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(54) Teaseling machine.

(57) The teaseling machine is provided with fabric entraining members (2,3) arranged to cooperate with a plurality of teaseling rollers (p,c) set for rotation about their own axes and preferably parallel to one another. This machine is characterized in that the rotation axes of the teaseling rollers (p,c) are stationary relatively to the rotation axes of the fabric entraining members (2,3) and positioned along a curvilinear profile with its convexity facing a passage area (5) of a fabric (4) to be teaseled.

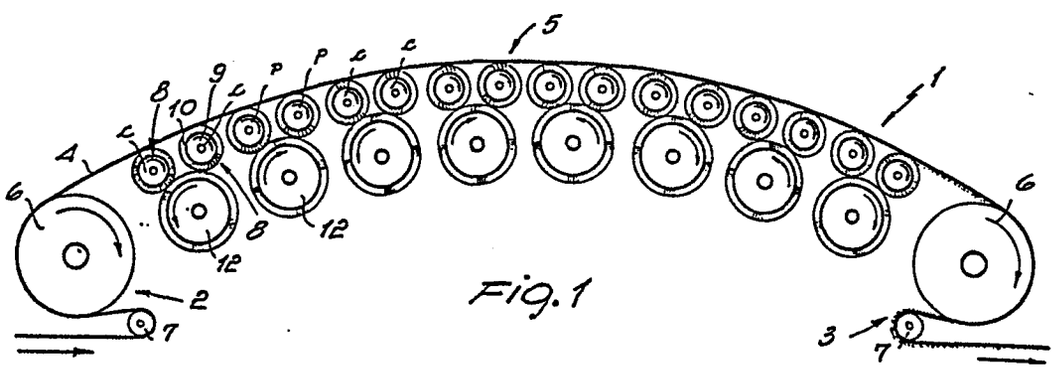

Fig. 1

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"TEASELING MACHINE"

This invention relates to a teaseling machine.

As is known, teaseling machines are currently available which comprise, in general, a rotating cylindrical drum having, connected to its periphery, teaseling rollers set for rotation about their own axes, and hence performing a revolution movement relatively to the drum axis.

The teaseling rollers carry a teaseling liner which is provided with a thick series of metal hooks adapted to act on a fabric to be teaseled to raise pile thereon, thus imparting to the so treated fabric an attractive appearance which makes it suited to special applications.

In rotating about their own axes and rigidly with the drum, the rollers move past a cleaning station where one or more brushes remove any pile left on the metal hooks, thereby the machine proper operation can be ensured.

In view of the absolute motion of the teaseling rollers, apparent becomes the mechanical complexity of the drives involved in imparting a rotary motion to each roller about its own axis while allowing the rotational speed to be adjusted, simultaneously with the actuation of the drum, also optionally at a variable speed, and the variations in advance rate of the fabric.

This makes particularly complex the adjustment of the teaseling action intensity by controlling the speeds of the teaseling rollers, drum, and fabric, which involves the

availability of highly qualified personnel. Moreover, the inadequate adaptability of the traditional teaseling machine to adjustment in the inoperative condition of the machine results in uneven processing of the starting portion of a fabric introduced therein.

Finally, with these prior machines it is not unfrequent for the fabric to break owing to local weakening or erroneous adjustment of the machine.

In such cases, the broken fabric flap tends to twist around the teaseling rollers and make restoration of the machine to normal operating conditions extremely difficult.

It should be further considered that the provision of one brush or single brush set at a fixed position with respect to the drum results in inadequate cleaning of the teaseling rollers, especially where the fabric being processed requires a deep teaseling action and intense pile raising.

Another problem inherent to convention machines is the uneven tensions induced in the fabric during its residence on the drum, which tensions are due to the drum rotational movement producing a decreasing and uneven action between the fabric inlet to the machine and its outlet therefrom providing an irregular teaseling effect and, possibly, de-wefting of the fabric.

In the light of these technical problems, it is a primary aim of the invention to eliminate such prior drawbacks by providing a teaseling machine having a highly simplified mechanics and adapted to facilitate

setting up of the teaseling process to ensure effectuation of this setting operation without the fabric being required to slide over the rollers.

Within the above aim, it is an important object of the invention to provide a teaseling machine which affords a reduction in fabric reject also with different articles to be teaseled.

Another object of the invention is to improve the roller cleaning efficiency to provide an evener and better distributed reaseling effect.

It is a further object of the invention to facilitate removal of the fabric from the teaseling rollers in the event of breakage of the same.

A not unimportant object of the invention is to improve accident prevention conditions by eliminating the large rotary masses of conventional teaseling machines and potential failure of the latter due to centrigufal effect.

A not unimportant object of the invention is to facilitate control of the absolute speed of the teaseling rollers, to free the output rate from the mechanical ratio of fabric speed to teaseling roller speed, facilitate determination of the point of non-teaseling, i.e. that point where the peripheral speed of the teaseling rollers is nil relatively to the fabric entrainment speed, and afford low manufacturing cost, low space requirements, and a high versatility in use.

That aim and these objects are achieved by a teaseling machine comprising entraining members for

a fabric to be teaseled cooperating with a plurality of teaseling rollers set for rotation about their own axes, and characterized in that the rotation axes of said teaseling rollers are stationary relatively to the rotation axes of said entraining members and laid along a curvilinear profile having its convexity facing a passage zone of said fabric.

Further features and advantages of the invention will be more readily understood from the following detailed description of a preferred, but not exclusive, embodiment of the teaseling machine according to the invention, with reference to the accompanying illustrative drawings, where:

Figure 1 is a schematic, side elevation view of the teaseling machine according to the invention;

Figure 2 is a similar view to Figure 1, but showing a different configuration of the cleaning members;

Figure 3 shows schematically a preferred embodiment of the teaseling machine drive assembly;

Figure 4 shows a possible combination of two teaseling machines according to the invention; and

Figure 5 is a perspective detail view of a preferred type of teaseling roller.

Making reference to the drawing views, and in particular to Figure 1 thereof, a teaseling machine according to the invention is generally indicated at 1. It essentially comprises a pair of entraining

members located, the one at the machine inlet end, and the other at the outlet end thereof, being respectively designated with the reference numerals 2 and 3 and operative to feed a fabric 4 into the the teaseling machine while keeping it optionally under tension as it moves through the passage or teaseling zone 5.

Each entraining member preferably comprises an entraining roller 6, possibly arranged to cooperate with a small cylindrical tensioner 7 which increases the fabric angle of winding around the entraining roller and controls its tension.

At the space portion included between the entraining members, the teaseling machine is provided with a plurality of teaseling rollers p,c set for rotation about their rotation axes and preferably parallel to one another and to the entraining rollers.

According to the invention, the rotation axes of the aforesaid teaseling rollers are stationary relatively to the rotation axes of the entraining members and arranged along a curvilinear profile whose convexity faces the fabric passage zone 5.

The teaseling rollers may be of conventional design, that is provided with a supporting body 9, with which a peripheral liner 10 is rigid, e.g. of the type having plural metal hooks effective to raise pile off the fabric, or alternatively, of the type shown in Figure 5, where between the conventional supporting body 9 and liner 10, there are interposed a plurality of ribs 11 preferably extending along

generatrix lines of the supporting body so as to impart to the teaseling roller an active surface, whereon the hook liner is applied, having an irregular profile, and accordingly such as to apply vibrational effects to the fabric 4.

The vibratory motion so transferred further improves the machine teaseling capability to result in an advantageously increased hourly output without affecting the process quality.

Depending on the orientation of the hooks present on the liner 10 relatively to the fabric feed direction, the teaseling rollers may be distinguished as with-the-pile rollers and against-the-pile rollers, respectively as indicated at p and c.

In the teaseling machine, the teaseling rollers will be preferably alternating with-the-pile and against-the-pile ones, so as to counteract the tractive forces applied to the fabric, and in that sense the cited rollers may be either alternated individually, as shown in Figure 2 where each with-the-pile roller is followed by one against-the-pile roller, or grouped in sets of with-the-pile rollers alternating with sets of against-the-pile rollers, as shown in Figure 1.

Each set of with-the-pile or against-the-pile rollers cooperate with a cleaning member, preferably a rotary brush 12 which extends with its axis substantially parallel to the rotation axes of the teaseling rollers and is driven rotatively in a direction preferably agreeing with the orientation of the liner hooks.

In the example shown in Figure 1, both the with-the-pile and against-the-pile rollers are arranged in pairs and each set is associated with a cleaning member of their own which turns in agreement with the hook orientation while maintaining their axes of rotation stationary relatively to the rotation axes of the entraining rollers 6 and of the teaseling rollers p,c.

In Figure 2, since the teaseling rollers are individually alternated as with-the-pile and against-the-pile rollers, the rotary brushes are in this case carried oscillably on brackets 13, for example, journalled on a frame of the teaseling machine which carries the rotary parts in general, so that they can be switched from a with-the-pile roller to an against-the-pile roller to remain engaged with each of the cited rollers for preset time periods.

This allows a longer brush engagement time with that of the rollers which is more prone to clogging to be scheduled, thus further improving the quality of the work carried out on the machine.

In order to obtain simultaneous control of the cited brackets for simultaneously switching the brushes, for example, from the with-the-pile rollers over to the against-the-pile rollers, they are interconnected by links 14 and may possibly control a switching device 15 which, on each transfer of the rotary brushes from one to another of the cited rollers, reverses their direction of rotation to keep the brush peripheral velocity in a direction agreeing with that of the hooks.

Figure 3 shows an exemplary construction of a drive assembly for the teaseling machine, as generally indicated at 20.

In that embodiment, a single motor 21, preferably a DC one, drives all the rotary components; it is kinematically comected, through reverse gears 22, to speed variators, respectively 23 and 24, the one acting on the with-the-pile rollers and the other on the against-the-pile rollers.

Both speed variators may be provided, on an output shaft 25 kinematically connected to the cited rollers, with clutch devices 26, e.g. electromagnetic clutches, to selectively control the operation and stopping of the with-the-pile and against-the-pile rollers.

The motor 21 is further connected, through a clutch device 27, to a speed variator 28 for the entraining rollers 6,7, which has an output shaft 29 preferably directly connected to the entrainment member 3 and through a transmission to a further variator 30, e.g. of the type with variable pitch palley, to drive the entrainment member 2 through a drive shaft 31.

This enables the relative speeds of the entraining members to be changed to apply a higher or lower tension on the fabric at the passage zone.

Possibly both the motor 21 and speed variators and deflector drive 30 may be provided with speed detector members 32 which enable an instantaneous and continuous measurement of the speeds of the various rollers to easily effect adjustment operations even

with no fabric being fed into the machine; this allows an efficient and easy control of the absolute speed of the teaseling rollers, which is practically impossible to do with conventional teaseling machines because no suitable measuring instruments are accessible to measure the absolute speed of the teaseling rollers by adding together the rotation and revolution thereof; the operation would in fact be excessively complicated because related to too many variables among which the belt stretching, slippages, or non-constant drive ratii.

The particular configuration of the teaseling machine according to the invention further results in an extremely limited vertical dimension thereof, thereby two or more machines may be superimposed on one another with great ease as shown in Figure 4.

This permits both faces of the fabric 4 to be teaseled with a single pass without requiring such ancillary equipment as fabric piece upturners or the like.

The teaseling machine according to the invention operates in the following manner. The fabric 4 is fed in from the side of the entraining member 2, and after travelling through the passage zone 5, comes out of the machine from the side of the entraining member 3.

A speed differential between the cited entraining members allows the tension on the fabric at the passage zone to be changed.

The teaseling rollers are rotated, e.g. by means of the motor 21 which drives the speed variators 23

and 24, and turn preferably in the same direction at an independently adjustable peripheral speed for the with-the-pile and against-the-pile rollers.

Since the speed of the teaseling rollers is adjustable, a teaseling effect will be provided with the pile when the peripheral speed of the with-the-pile rollers is lower than that of the fabric running over them, while for against the pile, a similar effect will be achieved when the peripheral speed of the against-the-pile rollers is higher than the fabric speed.

Where the with-the-pile and against-the-pile rollers are grouped together and alternated to one another as shown in Figure 1, the rotary brushes will clean that set of rollers with which they are associated.

Their drive may be any one, e.g. directly from the motor 21, by preferably using the expedient of rotating the brushes of the with-the-pile rollers in the opposite direction to the brushes of the against-the-pile rollers so as to ensure in both cases rotation in the same direction as the tips of the metal hooks attached to the liners 10.

Where a configuration of the type shown in Figure 2 is used, i.e. with individually alternating with- and against-the-pile rollers, the brushes, being carried rotatably on the brackets 13, may be switched from with-the-pile roller cleaning to against-the-pile roller cleaning and vice versa while remaining for a longer time in engagement with

those of the rollers which are more liable to clogging.

This brings about a definite improvement in the machine performance especially where the fabric to be processed requires deep teaseling and tend to readily release pile.

Where the fabric has a very short pile or requires no deep teaseling, the brushes may be even omitted from the teaseling machine because, in these situations, clogging of the teaseling liners would not be a problem.

Cleaning of the rotary brushes may be accomplished by forced suction in a manner known per se.

The possible equipment of the machine with teaseling rollers having ribs as shown in Figure 5 further improves the teaseling effect to be obtained for a given teaseling rate; the ribs, in fact, impart to the fabric a vibrational stress which may be substantially likened to that created by the diverting rollers of conventional teaseling machines.

Owing to the particular configuration of the machine and linkages of the drive assembly 20, it may be noted that, once the processing rate has been set for a given teaseling effect, on switching to a higher or lower rate, the effect remains unaltered; of course, the amount of pile raised from the fabric will change because this amount is directly proportional to the time of residence of the fabric in contact with the teaseling rollers, thereby for a given teaseling force, less pile will be raised

at a higher rate, and vice versa.

Finally, with the teaseling rollers fixed at their positions and arranged along a curvilinear profile with its convexity facing the fabric passage zone, by using one against-the-pile roller or set of rollers at the fabric inlet and one with-the-pile roller at the fabric outlet one may work with low tension between the entraining rollers 6 because the tension required for processing at the passage zone is provided by the teaseling rollers themselves, to the best advantage of the teaseling effect , of the fabric shrinkage and wefting thereof, thus giving an improved quality product.

Thanks, moreover, to the reduced vertical dimension it becomes extremely simple to superimpose several machines and process with ease both faces of the fabric without involving the use of upturning members.

Apparent is, moreover, the advantage of an improved safety because the large rotating masses of conventional machines are totally eliminated.

The clutch devices present on the output shafts of the speed variators provide a simple means of deactivating the moving parts to permit adjustment of the machine even with the fabric stopped and in the possible event of breakages.

The invention as disclosed is susceptible to many modifications and variations without departing from the scope of the inventive idea. Furthermore, all of the details may be replaced with other

technically equivalent elements.

In practicing the invention the materials used as well as the dimensions may be any selected ones contingent on requirements.

CLAIMS

1. A teaseling machine comprising entraining members (23) for a fabric to be teaseled cooperating with a plurality of teaseling rollers (p,c) set for rotation about their own axes, and characterized in that the rotation axes of said teaseling rollers (p,c) are stationary relatively to the rotation axes of said entraining members (2,3) and laid along a curvilinear profile having its convexity facing a passage zone (5) of said fabric (4).

2. A teaseling machine according to Claim 1, characterized in that it comprises cleaning members (12) cooperating with said teaseling rollers (p,c).

3. A teaseling machine according to Claim 1 and/or 2, characterized in that said teaseling rollers (p,c) are arranged alternately individually or in sets of with-the-pile and against-the-pile rollers and have substantially parallel rotation axes, said cleaning members comprising rotary brushes (12) cooperating with said teaseling rollers (p,c) and rotating in opposite directions when respectively engaging said with-the-pile and against-the-pile rollers (p,c).

4. A teaseling machine according to one or more of the preceding claims, characterized in that said rotary brushes (12) are rotatably carried on oscillating brackets (13) and cooperate with a reverse gear (15) for reversing their direction of rotation when brought from a position of engagement with said with-the-pile rollers (p) into a position of engage-

ment with said against-the-pile rollers (c).

5. A teaseling machine according to one or more of the preceding claims, characterized in that said teaseling rollers (p,c) comprise a supporting body (9) for a liner (10) provided with teaseling hooks, between said supporting body (9) and said liner (10) there being provided ribs (11) extending substantially along the generatrix line of said teaseling rollers (p,c).

6. A teaseling assembly, characterized in that it comprises at least two teaseling machines according to one or more of the preceding claims and superimposed on one another, said fabric to be teaseled being passed sequentially through said at least two teaseling machines.

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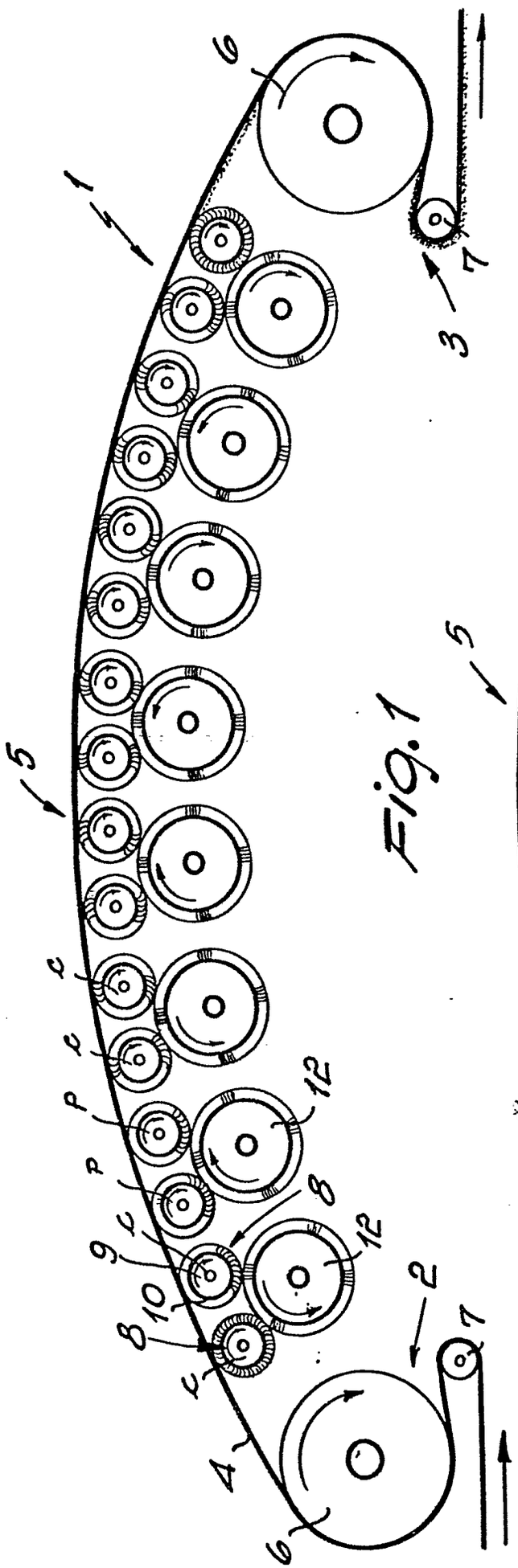

Fig.1

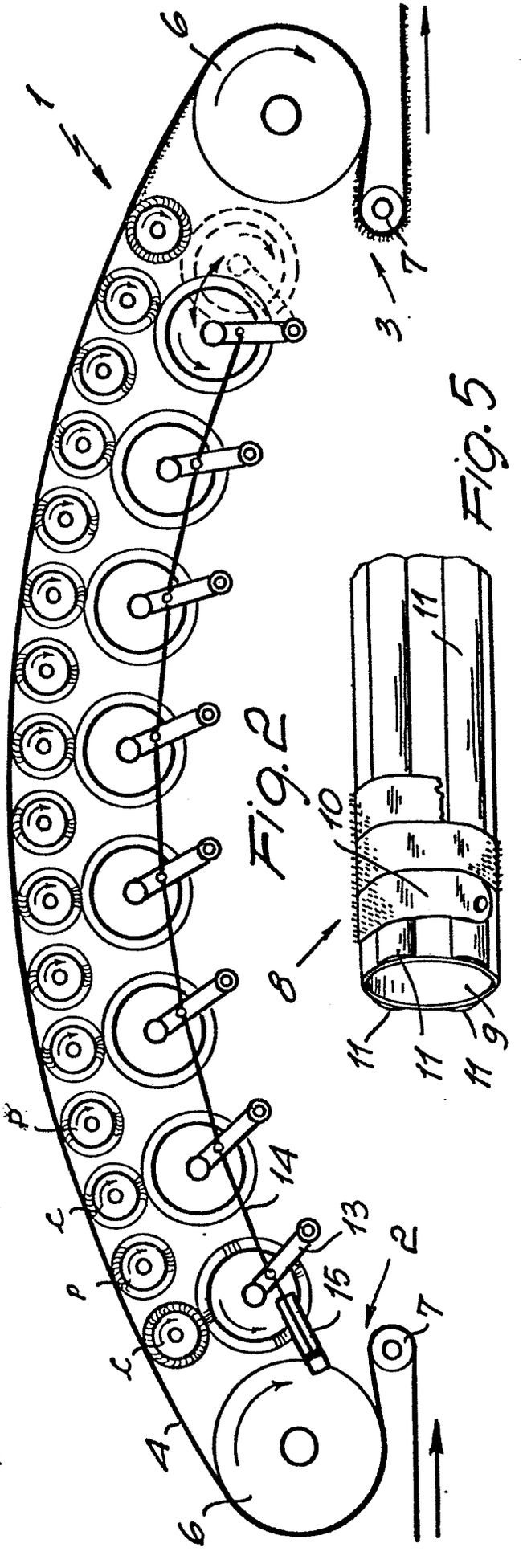

Fig.2

Fig.5

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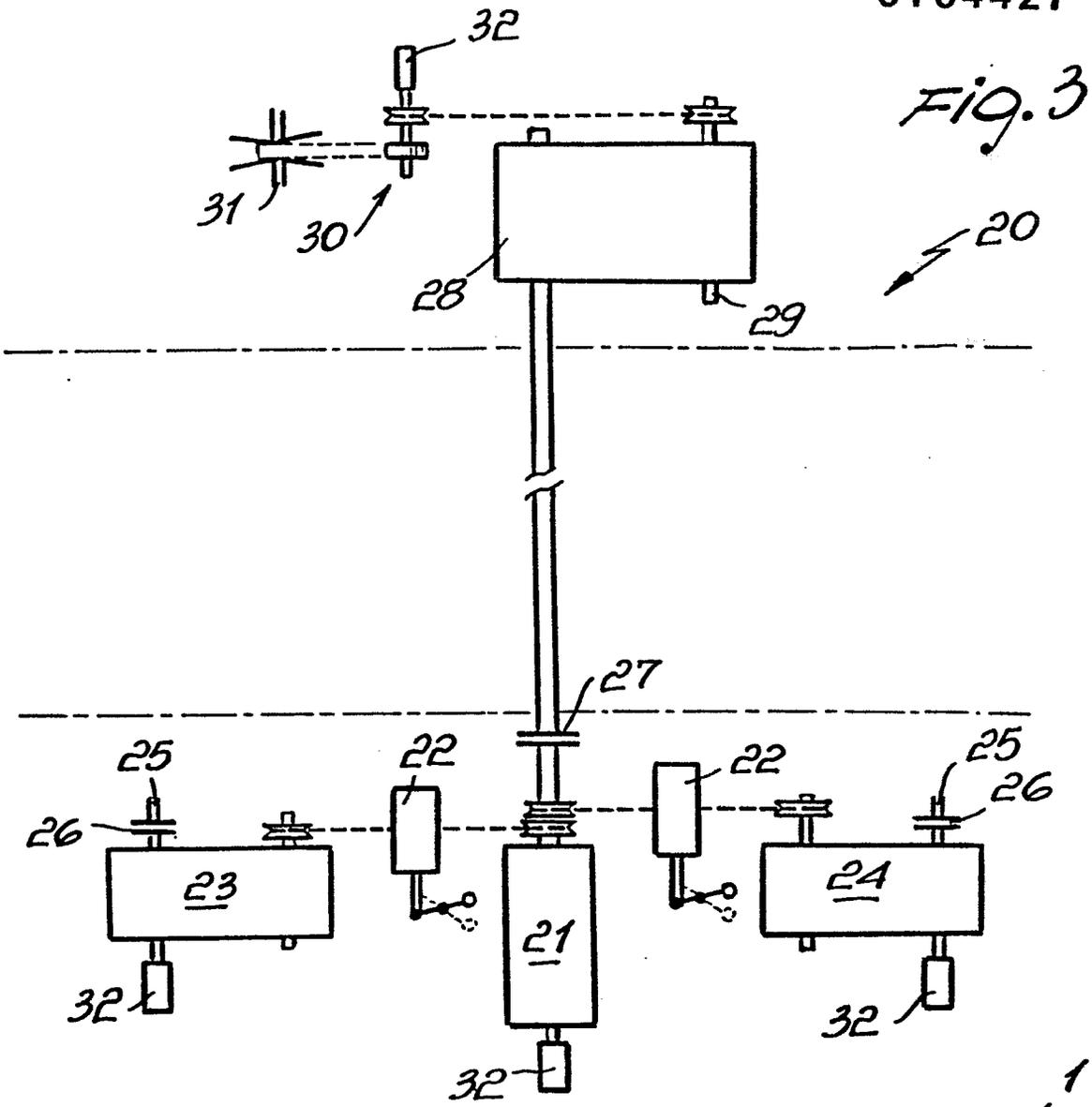

Fig. 3

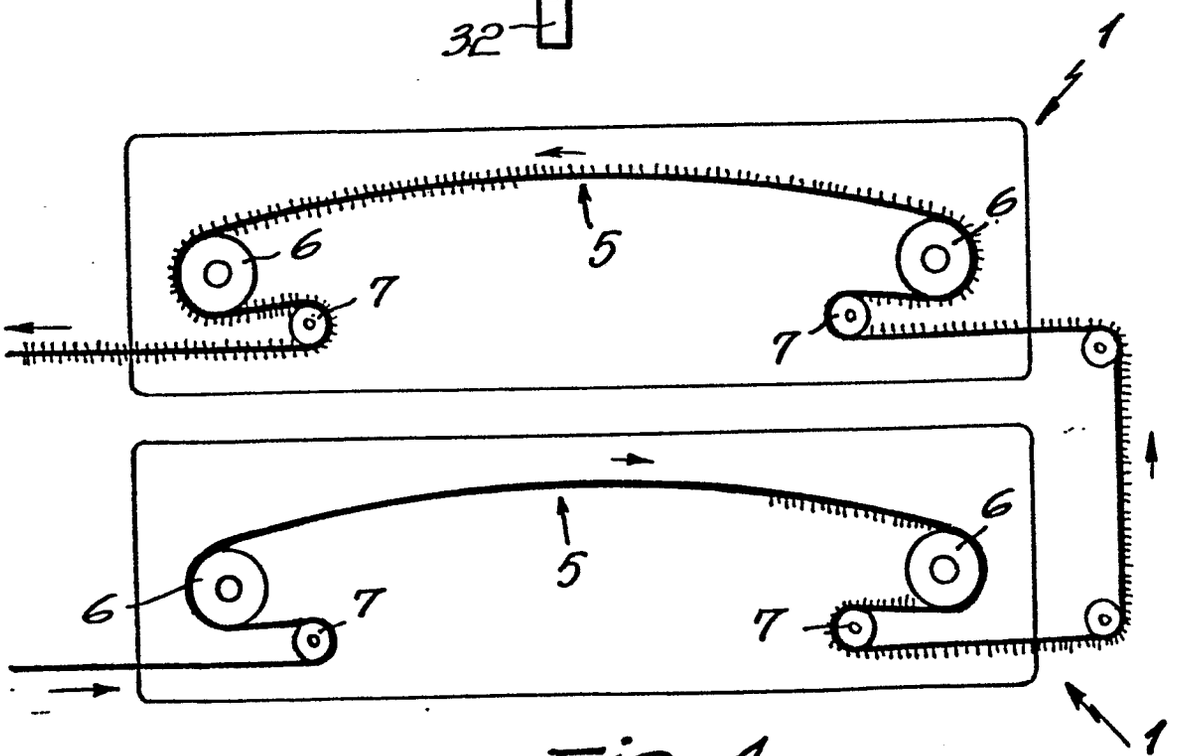

Fig. 4

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EUROPEAN SEARCH REPORT

0164427
. Application number

EP 84 10 6627

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.4)
X	DE-A-2 045 673 (GIRMES) * whole document *	1-3,5	D 06 C 11/00
X	US-A-4 073 043 (LOWDER) * whole document *	1-3,5	
X	GB-A-1 409 870 (RILEY) * whole document *	1,2,5	
X	EP-A-0 088 431 (LAMPERTI) * whole document *	1,6	
X	FR-A-2 169 977 (BOLLI) * whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			D 06 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	08-02-1985	PETIT J.P.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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