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

(11) Publication number: **0 512 492 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **92107619.6**

(51) Int. Cl.5: **B65B 19/04**

(22) Date of filing: **06.05.92**

(30) Priority: **08.05.91 JP 102849/91**

(43) Date of publication of application:
11.11.92 Bulletin 92/46

(84) Designated Contracting States:
DE GB IT

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(54) Cigarette supplying and stopping device used in a cigarette wrapping apparatus.

(57) A cigarette wrapping apparatus is provided with stops (61) insertable in and retractable from cigarette supplying passageways (12) for supplying parallel arranged cigarettes (C) and a driving mechanism (60) of the stops (61). Each stop (61) is extended into the respective cigarette supplying passageway (12) to hold a cigarette (C) and stops the supply of the cigarette.
The extension of the stops into the cigarette supplying passageways (12) automatically stops the supply of the cigarettes and also readily stops the operation of the wrapping apparatus in a short time. The pressing force of the stops (61) produced by the driving mechanism (60) is selected such that cigarettes (C) are not deformed or collapsed but are immovably held.

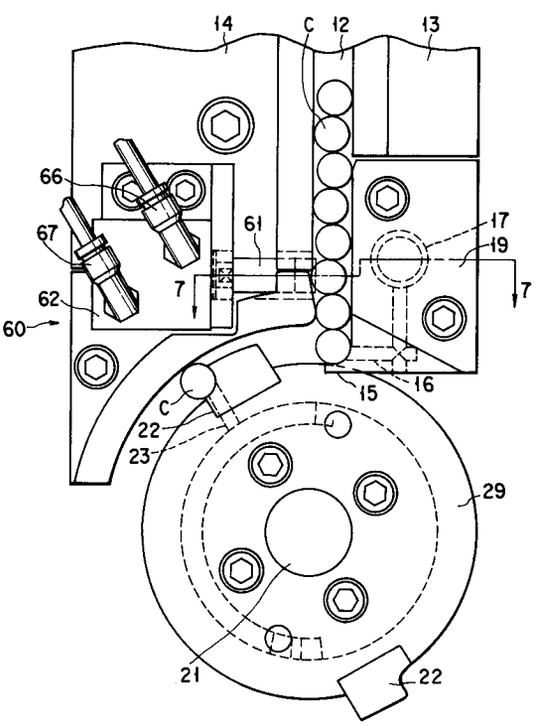

FIG. 6

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This invention relates to a cigarette supplying and stopping device used in a cigarette wrapping apparatus and more particularly to a cigarette supplying and stopping device used in a cigarette wrapping apparatus which has an automatic cigarette supply-stopping mechanism provided on an cigarette parallel-arranging device which arranges cigarettes in parallel and pile them in three steps in a staggered manner and prevents half-finished goods from being left on the intermediate portion of the wrapping apparatus when the operation of the wrapping apparatus is stopped.

In general, a cigarette wrapping apparatus is provided with a cigarette parallel-arranging device which takes out cigarettes from a hopper or the like containing cigarettes randomly arranges the cigarettes in parallel and piles them in three steps in a staggered manner such that, of twenty cigarettes to be packed in a box, seven, six and seven cigarettes constitute the lower step, the intermediate step and the upper step, respectively. The cigarette wrapping apparatus is further provided with a packing device for wrapping piled cigarettes with aluminum foil or wrapping sheets. The cigarette wrapping apparatus is still further provided with a sealing device for attaching seals (sealing pieces, for example) to cigarette packages. The cigarette parallel-arranging device, the packing device and the sealing device are integrally connected to each other to form a cigarette wrapping apparatus. Cigarettes put in the hopper or the like are sent out from the cigarette wrapping apparatus as packed final products.

When the operation of the cigarette wrapping apparatus is stopped during a wrapping operation, many unfinished products are left on the intermediate portion of the cigarette wrapping apparatus. If unfinished products are left in the packing device and no means for removing these unfinished products are used, an adhesive is dried, and, in case a thermally molten type adhesive is used, the adhesive is excessively heated by a heater and flows to make the unfinished products burnt. They become "no good" products and are thrown away.

The operation of cigarette wrapping apparatus is stopped when maintenance or repair is required. In the conventional cigarette wrapping apparatus, stopping blocks or the like are manually inserted into cigarette supplying passageways in the cigarette parallel-arranging device to interrupt the passage of cigarettes and thereafter the cigarette wrapping apparatus is operated for a predetermined time. After all cigarettes and unfinished products are taken away from the interior of the cigarette wrapping apparatus, the operation of the apparatus is stopped.

The number of the cigarette supplying passageways is twenty which corresponds to the number of cigarettes in a box. It is not only very cumbersome and uneconomical to put the stopping blocks in the cigarette supplying passageways simultaneously but also it requires skill to do so. Further, when the cigarette wrapping apparatus must be stopped due to some operational trouble, it takes a long time to stop the apparatus.

The object of this invention is to provide a cigarette supplying and stopping device which readily and automatically stops the supply of cigarettes in a short time.

In order to attain this object, the cigarette supplying and stopping device according to this invention is provided with a plurality of cigarette supplying passageways for transporting parallel-arranged cigarettes, stops disposed in the respective cigarette supplying passageways and retracted therefrom and a driving mechanism for driving the stops.

In order to stop the operation of the cigarette wrapping apparatus, the stops project into the cigarette supplying passageways by means of the driving mechanism and cigarettes are held between the stops and the inner faces of the cigarette supplying passageways to interrupt the movement of the cigarettes. The pressing force of the stops has a value which does not deform or collapse cigarettes but has a sufficient value to interrupt the movement of the cigarettes through the passageway.

With this apparatus, cigarettes moved in a plurality of cigarette supplying passageways can readily be stopped simultaneously in a short time by simply operating the driving mechanism.

The apparatus according to this invention is provided with an air cylinder whose pressing force is set such that cigarettes held between the stops are not deformed or collapsed but are held immovably in the passageway.

The apparatus according to this invention is further provided at the outlets of the cigarette supplying passageways with cigarette holding projections for securely but temporarily holding cigarettes which are being supplied.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view of the overall cigarette wrapping apparatus according to this invention;

Fig. 2 is a front view of the cigarette parallel-arranging device of the cigarette wrapping apparatus as shown in Fig. 1;

Fig. 3 is a side view of the cigarette parallel-arranging device as shown in Fig. 2;

Fig. 4 is an enlarged front view of a part of this cigarette parallel-arranging device;

Fig. 5 is an enlarged front view of another part of this cigarette parallel-arranging device;

Fig. 6 is a front view of a cigarette supplying and stopping device with which the cigarette parallel-arranging device is provided; and

Fig. 7 is a cross-sectional view along line 7-7 in Fig. 6.

An embodiment of a cigarette supplying and stopping device will be described with reference to the drawings.

First, a cigarette wrapping apparatus for wrapping twenty cigarettes in a box will explained. The overall structure of the apparatus is shown in Fig. 1.

A cigarette parallel-arranging device 1 has a hopper 2 into which a plurality of cigarettes are supplied from a known cigarette manufacturing machine (not shown) which is outside of the scope of this invention. Twenty cigarettes to be contained in a box are piled in three steps by means of the cigarette parallel-arranged device such that the lower, intermediate and upper steps include seven, six and seven cigarettes, respectively.

The piled cigarettes are supplied to a packing device 3 disposed adjacent to the cigarette parallel-arranging device 1, for automatically packing each set of twenty cigarettes to be contained in a box with aluminum foil or a wrapping sheet.

The packed product is applied with a seal by means of a sealing device 4 disposed adjacent to the packing device 3 and is delivered out of the packing device 3 by means of a taking-out conveyer 5.

The structure of the cigarette parallel-arranging device will be described with reference to Figs. 2 to 5.

As shown in Fig. 2, twenty vertical cigarette supplying passageways 12 whose number corresponds to the number of cigarettes in a box are arranged parallel with each other at the bottom of the hopper 2. As shown in Fig. 4, the cigarette supplying passageways 12 are formed between the blocks 13 and 14 and their width is slightly larger than the diameter of each cigarette C.

An inverted V-shaped guide block 18 is fixed to the upper surface of each of the blocks 13 and 14. A pair of swingable agitator rollers 11 are provided on both sides of the upper end or inlet of each cigarette supplying passageway 12 so as to lead cigarettes C in the hopper 2 to the respective cigarette supplying passage 12. With this arrangement, cigarettes C in the hopper 2 are guided by the guide block 18 and supplied into the cigarette supplying passageways 12, one by one, by means of the agitator rollers 11. The cigarettes C are arranged in parallel with each other in the cigarette supplying passageways 12 and are moved downward by their own weight.

A cigarette holding block 19 is provided on the lower end or the outlet of each cigarette supplying passageway 12. A substantially vertical cigarette holding projection 15 is provided on the lower end portion of the cigarette holding block 19 so as to extend in the respective cigarette supplying passage 12. At the side wall of the cigarette holding projection 15 is opened a negative pressure nozzle 16 which communicates with a negative pressure path 17. The cigarettes C delivered into the cigarette supplying passageways 12 abut against the cigarette holding projections 15, and are sucked and held in position due to a negative pressure produced by the negative pressure nozzles 16.

As shown in Figs. 2 and 4, a cigarette receiving drum 20 is provided at the lower end of each cigarette supplying passageway 12. Each cigarette receiving drum 20 is mounted on a rotary shaft 21 and rotated in the direction of an arrow in Fig. 4. A plurality of (two, for example) cigarette receiving members 22 are provided on the peripheral surface of each cigarette receiving drum 20. In the forward portion of a side face of each cigarette receiving member 22 is formed a semicircular depression for holding a cigarette C. A negative pressure nozzle 23 is opened at the depression.

The cigarette C held by the cigarette holding projection 15 provided on the lower end of each cigarette supplying passageway 12 is accordingly received by the depression of the respective cigarette receiving member 22 and is held by a negative pressure.

As shown in Fig. 2, three cigarette parallel-arranging drums 30 are disposed adjacent to groups of the cigarette receiving drums 20 for the lower, intermediate and upper steps of cigarettes (seven cigarette receiving drums for the lower step, six cigarette receiving drums for the intermediate step and seven cigarette receiving drums for the upper step). Each cigarette parallel-arranging drum 30 is mounted on a rotary shaft 31 and rotated in the direction of an arrow in Fig. 5. The peripheral rotational speed of each cigarette parallel-arranging drum 30 is rendered equal to the peripheral rotational speed of the corresponding cigarette receiving drum 20. In the peripheral surface of each cigarette parallel-arranging drum 30 are formed a plurality of groups of cigarette parallel-arranging depressions 32. The number of each group of cigarette parallel-arranging depressions 32 is seven or six according to the number of the corresponding step of the cigarettes C. When a group of cigarette parallel-arranging depressions 32 pass the region of the respective cigarette receiving drum 22, cigarettes C are received by the corresponding group of cigarette parallel-arranging depressions 32. In this way, each group of cigarette parallel-arranging depressions 32 receive the re-

spective group of parallel-arranged cigarettes C. A negative pressure nozzle (not shown) is opened at each cigarette parallel-arranging depression 32 and a cigarette C received by the depression 32 is held by a negative pressure.

As shown in Figs. 2 and 5, a transporting drum 40 is provided adjacent to each cigarette parallel-arranging drum 30 and is mounted on a rotary shaft 41 so as to be rotated in the direction of an arrow in Fig. 5. In the peripheral surface of each transporting drum 40 are formed a plurality of cigarette holding grooves 42. A negative nozzle is opened at each cigarette holding groove 42. Each group of parallel-arranged cigarettes C held in each group of cigarette parallel-arranging depressions 32 of a cigarette parallel-arranging drum 30 are transferred to the respective group of cigarette holding grooves 42 of the corresponding transferring drum 40.

As shown in Figs. 2 and 5, a cigarette piling drum 50 is provided adjacent to the three transporting drums 40 for the three groups of parallel-arranged cigarettes C. The cigarette piling drum 50 is mounted on a rotary shaft 51 and is rotated in the direction of an arrow in Fig. 5. On a side of the cigarette piling drum 50 are provided a plurality of heads 52. When each head 52 passes the region of each transporting drum 40, the groups of parallel-arranged cigarettes C are transported to the head 52. After the head 52 has passed the regions of the three transporting drums 40, twenty cigarettes C are piled in three steps in a staggered manner.

As shown in Fig. 3, a pushing-out drum 53 rotated together with the cigarette piling drum 50 is mounted on the rotary shaft 51 and is provided with pushers 54 for pushing out twenty cigarettes C held by each head 52 so as to be caused to face a head 52. Twenty cigarettes C are packed in a box by means of the packing device 3 and a seal is applied to the resultant cigarette package by means of the sealing device 4.

Each cigarette supplying and stopping device according to this invention with which the cigarette parallel-arranging device 1 is provided will be described with reference to Figs. 6 and 7. On the lower end portion of each cigarette supplying passageway 12 is provided a cigarette supplying and stopping device 60. More specifically, the apparatus 60 is, for example, provided on the lower end portion of the block 14, which is one of the blocks forming the cigarette supplying passageways 12. The cigarette supplying and stopping device 60 has a stop 61 which is inserted into and retracted from the respective cigarette supplying passageway 12 through an opening 68 formed in the block 14. From the rear face of the stop 61 projects a guide pin 63 which is slidably guided by a guide bush 65 provided in a supporting member 69 and guides the projection and retraction of the stop 61. A driving mechanism such as an air cylinder 62 is connected to the stop 61. The air cylinder 62 is fixed to the block 14 and connected by air pipes 66 and 67 which are connected to electromagnetic valves (not shown).

The cigarette supplying and stopping device 60 is provided on each cigarette supplying passageway 12, the total number of the cigarette supplying passageways 12 being twenty. The number of cigarettes C existing between the cigarette C pressingly held by projected stop 61 and the cigarette C held by the cigarette holding projection 15 in a cigarette supplying passageway 12 is set to be the same (for example, one as shown in Fig. 6) as in the other cigarette supplying passageways 12. The cigarette supplying and stopping device 60 are simultaneously operated by means of a control device (not shown), etc.

The pressing force of the air cylinder 62 is selected such that the cigarette C is not deformed or collapsed by the stop 61 but it is immovably held thereby.

The operation of the cigarette supplying and stopping device 60 will be described. The stop 61 of the apparatus 60 is retracted during the operation of the wrapping device such that a cigarette C freely passes the respective cigarette supplying passageway 12 and received by the respective cigarette receiving drum 29.

The operation of the wrapping device is stopped as follows. In response to a signal from a control device (not shown), pressurized air is supplied to the air cylinder 62 of the cigarette supplying and stopping device 60 for each cigarette supplying passage 12, and the stop 61 is inserted into the cigarette supplying passageway 12. A cigarette C is held between the front end of the stop 61 and the inner face of the cigarette supplying passageway 12 in such a way that the cigarette C is rendered immovable and the supply of the cigarette C is stopped. Then the wrapping device is operated for a predetermined time, whereby the cigarettes disposed downstream of the held cigarette C are packed as finished products. Since cigarettes C are held in turn by means of the control device (not shown), no products which contain insufficient number of cigarettes are produced.

This invention is not limited to the above-mentioned embodiment. For example, the driving mechanism for driving the stops is not limited to air cylinders but may be solenoids or the like.

According to this invention, the stops of the cigarette supplying and stopping devices project in the cigarette supplying passageways to press cigarettes and stop the wrapping device. In conse-

quence, the supply of cigarettes from the cigarette supplying passageways is automatically stopped, whereby the wrapping device is readily stopped in a short time without skillfulness.

Claims

1. A cigarette supplying and stopping device used in a packing apparatus comprising an cigarette parallel-arranging device for arranging a plurality of cigarettes in parallel and piling said cigarettes in a staggered manner, and a wrapping device for wrapping said cigarettes which are piled, said cigarette supplying and stopping device characterized by comprising:

   a plurality of cigarette supplying passageways (12) through which said cigarettes (C) arranged in parallel pass;

   stops (61) inserted into and retracted from said cigarette supplying passageways (12); and

   a driving mechanism (60) for inserting said stops (61) into and retracting said stops (61) from said supporting passageways (12).

2. The device according to claim 1, characterized in that said driving mechanism (60) has air cylinders (62) applying to said stops (61) a pressing force which has such a value that said pressing force does not deform or collapse said cigarettes (C) held between said stops (61) and inner faces of said cigarette supplying passageways (12) but immovably holds said cigarettes (C).

3. The device according to claim 1 or claim 2, characterized in that each of said cigarette supplying passageways (12) has an outlet provided with a cigarette holding projection (15) for temporarily holding said cigarettes (C) transported in said cigarette supplying passageway (12).

4. The device according to claim 3, characterized in that said stops (61) are disposed close to said cigarette holding projections (15) of said outlets of said cigarette supplying passageways (12).

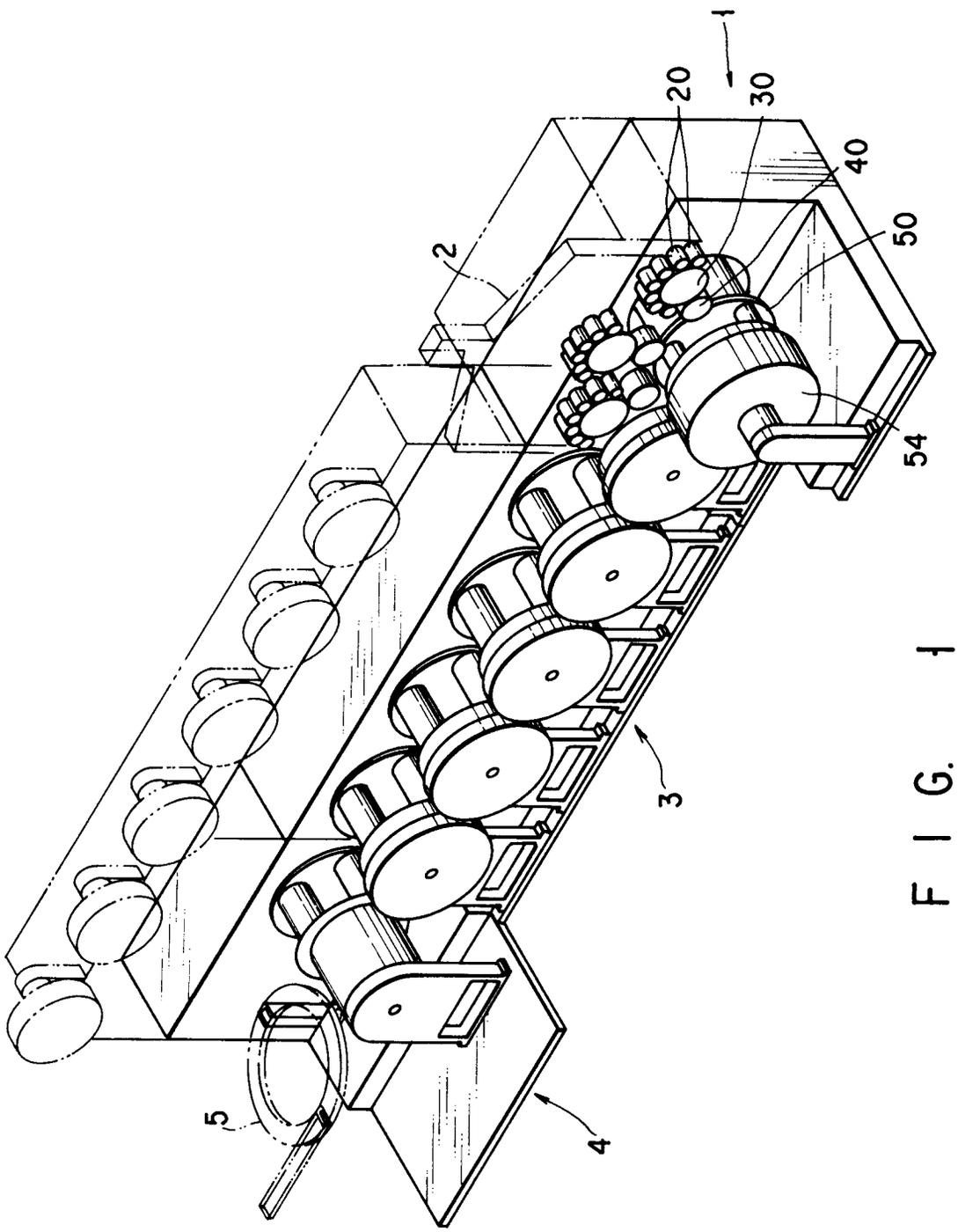
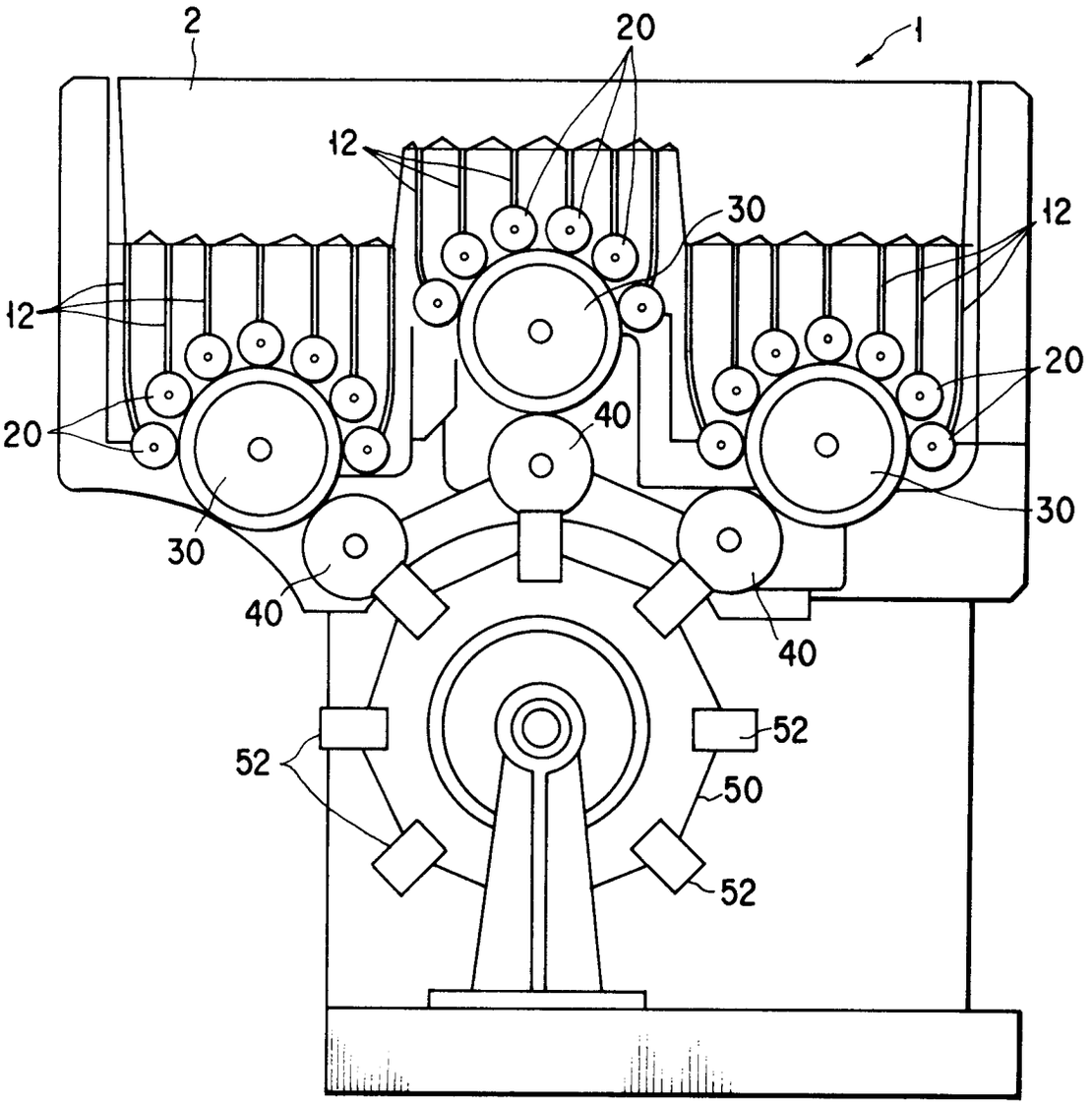


FIG. 1



F I G. 2

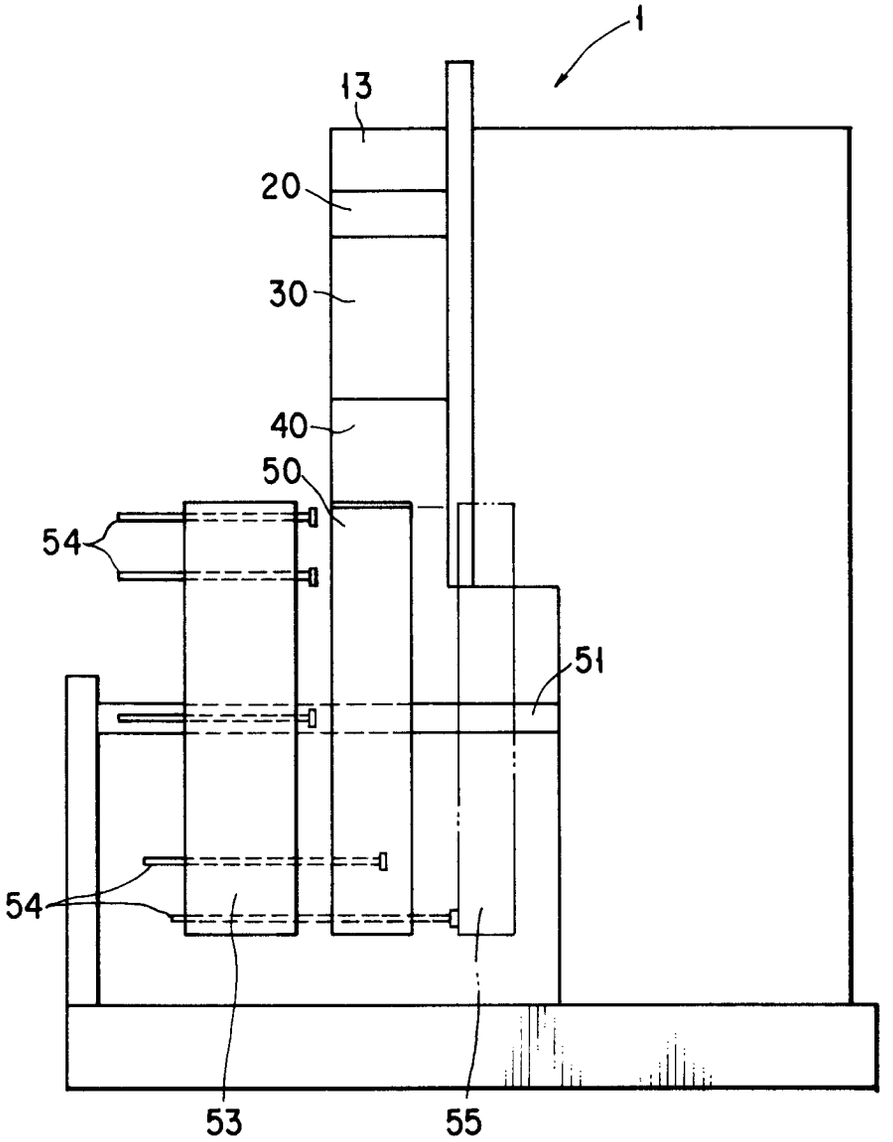
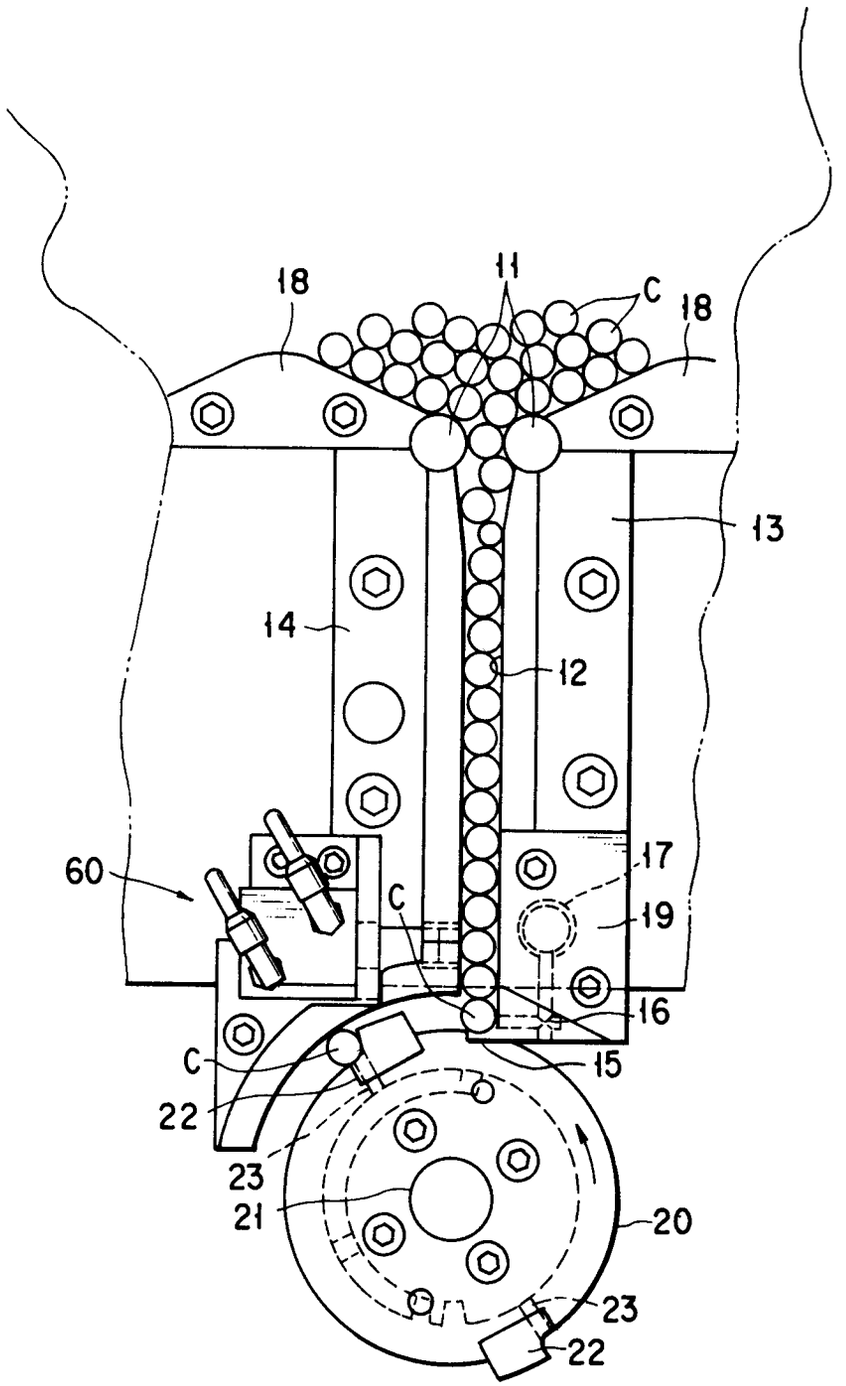


FIG. 3



F I G. 4

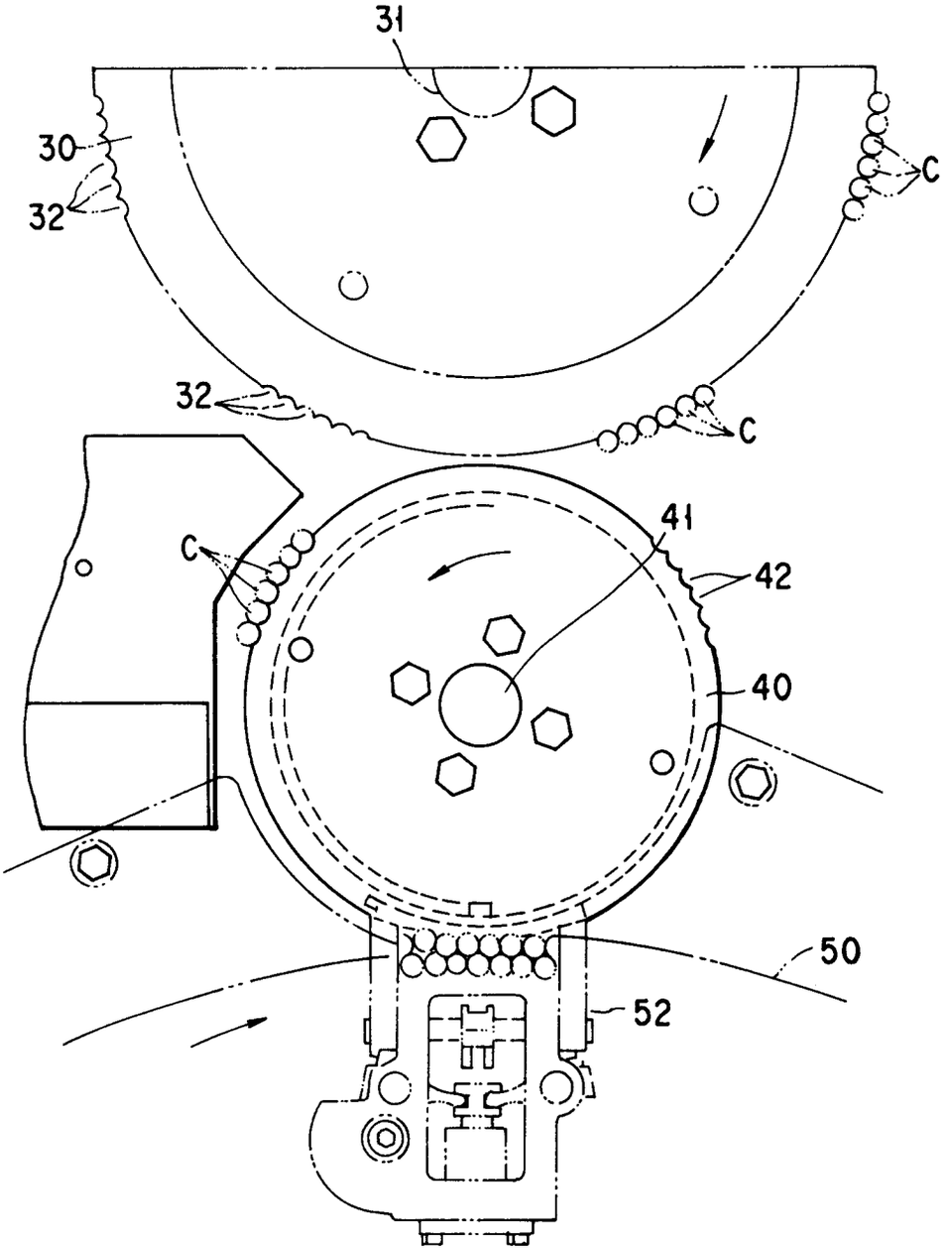


FIG. 5

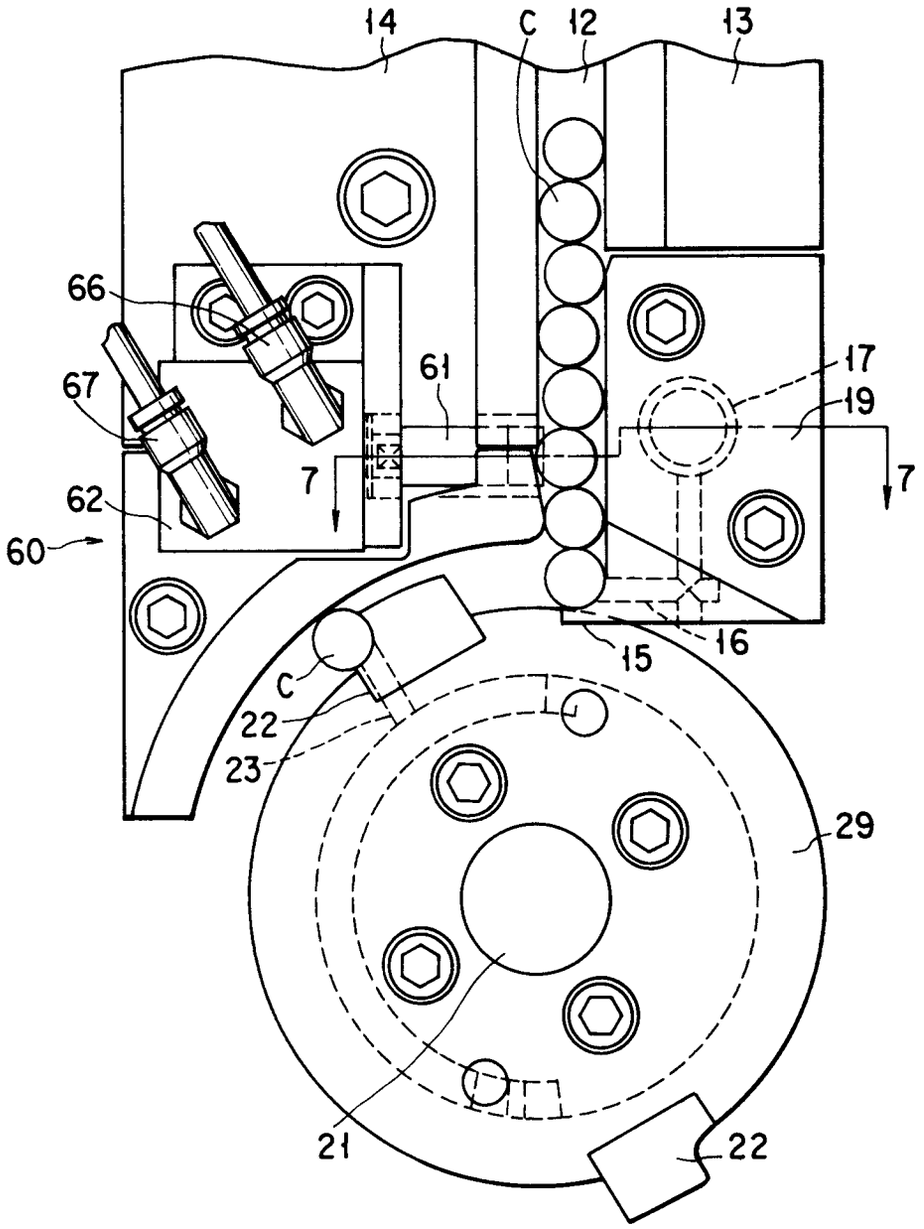


FIG. 6

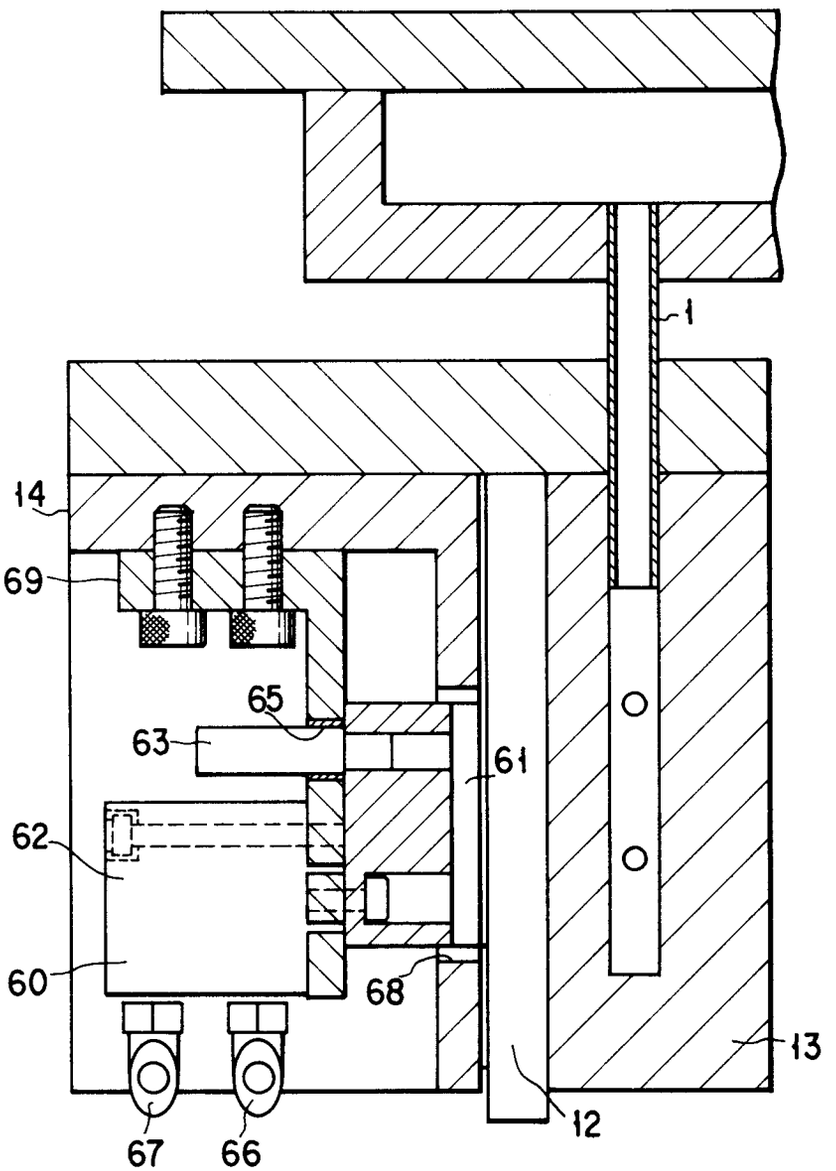


FIG. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 10 7619

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)
X	DE-C-528 448 (MUELLER) * page 2, line 18 - line 88 * * figures 1,2 *	1-4	B65B19/04
A	EP-A-0 210 544 (FOCKE) * abstract; figure 1 *	1	
A	GB-A-783 236 (KOERBER) * page 2, line 22 - line 37; figure 1 *	3	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 AUGUST 1992	CLAEYS H.C.M.

CATEGORY OF CITED DOCUMENTS

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