limitative embodiments shown in the following figures, wherein:

Fig. 1 shows a partly cut-away perspective view of a buffer assembly according to the invention,
Fig. 2a, 2b and 2c show detail views of a cross-section through the buffer assembly of fig. 1,
Fig. 3 shows a schematic view of a prior art rolling train, and
Fig. 4 shows a schematic view of a rolling train according to the invention.

Fig. 1 shows a buffer assembly 1 on which a steel wire 2 can be buffered. This figure shows only one winding of the steel wire 2. Buffer assembly 1 comprises a drum-like holder body 3 which contains a widening portion 4 on the underside. The drum-like holder body 3 is rotatable by means of a motor 5. This latter is rigidly connected to a frame 6. Standing supports 7 are arranged on this frame 6, which supports 7 bear rotatable guide wheels 8,9,10,11,12,13. Guide wheel 8 is herein placed in the lowest position and the subsequent guide wheels 9,10,11,12,13 are disposed a little higher in each case. This results in a height difference of guide wheels 8 and 13 which is at least as large as the thickness of the steel wire 2 for buffering. In one full rotation of the drum-like holder body 3 the guide wheels 8-13 will shift the bottom winding of steel wire 2 at least so far upward over the side wall of holder body 3 that space is created for a subsequent winding of steel wire 2. Guide wheels 8-13 thus push the bottom winding of steel wire 2 upward along holder body 3. This will be further elucidated in fig. 2a-c.

On the top of buffer assembly 1 is arranged an arm 14 which is freely rotatable round a shaft 15. This shaft 15 is also the axis of rotation of the holder body 3 and is rigidly connected to frame 6. An outer end of arm 14 is provided with a guide wheel 16 with which the winding of the steel wire 2 buffered on holder 3 can be taken from the holder and discharged via a second guide wheel 17 to a following processing station. Arm 14 is freely movable round shaft 15 and, subject to the demand for steel wire 2 of a following processing station, the arm 14 will unwind steel wire 2 from holder body 3 at a higher or lower speed. For the sake of clarity only one winding of the steel wire 2 is shown in this figure but in practice a large number of windings of steel wire 2 will be present round holder body 3.

Fig. 2a shows a cross-section through the lowest guide wheel 8 and a part of the holder body 3. The highest guide wheel 13 is shown by means of a broken line. A bottom winding 18 of steel wire 2 is displaced by a full rotation of holder body 3 to the level at which a preceding winding 19 of steel wire 2 is situated. The level difference N between the lowest guide wheel 8 and the highest guide wheel 13 is at least as great as the thickness of steel wire 2.

Fig. 2b shows the cross-section as depicted in fig. 2a, wherein two windings 18,19 of the steel wire are situated round holder body 3, while fig. 2c shows the situation in which three windings 18,19,20 are located round holder body 3. With each subsequent winding to be newly arranged the windings 18,19,20 located thereabove are displaced upward. Since holder body 3 is provided on the underside with a widened part 4, more space will be available after a number of windings for a determined winding 18,19,20 round the holder body 3 so that windings 18,19,20 will be able to lie one over another in different layers.

Fig. 3 shows a rolling train 21. A bundle of wire material 22 is placed therein on a mandrel 23. Metal wire 2 is removed from bundle 22 by a wheel 24 and fed via means 25 for removing the mill scale from the metal wire 2 to a soaping device 26 where the metal wire is cleaned. A rolling device 27 is placed after soaping device 26.

After rolling device 27 the rolled metal wire 2 can be fed to a following device.

In the rolling train 28 according to the invention the initial route is the same as that in the existing rolling train 21. A significant difference however is that the buffer assembly 1 as shown in fig. 1 is incorporated between soaping device 26 and rolling device 27. In the case of disturbances in the initial route of rolling train 28, i.e. in the unwinding of wire bundle 22, descaling in device 25 or cleaning of the wire 2 in soaping device 26, the rolling operation 27 will be able to continue, at least for as long as the buffer assembly 1 is provided with sufficient buffered wire 2 for this purpose. The rotation speed of arm 14 of buffer assembly 1 depends on the amount of wire demanded by the rolling device 27.

## Claims

1. Buffer assembly for a wire, such as for instance a metal wire, comprising:

   - a holder body for carrying the wire windable round the holder body,
   - guide means placed round the holder body, the guiding surface of which is located at least at two mutually differing levels relative to the axis through the holder body, and
   - means for rotating the holder body and the guide means relative to one another round the axis through the holder body.

2. Buffer assembly as claimed in claim 1, wherein the holder body is substantially cylindrical and the side wall of the holder body has on one of the outer ends a larger diameter than the diameter of the remaining, greater part of the substantially cylindrical holder body.

3. Buffer assembly as claimed in claim 2, wherein the part of the cylindrical body with the larger diameter transposes smoothly into the remaining cylindrical part of the holder body.

4. Buffer assembly as claimed in any of the foregoing claims, wherein the guide means have a helical surface.

5. Buffer assembly as claimed in any of the foregoing claims, wherein the guide means comprise a plurality of separate guide elements arranged at varying heights relative to the axis through the holder body.

6. Buffer assembly as claimed in claim 5, wherein the guiding surfaces are formed by rotatable wheels placed at varying heights round the holder body and the shaft directions of the wheels lie perpendicular to the axis through the holder body.

7. Buffer assembly as claimed in any of the foregoing claims, wherein the holder body is rotatable round the axis of the holder body by means of a motor.

8. Buffer assembly as claimed in claim 7, wherein the guide means are connected in stationary manner to the motor for driving the holder body.

9. Buffer assembly as claimed in any of the foregoing claims, wherein the assembly is also provided with an unwinding mechanism for unwinding from the holder the wire wound thereon.

10. Buffer assembly as claimed in claim 9, wherein the unwinding mechanism comprises an arm which is rotatable round the axis of the holder means and which has a guide for guiding the wire arranged at a distance from the point of rotation.

11. Rolling train for rolling wire in which the following processing stations are successively disposed:

    - unwinding means for unwinding metal wire from a bundle,
    - means for removing the mill scale from the metal wire,
    - means for cleaning the metal wire using soap, and
    - means for rolling the wire, wherein a buffer assembly as claimed in any of the foregoing claims is disposed between the means for cleaning the metal wire with soap and the means for rolling the metal wire.

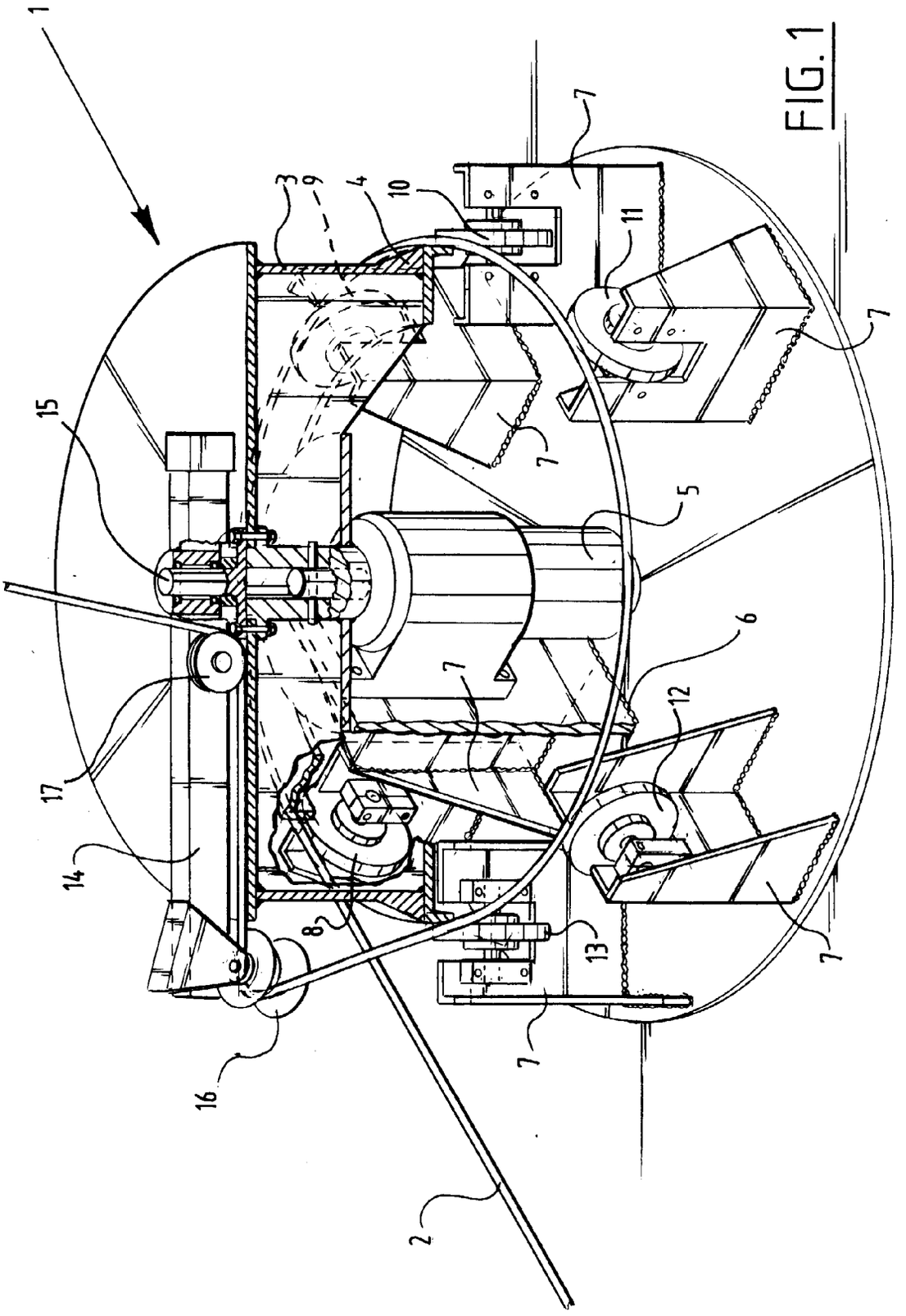


FIG. 1

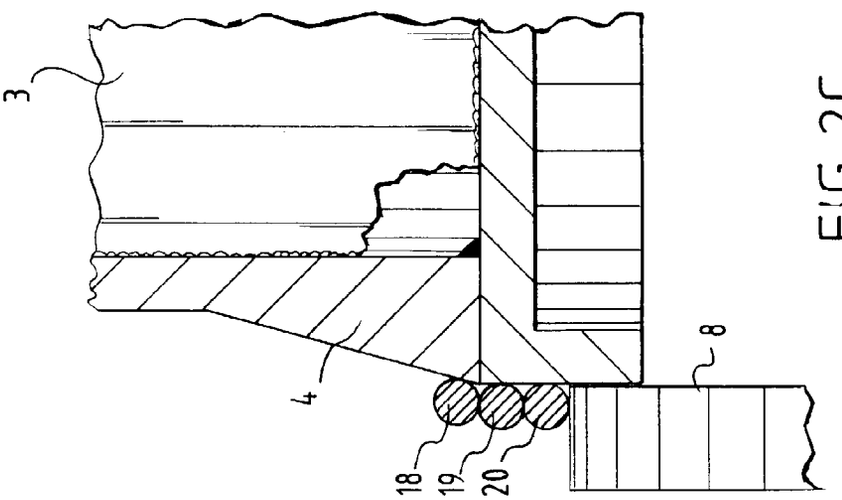


FIG. 2C

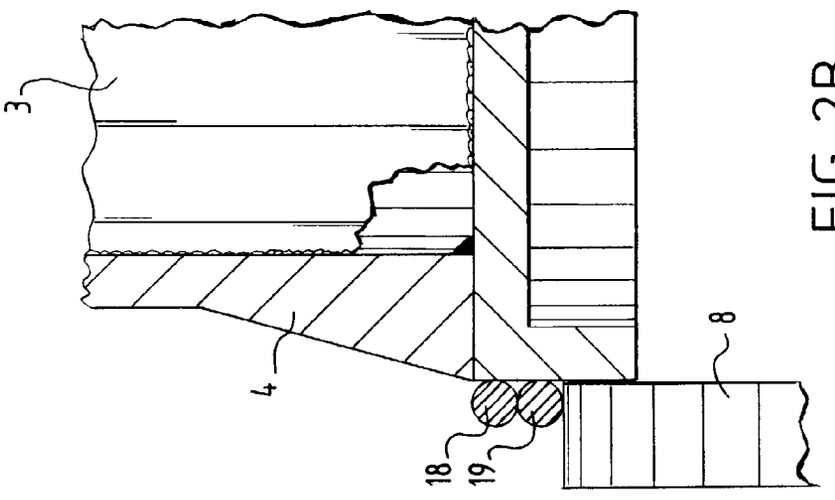


FIG. 2B

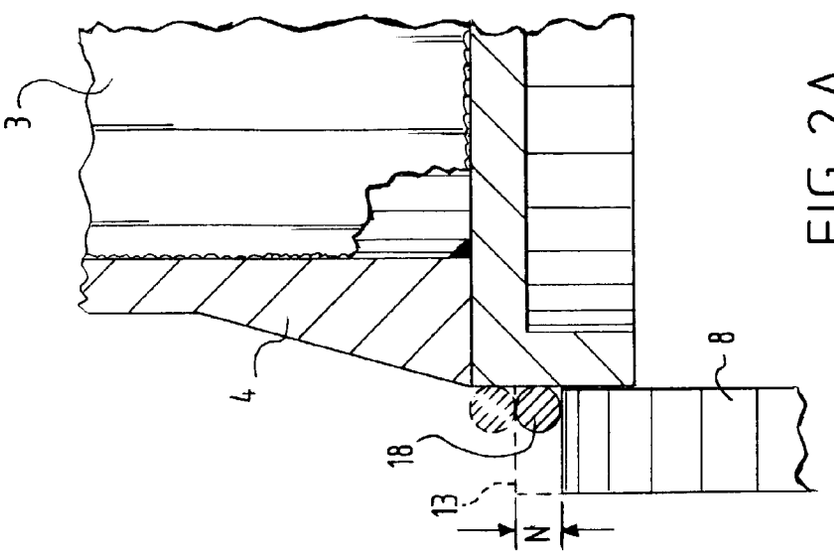


FIG. 2A

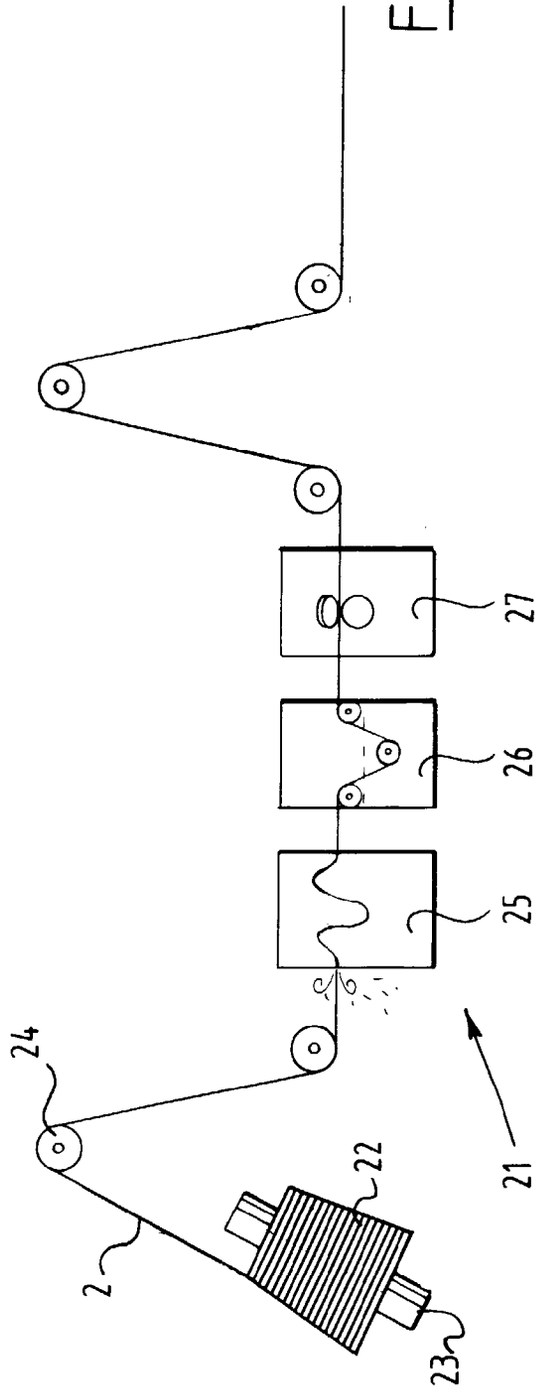


FIG. 3

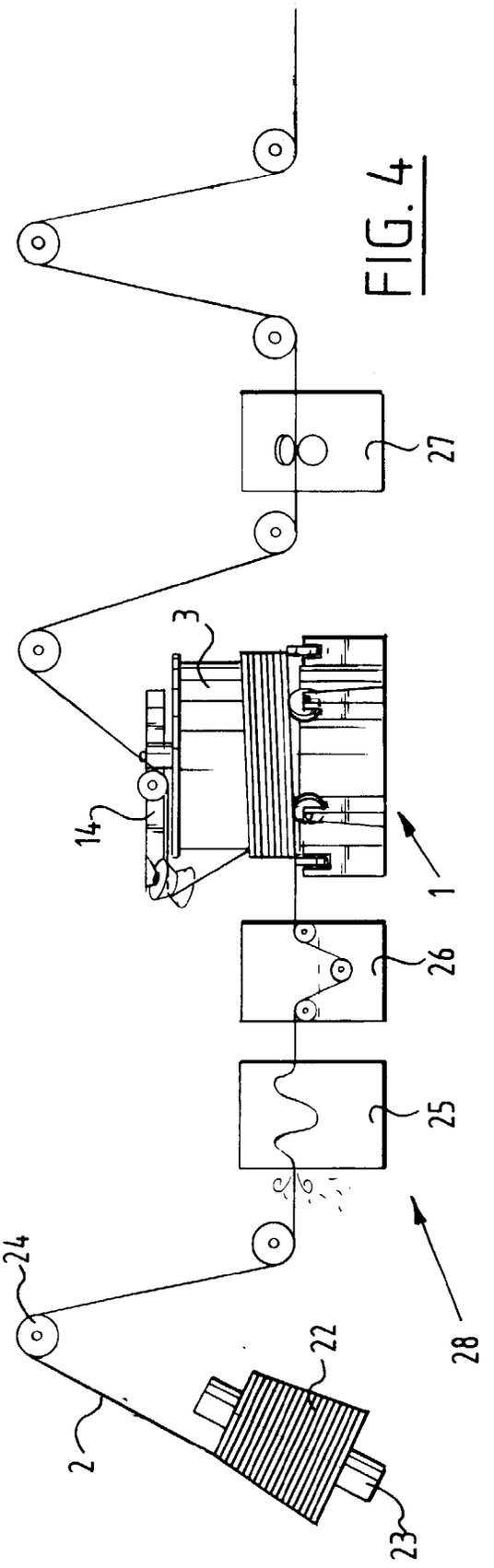


FIG. 4

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# EUROPEAN SEARCH REPORT

Application Number
EP 97 20 2798

## 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.6) |
|---|---|---|---|
| X<br>A | US 3 938 751 A (KAWAKAMI HEIJIRO ET AL) 17 February 1976<br>* column 5, line 5 - line 62; figures * | 1-4,7-9<br>11 | B21C49/00 |

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B21C
B65H

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 7 January 1998 | Barrow, J |

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