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(54) **Apparatus for cutting and feeding thin web lengths.**

(57) An apparatus is disclosed for feeding lengths of a thin web (F) which is provided particularly in a machine for packaging articles into a heat-contractible thin web, and in which the cutting of the thin web (F) is made by the blade (260) of a rotary blade means (60) carried by the means (58, 59, 70, 69, 68) for lifting and lowering the rotary blade means, preferably by a swingable system. The rotary blade means (60) is continuously driven in rotation, and the same is cyclically lowered and caused to cooperate by its blade (260) with a stationary counterblade (34), whereby a cut is made in the thin web (F) lying therebetween, and the said rotary blade means is then lifted and kept in its uplifted position, until a required length of the thin web (F) has been caused to pass thereunder. The length of the thin web (F) is adjustable by changing the speed at which the thin web is caused to slide through the cutting unit, and/or by changing the frequency at which the rotary blade means (60) is lifted and lowered.

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APPARATUS FOR CUTTING AND FEEDING THIN WEB LENGTHS

In the machines for packaging articles into lengths of a heat-contractible thin web, means are provided for unwinding the thin web from a bobbin, for longitudinally stretching the thin web to a suitable degree, and for cyclically cutting the thin web transversely into sections of a length being each time adapted to the size of the to-be-packaged articles. In high output machines, the cutting means usually are in form of a rotary blade means that is driven in rotation by a motor, with the interposition of a friction clutch and a brake, or of any like means, which are so provided that after the blade of the rotary blade means having been caused to make a cut in the thin web, the said rotary blade means will be stopped in a position in which the same does not interfere with the thin web, and in which it is ready for being again operated and moved into its motor-interlocked condition, so that the blade of the rotary blade means is caused to cut the successive thin web section. The result of such an intermittent operative mode is that the several components of the cutting apparatus are subjected to an anomalous stress, whereby their average life is much reduced, and considerable limits are set to their operation, the more so to their high speed operation.

The invention aims to obviate to the aforementioned inconveniences by the following idea for overcoming the same. The rotary blade means is carried by a rotary blade means-lifting and lowering system, which preferably is of the cam-controlled swingable type. To cause the blade of the rotary blade means to make a cut in the thin web, the rotary blade means is moved into its down position, while when no cutting in the thin web is to be made, the said rotary blade means is lifted and is kept rotating at a suitable, preferably low speed. Downstream of the cutting apparatus, the thin web is pulled forward by two pairs of rollers by which the thin web is kept stretched as required. The speed of rotation of said roller pairs can be so changed as to have the thin web pulled through the cutting apparatus by the each time needed amount, before that the rotary blade means will be lowered down and caused to make a cut in the thin web with the blade thereof. By modifying the gear train through which the rotary blade means is driven in rotation, and by quite exceptionally modifying the cam track, the apparatus according to the invention is made capable to feed thin web sections of any desired length and at any speed. Also a possible variation in the speed of the thin web-entraining roller pairs is contemplated, which is achieved in such a manner that the said rollers will be imparted a variable motion, with an initial deceleration and a

successive acceleration, whereby to cause the thin web to be delicately slipped under a to-be-packaged article.

Further features of the invention and the advantages arising therefrom will clearly appear in the following specification of one preferred embodiment of the same, which is shown merely by way of a non-limiting example in the Figures of the three annexed sheets of drawing, in which:

Figure 1 is a diagrammatic, side elevational view of the primary means forming the apparatus according to the invention.

Figures 2 and 3 respectively are a top plan view with parts in section, and a side elevational view of the kinematic motions for imparting an in-phase motion to the cam, by which the rotary blade means and the thin web-entraining roller pairs are caused to swing.

Figure 4 is a plan view with parts in section, showing the upper pressure rollers in the thin web-entraining unit, and the rotary blade means. Figure 5 is a plan view with parts in section, showing the lower rollers in the thin web-entraining unit, and the initial part of the belts for taking up and transferring under vacuum a cyclically cut web length.

Referring first of all to Figure 1, there is shown that the thin web F being unwound from a not shown bobbin, after having being passed on the rollers 1, 2, 3 and on the device 30 for neutralizing any electrostatic charges, is led between a first pair of superposed parallel rollers 4, 5, and then between a further pair of superposed parallel rollers 6, 7. In the said roller pairs 4, 5 and 6, 7, the lower rollers 5, 7 are smooth rollers and are, for example, made of aluminum, while the upper rollers 4, 6 are covered with rubber, are given a grooved configuration, and are supported at their ends by respective pairs of swingable supporting members 8, 9 which are fulcrumed respectively at 10, 11 about the machine frame, and are urged downward by the springs 12, 13 that are adjustable by means of screw/nut screw means 14, 15 (see also Figure 4). By numerals 31, 131 thin web-ejecting fingers are designated, which are fitted into the annular recesses in rollers 4, 6, and are supported by the stationary crosspieces 32, 132.

Through gears 16, 17 (see Figures 4 and 5), the upper rollers 4, 6 are kinematically connected to the respective lower roller 5, 7. As shown in Figures 2, 5, the shafts of the lower rollers 5, 7 have one end protruding from the relative supporting member, and are provided with toothed equal pulleys 18, 19 for their connection through a toothed belt 20 to the output shaft of a speed variator

21. Downstream of pulley 15, the roller 5 is provided with an electromagnetic clutch 23, and at the opposite end thereof is provided with an electromagnetic brake 24 (Figure 5), so that the roller pair 4, 5 can be stopped when needed. Numeral 25 denotes an idler for belt 20 (Figure 3).

The kinematic chain 18-19-20 and/or the diameter of the roller pairs 4, 5 and 6, 7, are so provided that the downstream roller pair 6, 7 is rotated at a surface speed which is a little higher than the surface speed of the upstream roller pair 4, 5, so that the thin web length extending between the said roller pairs, will be longitudinally stretched to a proper degree. Perforated, equal endless belts 26 (Figure 1) are led over the lower roller 7, and these belts are set in a close relation, whereby a suction conveyor is formed. At their starting lower end the said belts 26 are led over an idler 27 by which the initial section of the said suction conveyor is arranged in a properly tapering down manner, between the said thin web-entraining roller pairs 4, and 6, 7. The suction conveyor is driven in motion by being set in contact with the pair of rollers 6, 7, and by the provision of any other kinematic connections, by which a linear velocity of the suction conveyor is ensured, that is the same as, or is slightly higher than the surface speed of the said pair of rollers 6, 7. In Figure 1, by numeral 28 are designated the channels in which the active upper branches of belts 26 are caused to slide, and to which suction is applied through the transversely arranged manifold 29.

Still in Figure 1 there is shown that the thin web F being delivered from the first pair of rollers 4, 5, is caused to slide on a transversely arranged, stationary comb-like member 34, and the rotary blade means 60 to be disclosed later, for cutting with its blade the thin web F, which is set at a short distance therefrom, is caused to cooperate with the edge 134 of the said comb-like member 34 that performs the function of counterblade. At the outlet of the comb-like member or counterblade 34, the thin web F sinks on the inclined initial section of belts 26 and is then moved between the pair of rollers 6, 7, whereupon the thin web is carried by the straight upper branch of said belts 26.

Referring to Figures 2 and 3, there is shown that the variator 21 for transmission to the thin web-entraining roller pairs 4, 5 and 6, 7 of their motion of rotation, is in its turn driven through the motion transmission drive consisting of the toothed pulleys 35, 36, the toothed belt 37, and the idler 38, by a crank member 39 keyed onto the shaft 40 of pulley 36. In the said crank member 39 the one end is fitted of a pivot pin 41 which is parallel to the said shaft 40, and which by its opposite end is made integral of a bushing 42 that is fitted on a straight guide 43 with its axis extending at right angles

thereto, and that is slidable thereon. The guide 43 is by its ends rotatably supported by supporting members 44, 144 secured to a flat disc 45 that by one of its faces is in turn secured to a pinion 47, in an offset position relative to this pinion, and that is angularly adjustable in position by means of the slots 46 shown in Figure 1, the said pinion 47 transmitting to other components of the packaging machine their motion off rotation. The pinion 47 is keyed onto a shaft 48 rotatably supported by the machine frame, and by means of a further pinion 49 and a chain 50 with an idler 51, this pinion 47 is connected to a pair of pinions 52, 53 which are dowelled to a shaft 54 to be disclosed later, the pinion 53 being connected to a driving geared motor, not shown in the drawings.

The above mentioned shaft 40 is rotatably supported by a slide 55 (Figure 3) which is slidably mounted on a guide 56, and is connected to an adjusting screw 57, the whole arrangement being such that the said shaft 40 can be translated parallelly to itself, up to the each time required extent. By means of the adjusting screw 57, the shaft 40 can be set in line with, or can be offset from the shaft 48 (Figure 2), to the each time needed degree. When the two shafts 40, 48 are set in line with each other, these shafts are rotated at a same constant speed. Whereas, when the shaft 40 is offset from the shaft 48, the shaft 40 is rotated in a variable motion mode, so that the roller units 4, 5 and 6, 7, and the belts 26 are allowed to feed the thin web F to a to-be-packaged article, at first with a decelerated, and then with a suitably accelerated motion. In Figure 3, the pulley 36 is shown in two different operative positions, respectively by a solid line and by a dash line.

The just described motion adjustment means are not a feature particularly characterizing the invention, so that these means may be actually provided in any other suitable manner, or they may be even omitted.

In Figures 1 and 4 there appears that upstream of rollers 4, 5 a shaft 58 is provided at a short distance therefrom and in parallel relation therewith, which by means of a pair of arms 59 rotatably supports the rotary blade means 60 that is arranged parallel to the said shaft 58, and is of the type comprising, for example, a shaft 160 on which a serrated blade 260 is longitudinally fitted. Whenever the blade 260 is caused to act on the stretched thin web F being supported from its underside by the comb-like member 34 performing the function of counterblade, this blade will make a transverse cut in the thin web F. The shaft 160 is fitted at its one end with a toothed pulley 61 that by means of a toothed belt being kept stretched by jockey pulleys 62 carried by a stationary arm 63 secured to the shaft 58, is connected to a toothed

pulley 64 keyed onto a bushing 65 being rotatably mounted on shaft 58. A toothed wheel 66 is keyed onto the bushing 65, and is caused to mesh with, or is indirectly connected to a respective toothed wheel 67 keyed onto the shaft 54 that is driven by the main geared motor of the machine. A cam 68 is keyed onto the said shaft 54 (see also Figures 2 and 3), and is caused to cooperate with the pin 69 provided at the free end of a lever 70, that by its opposite end is connected to the shaft 58.

The operation of the thus conceived apparatus is simple and apparent. The blade means 60 is rotated at a suitable, preferably reduced speed, and the track of cam 68 is so provided as to promote the cyclical lifting and lowering of the said rotary blade means. When the rotary blade means 60 is angularly moved into its down position, the blade thereof is caused to cooperate with the edge 134 of the underlying comb-like member or counterblade 34, whereby a cut will be made in the thin web F. The rotary blade means 60 is imparted its swinging motion at a frequency that is interlocked with the frequency at which a group of to-be-packaged articles is moved forward by the means for advancing these articles and for dealing out thereto the respective thin web length as obtained by successive thin web-cutting operations. In order to cause the length of the thin web sections to be changed, it is sufficient to have the variator 21 so adjusted as to modify the speed of rotation of the roller pairs 4, 5 and 6, 7, and of the next-following suction conveyor. By modifying the gear unit 66, 67, any feeding problem can be certainly solved. Of course, a speed variator can be fitted in place of the said gear unit.

Only in exceptional cases it will become necessary to have the cam track modified. Of course, any other suitable means may be provided in place of the cam 68.

Should the supply of the to-be-packaged articles fail, the friction clutch 23 is set apart, and the brake 24 is operated and caused to stop the roller pair 4, 5, while the rollers 6, 7 and the conveyor 26 delivering the thin web length cut in the preceding cycle, are kept in motion.

Claims

1. An apparatus for cutting and feeding lengths of a thin web (F), which is provided particularly in a machine for packaging articles into lengths of a heat-contractible thin web, and is of the type comprising a rotary blade means (60) fitted with a serrated blade (260) that is caused to cooperate with a stationary counterblade (34), characterized in that the said rotary blade means (60) is carried by the means (58, 59, 68, 69, 70) for lifting and

lowering the same, by which the rotary blade means (60) will be lowered as soon as its serrated blade (260) has been caused to arrive at the angular position for its cooperation with the counterblade (34), whereupon the rotary blade means is immediately lifted by the said means (58, 59, 68, 69, 70) which will keep the rotary blade means (60) in its uplifted position, until a thin web section of the length being each time required, has been caused to pass thereunder, means being provided for adjusting the speed at which the thin web (F) is caused to longitudinally slide, whereby the length is variable of the thin web sections to be supplied to the packaging machine.

2. The apparatus according to Claim 1, in which the rotary blade means (60) is carried by the one end of a pair of levers (59) pivotally connected to a shaft (58) arranged parallel to the said rotary blade means, with at least one lever (70) being connected by its one end to the said shaft (58), and which through a pin (69) provided at the opposite free end thereof, is caused to cooperate with a cam (68) being operated in an in-phase relation with the other components of the packaging machine, and the said shaft (58) about which are fulcrumed the levers (59) that carry the rotary blade means (60), rotatably supports a part (61, 62, 63, 64, 65, 66) of the chain of the kinematic motions imparting the said rotary blade means its motion of rotation.

3. The apparatus according to Claim 2, in which a gear unit (66, 67) is provided in the chain of the kinematic motions imparting the rotary blade means (60) its motion of rotation, and the said gear unit may be replaced, when needed, with another gear unit having a suitable gear ratio, any time the speed of rotation of the said rotary blade means has to be changed.

4. The apparatus according to Claim 2, in which a variator (21) is provided in the chain of the kinematic motions imparting the rotary blade means (60) its motion of rotation, whereby the speed of rotation of the said rotary blade means is adjustable.

5. The apparatus according to Claim 1, in which the blade (260) of the rotary blade means (60) is caused to act on the thin web (F) between two pairs of driven parallel rollers (4, 5; 6, 7), by which the thin web (F) is longitudinally pulled in the manner as required for the thin web to be unwound from its bobbin, and is longitudinally stretched to a proper degree, provisions being made for the said roller pairs (4, 5; 6, 7) to be mutually synchronized and to be imparted their motion of rotation from the motive unit of the machine, with the interposition of a speed variator (21), the pair of rollers (4, 5) being connected to the kinematic motion driving the same, with the interposition of a friction clutch and brake unit (23, 24), whereby the said rollers can be

uncoupled and braked, when needed, while the pair of rollers (6, 7) will deliver the thin web length having been cut during the preceding cycle.

6. The apparatus according to Claim 5, in which the speed variator (21) is connected to the actuating unit, with the interposition of a variable motion-generating device (35 to 48), which is so adjustable that the thin web length being cyclically fed by the said apparatus, will be moved in a properly decelerated manner, and positioned at a to-be-packaged article.

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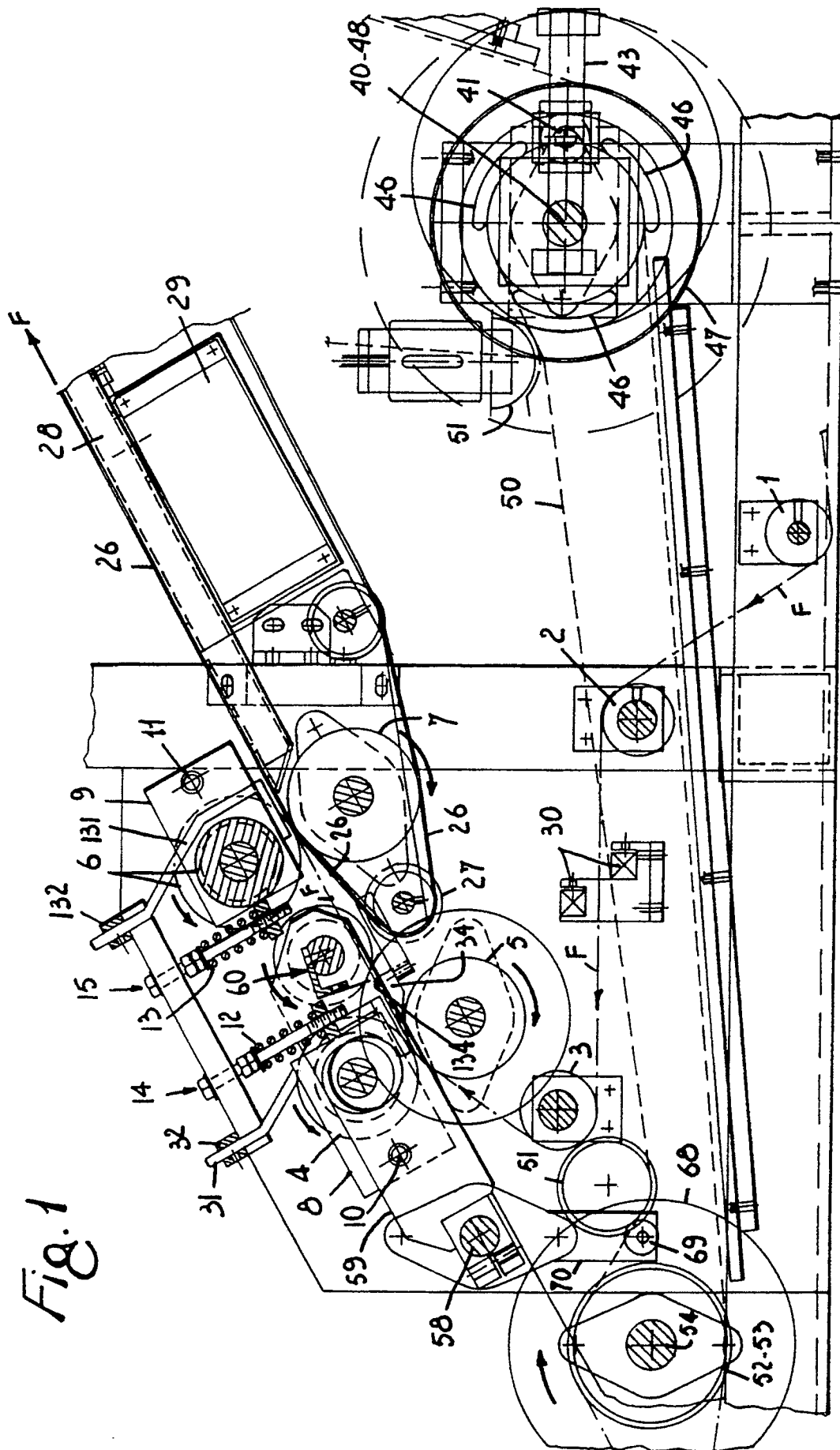
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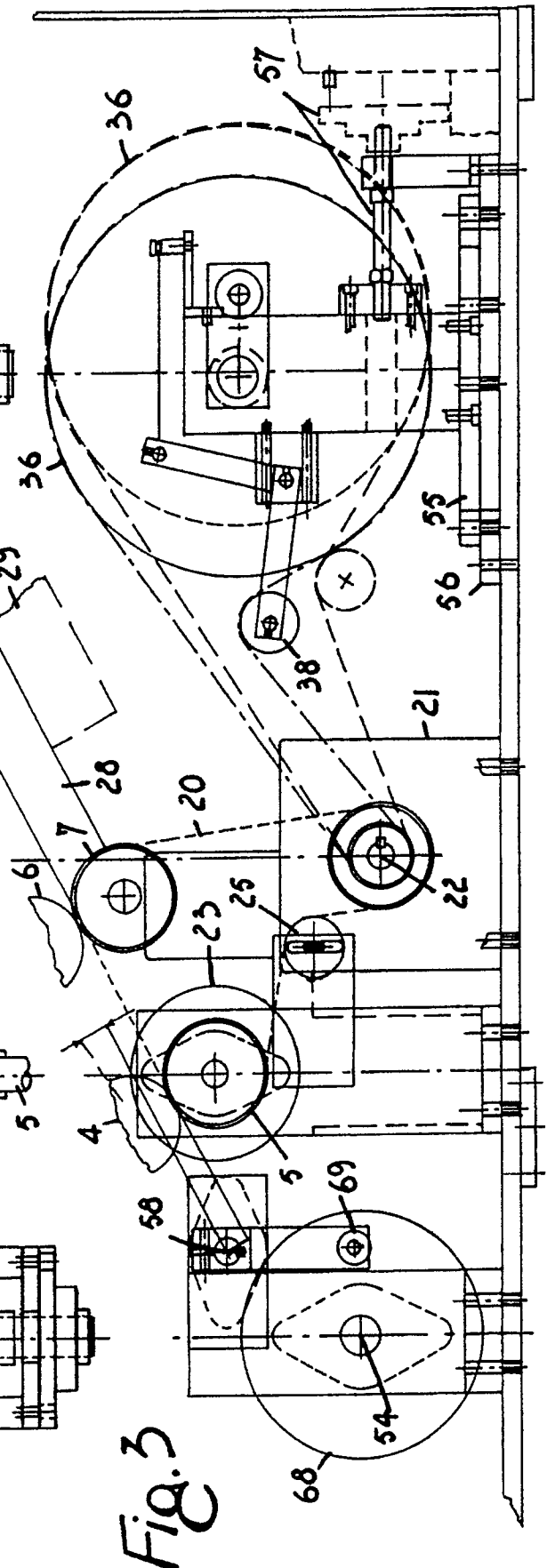
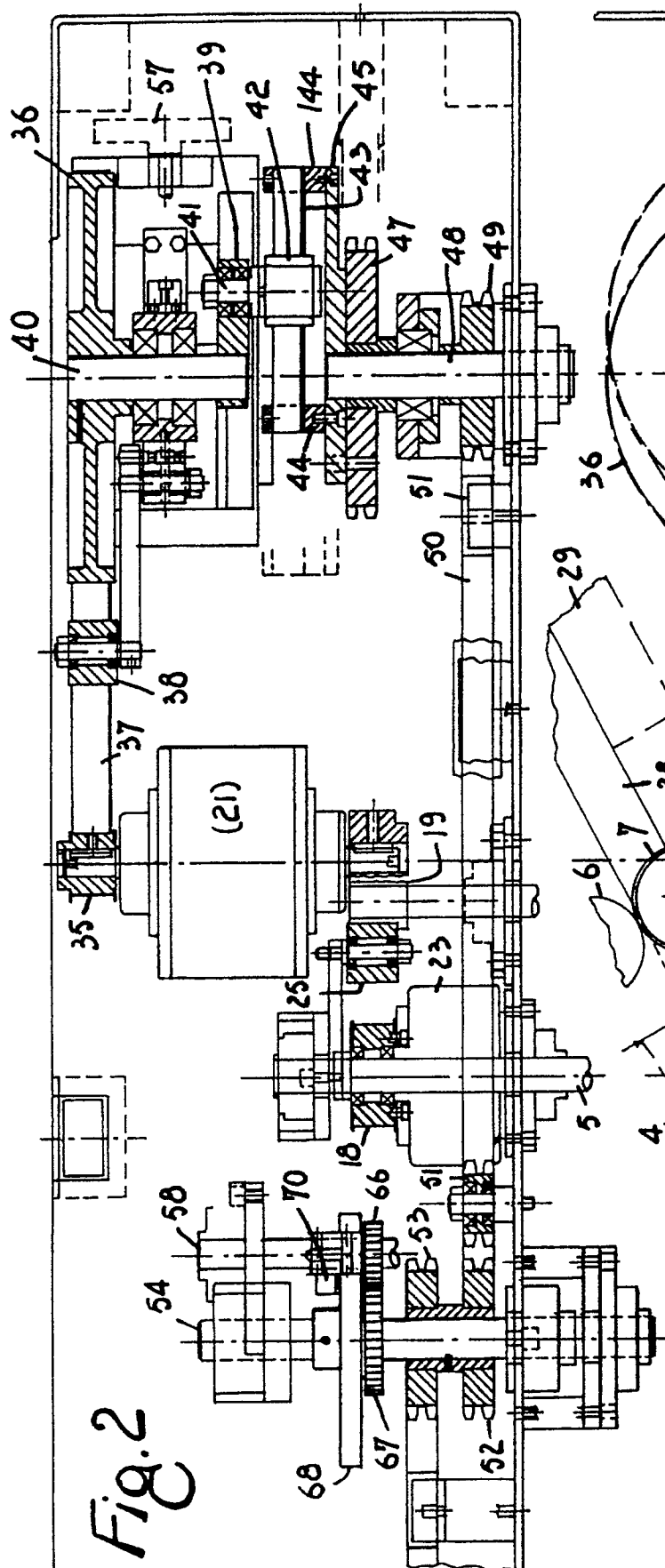
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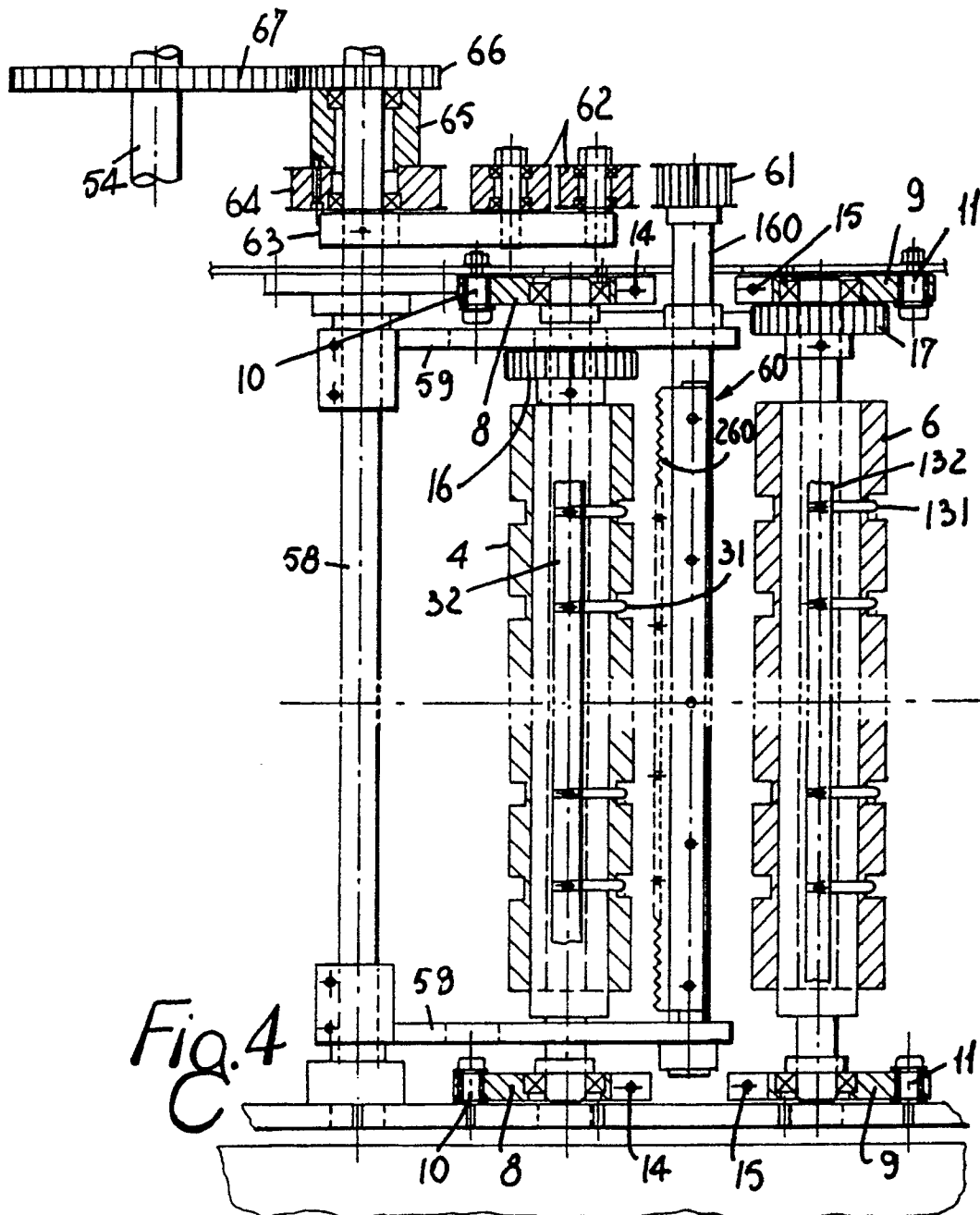
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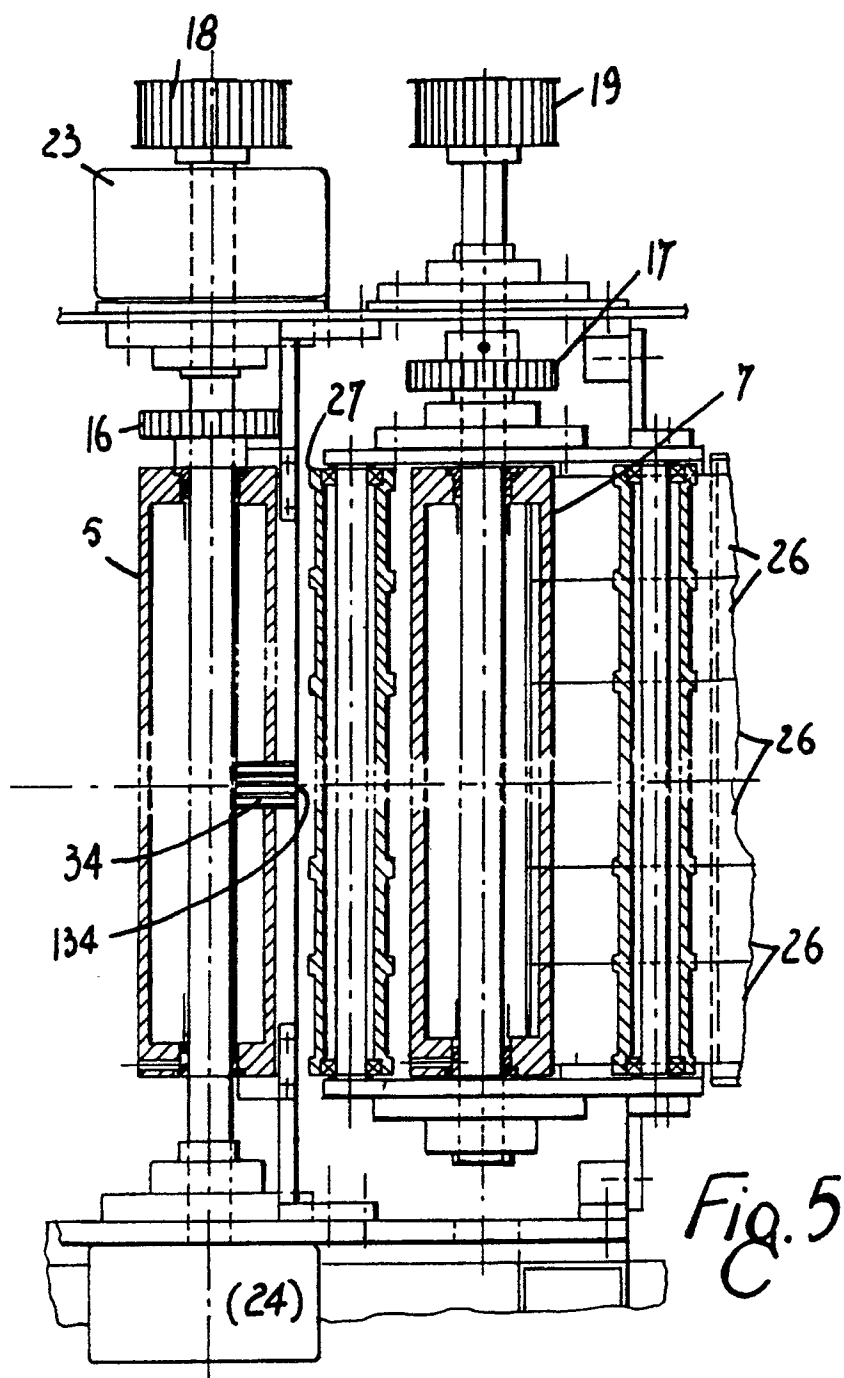
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EUROPEAN SEARCH REPORT

Application Number

EP 90 11 2317

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)
A	FR-A-1 469 856 (SERAGNOLI) * Complete document *	1	B 65 B 61/08
A	US-A-3 015 978 (INNOCENTI) * Complete document *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 5)
			B 65 B B 23 D B 42 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25-09-1990	Examiner NGO SI XUYEN 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			