(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 491 666 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **91830541.8**

(22) Date of filing : **06.12.91**

(51) Int. Cl.[5] : **B65B 61/06,** B26D 7/14, B26D 5/22, B26D 1/38

(30) Priority : **18.12.90 IT 377890**

(43) Date of publication of application : **24.06.92 Bulletin 92/26**

(84) Designated Contracting States : **AT BE CH DE DK ES FR GB GR LI LU NL SE**

(71) Applicant : **DIMAC S.P.A.**
Via 1o Maggio 31
I-40064 Ozzano Emilia (IT)

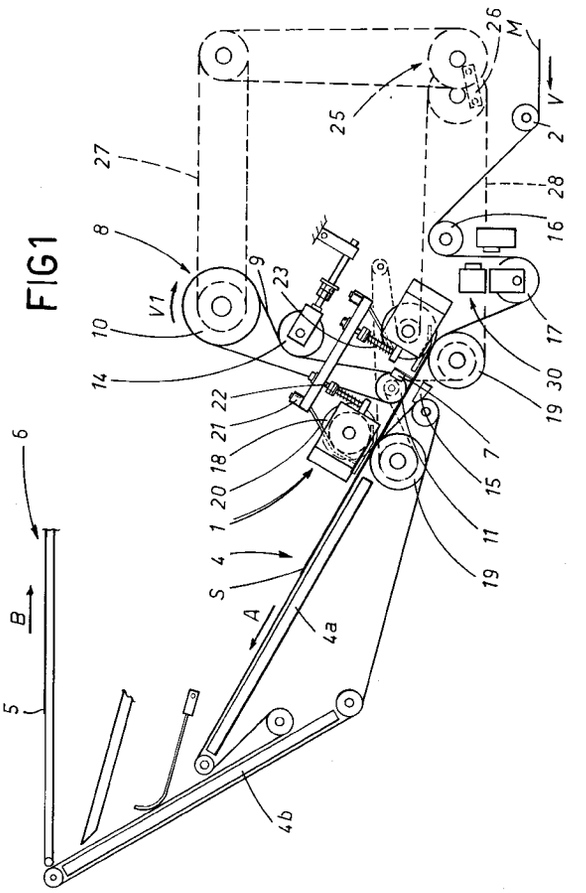
(72) Inventor : **Ponti, Giuseppe**
Via Gramsci, 1
I-40127 Quarto Inferiore, Bologna (IT)
Inventor : **Bettini, Rodolfo**
Via Don Fornasini, 82
I-40128 Bologna (IT)

(74) Representative : **Lanzoni, Luciano**
c/o BUGNION S.p.A. Via dei Mille, 19
I-40121 Bologna (IT)

(54) Film feeding and cutting group, applicable on automatic product conditioning machines.

(57) The feeding and cutting group object of the invention envisages means (8) of support and movement of a knife (7) comprising a chain pair (9), parallel to and opposite one another, closed around a corresponding first cogged wheel pair (10 and 11) of which one is motorised and phased with a machine ; the chain pair (9) rigidly and bilaterally supports the knife (7) so as to permit of continuous movement, through a virtually circular cycle, so as to bring the said knife (7), cyclically, perpendicular to a first conveyor belt (4) and at the level of the same conveyor belt (4), into a position of interference and cutting with respect to the film (M) into lengths (S) at a velocity (V_1) superior to the advancement velocity (V) of the said film (M).

FIG1



EP 0 491 666 A1

The invention relates to a film feeding and cutting group applicable on automatic product conditioning machines.

Automatic machines of this type have a work line comprising known intermediate positioning stations and packing stations for groups of products in plastic envelopes (downstream of the machine).

The intermediate positioning stations have the task of defining, in terms of numbers, pre-established groups of products (varying according to the packing which is to be done) and of transporting said products towards the above-mentioned packing stations at the end of which the product group (or part of it) leaves the station itself and passes into the transport station, which is in its turn provided with a mobile lower belt which enables the products to reach the wrapping station.

The product wrapping stations are equipped with a feeding system for film in bobbins (said film will be used to make the above-mentioned envelopes), which film is of thermo-retractable plastic material, and which bobbins are situated in an appropriate station below the level of the product conveyor belt; said station carries the film, by means of an appropriate inclined belt moving in the same direction as the advancement direction of the product, up to the level of the said product conveyor belt.

The film feeding station is equipped with a cutting device, positioned upstream of the film conveyor belt, which comprises a mobile rotating knife, said knife being positioned transversally with respect to the direction of said film and said knife being as long as the film is wide; said knife is phased with the rest of the production line and permits of the cutting off of sections, of predeterminable length, of the film, said lengths being those required for the packing of the products.

Said cutting devices have however some noted drawbacks due to the fact that, in the most-often realised embodiment, the knife is activated by means of motorisation, having a bracking and friction device which device makes it possible, in co-operation with a series of cogged wheels, to stop the knife in a non-interfering position with respect to the film direction line, and then to activate it, phasing it with the length of the film to be cut, and finally to cause it to make a round angle at each operation; said type of intermittent-cyclic movement can bring about anomalies and irregularities in the functioning of the various movement components of the cutting stations and furthermore decisively limits the operativity of the knife at high speeds; to add to this, the most negative aspect consists in the high costs attached to such operations, with consequent limitations where high category machines are concerned.

To this end, the same applicant has previously realized a solution for the feeding and cutting group in which the movement of the knife is continuous, envisaging a lifting and a lowering, in oscillation and phased with the rest of the machine, of the said knife, which, while continuously rotating, remains in a lifted and non-interfering position when the film is in movement, while in operative cutting position it is lowered against the film, at a predetermined velocity with respect to the sheet of plastic film and in co-operation with a cutting-block, determining in this way the length of film required.

The above-described solution has brought about a considerable improvement in the operability of the entire station (particularly as regards the speed of execution and the number of lengths of film realised per unit of time), but it is still only economically worthwhile if combined with high productivity machines which need high performance from said cutting group, given that there are present cam organs dedicated to the cyclical procedure of the cutting.

Aim of the present invention is to realise a cutting group for heat-weldable film, in successive equal lengths, having continuous movement so as to provide a cutting device which is of moderate and for this reason applicable to lower performance but functionally effective machines.

The invention, as described in the claims which follow, reaches the said aims by providing a feeding and cutting group equipped with support and movement means for a knife comprising a chain pair parallel to and facing one another, closed around a first cogged wheel pair of which one is motorised and phased with the machine; said chain pair bilaterally and rigidly supports the knife in such a way as to permit of its continuous movement, through a virtually circular cycle, so as to bring said knife into a position of interference, perpendicular to a first conveyor belt and on the same level as said conveyor belt and therefore into a cutting position with respect to a length of film, at a velocity superior to that of the advancement of said film.

The advantages and characteristics of the present invention will better emerge from the detailed description which follows, made with reference to the enclosed diagrams, which represent a purely representative and non-limiting embodiment of the invention and in which:

- Figure 1 shows, in schematic lateral view, and with several parts not represented in order better to evidence other parts, the film feeding and cutting group object of this invention, mounted on an automatic machine;
- Figure 2 shows, from above, a view of the film feeding and cutting group of Figure 1.

With reference to the figures, the feeding and cutting group (denoted in its totality by 1) is applicable to machines dedicated to the transport and packing of groups of products; said feeding and cutting group 1 comprises: a roller 2 for plastic film M, supported by a support structure 3 for the machine, and arranged

upstream of a first conveyor belt 4 for the same film M.

The conveyor belt 4 carries the film M at an advancement velocity V which is predetermined and phased with the machine, and said conveyor belt 4 is arranged below a second conveyor belt 5, which conveyor belt 5 is motorised by a principal geared motor 25, and which conveyor belt 5 feeds a packing station 6 (not illustrated since it does not form the part of the present invention); immediately upstream of the conveyor belt 4 and downstream of the first roller pair 16 and 17, two pairs of rollers 18 and 19 are envisaged in succession, which rollers 18 and 19 are mounted to the support structure 3 of the machine. Each roller pair 18 and 19 has one roller mounted above the other in such a way that the unrolling film M is invited to move towards the conveyor belt 4; preferably the lower rollers 19 are smooth and made of metal, whereas preferably the upper rollers 18 are rubberised and exhibit circumferential grooves 18a wherein are housed extraction fingers 20 supported on cross-supports 21. The said cross-supports 21 also supports the upper rollers 18 and 19 by means of pivots 22 around which pivots 22 respective springs 23 are coiled, which springs 23 are regulatable in compression. Said springs 23 have the function of maintaining the said upper rollers 18 in a lowered position.

The conveyor belt 4 is kinematically connected to the above-mentioned principal geared motor 25 by a link 26 which link 26 defines a discontinuous rotating movement of the conveyor belt 4 with differentiated velocities so as to permit of distancing two successive lengths S of film M; correspondingly, one said rollers 18 and 19 from the downstream pair nearest to the first conveyor belt 4 is motorised by the principal geared motor 25 (by means of a chain 28) at a velocity which is greater than that of the preceding roller pair in such a way as to define a tension of the film M which will permit of its precise cutting (thanks to the fact that the film is thermo-retractable and can thus undergo deformations of this kind).

The feeding and cutting group 1 is equipped with a knife 7 (constituted in the example by a shaft 7a to which a saw blade is connected), which is equipped with means (denoted by 8 in the figures) of support and movement phased with the machine, and which is interpositioned between the above-described second roller pairs 18 and 19 in such a way as to define the lengths S of plastic film M, of predeterminable length in movement before it passes definitively on to the conveyor belt 4.

In figures 1 and 2 the means of support and movement 8 of the knife 7 comprise a chain pair 9, parallel and facing one another, and closed around a corresponding first cogged wheel pair 10 and 11 of which one cogged wheel is motorised and phased with the machine, while both are supported by a corresponding lateral wall which wall is part of the support structure 3; the chain pair 9 supports rigidly and bilaterally the knife 7 and envisages that one of the cogged wheels, the one denoted by 10 in figure 1, is motorised and connected to the principal geared motor 25 by means of a corresponding chain 27. It is envisaged that a second driven cogged wheel 14 is interpositioned between this first cogged wheel pair 10 and 11.

In order to effect a precise cut for the length S of film M, a perpendicular cutting-block 15 may be envisaged in correspondence with the rollers 18 and 19; said cutting-block 15 is arranged transversally with respect to the first conveyor belt 4 and upstream of said conveyor belt 4 in such a way as to co-operate with the knife 7, by lifting the film M slightly at the point of cutting.

In Figure 1 it can be noted that the conveyor belt 4 is subdivised into two contacting halves 4a and 4b, so as to realise a single passage plane for said film M, while at the same time providing differently and oppositely inclined halves with respect to the conveyor belt 5 and being arranged in such a way as to transport the film M in an advancement direction (indicated by arrow A in fig.1) opposite to the advancement direction of the conveyor belt 5 (indicated by arrow B in fig. 1).

With a cutting group so structured it is possible to effect the cut, and therefore the definition of the lengths S of film M continuously and cyclically: the cogged wheels 10 and 11 and the chains 9 permit of a continuous movement of the knife 7, through a path which is virtually circular, so as to bring the said knife 7, cyclically, into a position of interference, perpendicular to the first conveyor belt 4 (visible in fig. 1) and in correspondance with said conveyor belt 4; at this point the knife 7, co-operating with the cutting-block 15 which lifts a section of the film M, performs the cutting of the film M, at a velocity V_1, at the point of the film M lifted by the said cutting-block 15, faster at that point than the velocity V of advancement of the film M. Obviously the lengths S of the film can be varied by increasing or decreasing the advancement velocity of the film, but in order to obtain a perfect cut it is necessary to maintain the film velocity lower than the knife 7 velocity. In this case the stopping of the knife 7, for the changing of the size of the lengths S or when the reel of film M finishes, means that the entire group, including the first transport station, must be arrested.

Thanks to this cutting group it is possible always to obtain a perfect cut of the lengths in a continuous cycle (with all the production advantages that derive from this) and at the same time have a simpler and more economical structure, thanks to a simplified movement component requirement with respect to present art forms) and all the same functionally secure.

Claims

1. A film feeding and cutting group applicable on automatic product conditioning machines, comprising a roller 2 of a film M of plastic material coming from a bobbin, supported by a support structure 3 for the said machine and arranged upstream of a first conveyor belt 4 for the said film, which conveyor belt 4 carries said film M forward at a pre-established advancement velocity V phased with the said machine and which conveyor belt 4 is arranged below and inclined towards a second conveyor belt 5, which second conveyor belt 5 feeds a packing station 6; said group 1 being equipped with a knife 7 having means of support 8 and continuous movement and being phased with said machine, which knife 7 is placed close to and transversally to the said machine and upstream of said first conveyor belt 4 and has the function of cutting the predeterminable lengths S of said film M which film M is being transported on the said first conveyor belt 4; wherein said means of support 8 and movement of said knife 7 comprise a chain couple 9 parallel to and facing one another, supported by respective lateral walls of the said support structure 3, each chain 9 being closed around at least one corresponding first cogged wheel pair 10 and 11 of which at least one cogged wheel 10 is motorised and phased with the said machine; said chain pair supporting rigidly and bilaterally said knife 7 so has to permit of its continuous movement, through a virtually circular cycle, such as to bring the said knife 7, cyclically and virtually perpendicularly with respect to said first conveyor belt 4, into a position of interference with respect to said film M which it then cuts into predetermined lengths S at a velocity V_1 superior to that of the advancement velocity V of the said film M.

2. Cutting group as in claim one, wherein the said second conveyor belt 5 is kinematically motorised by a principal geared motor 25 and said first conveyor belt 4 is kinematically connected to the same geared motor 25 by means of a link 26, which link 26 defines a discontinuous rotating movement of the said conveyor belt 4 with differentiated velocities so as to permit of distancing two successives lengths S of film M; wherein one of the said first cogged wheels pairs 10 and 11 is connected to said principal geared motor 25 by means of a corresponding chain 27; each of said first cogged wheel pairs 10 and 11 being supported by the said support structure 3 and having a second driven cogged wheel 14 interpositioned between the corresponding said first cogged wheel pair 10 and 11 so as to define the said circuit of the said knife.

3. Cutting group as in claim 1, wherein said first conveyor belt 4 has a double roller pair 18 and 19 arranged bilaterally to said knife 7, wherein at least one of the said rollers 18 and 19 of the roller pair which is downstream of said knife 7 is motorised at a velocity which is superior to that of the remaining, upstream, pair in such a way as to define the tension of the said film M to permit of precise cutting of said film M.

4. Cutting group as in claim 1, wherein each of the said first cogged wheel pair 10 and 11 is supported by the said support structure 3 and presents a second driven cogged wheel 14 interpositioned between the corresponding said first cogged wheel pair 10 and 11 so as to define the said circuit of the said knife 7.

5. Cutting group as in claim 1, wherein said first conveyor belt 4 is equipped with a cutting-block 15 arranged transversally and upstream with respect to the said first conveyor belt 4, in such a way as to co-operate with the said knife 7 at the position of interference and cutting of said length S.

6. Cutting group as in claim 1, wherein said first conveyor belt 4 is subdivided into two contacting parts 4a and 4b is such a way as to realise a single transport plane for the said film M and having an inclined development with respect to the said second conveyor belt 5 as well as an advancement direction A substantially opposite to the advancement direction B of the said second conveyor belt 5.

FIG1

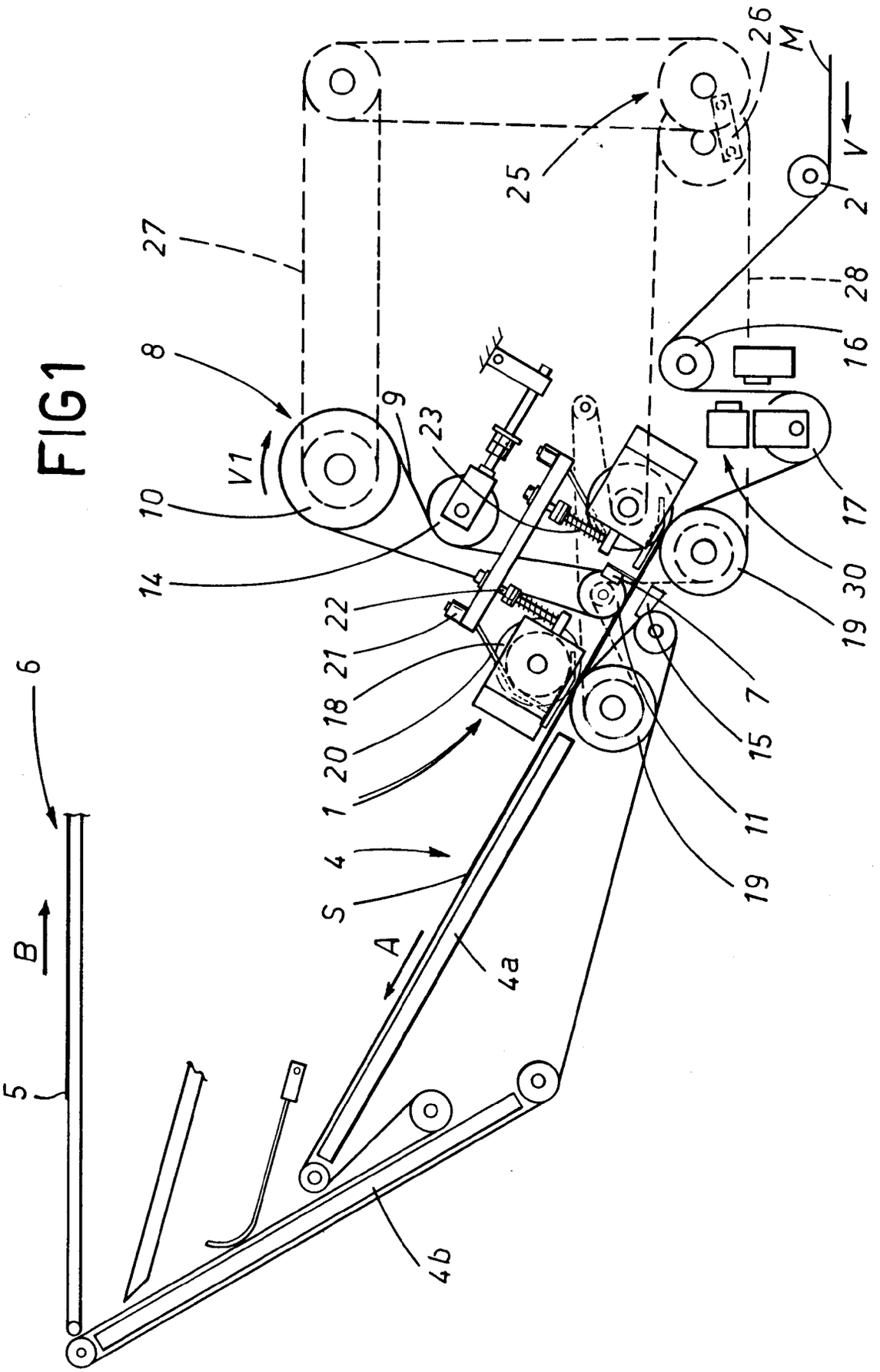
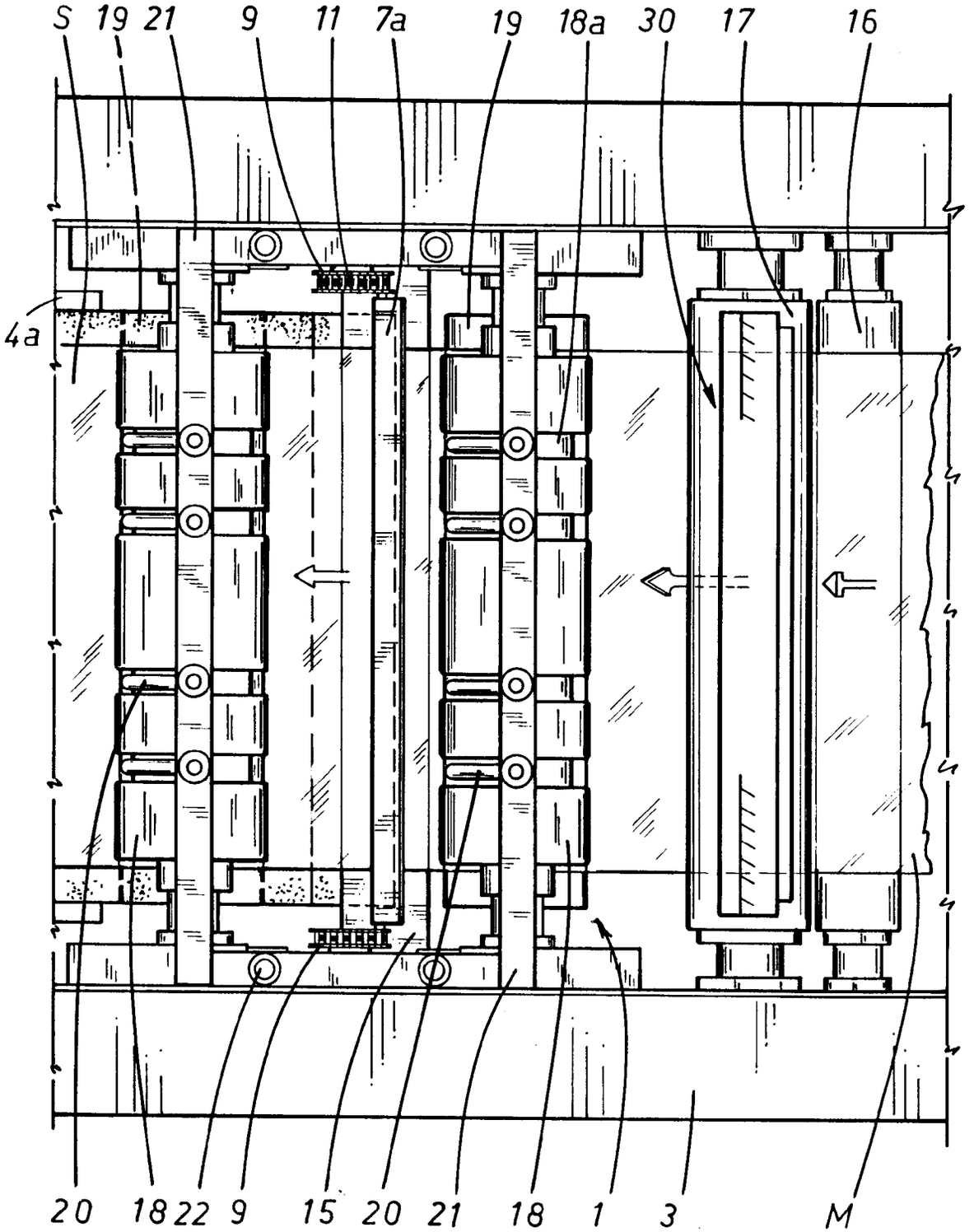

26
M
25
V
2
27
28
8
16
9
23
V1
10
17
14
19
30
22
21
18
20
1
7
15
11
4
19
S
A
4a
B
6
5
4b

FIG 2



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 83 0541

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.5)
Y	FR-A-1 387 570 (L. VAN DER MEULEN) * page 3, column 1, line 27 - column 2, line 25; figures *	1,3,4,5	B65B61/06 B26D7/14 B26D5/22 B26D1/38
Y	US-A-3 277 630 (D. YOUNGMAN) * column 3, line 16 - column 4, line 73; figures *	1,3,4,5	
Y	US-A-4 030 388 (H. RAMSEY) * column 6, line 39 - column 7, line 39; figures 6,7 *	4	
A	FR-A-974 612 (DUNLOP) * page 1, column 2, line 40 - page 2, column 1, line 31; figures *	1,3	
A	US-A-3 605 536 (J. SALOMON) * column 3, line 52 - column 4, line 43; figures *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5) B65B B26D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 MARCH 1992	JAGUSIAK A.H.G.

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

EPO FORM 1503 03.82 (P0401)