PATENT SPECIFICATION (11) 1596463

1596463

(21) Application No. 2804/78 (22) Filed 24 Jan. 1978 (19)
(31) Convention Application No. 12435 (32) Filed 26 Jan. 1977 in
(33) Italy (IT)
(44) Complete Specification published 26 Aug. 1981
(51) INT. CL.[3] B65G 29/00
(52) Index at acceptance
B8A 801 802 828 840 8G

(54) A DEVICE FOR FEEDING ARTICLES

(71) We, CARLE & MONTANARI S.p.A., of 24, Via Croce Coperta, Bologna, Italy, a joint stock company organised under the laws of the Republic of Italy, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a device for feeding articles, particularly adapted for feeding articles to a wrapping or packaging machine. More specifically, the invention relates to a device for the feeding of candies, or similar products, to a wrapping machine, of the type in which the candies are discharged in a random manner on a first disc, or conveyor disc, provided with orderly arranged pockets, into which the candies are directed by separating and sorting means. From the pockets of the conveyor disc the candies are transferred to a second disc, which may also be called a feeding disc, since it actually feeds the candies to the wrapping machine. The main problem in this type of feeding device resides in the fact that while the feeding disc which directly feeds the candies to the wrapping machine can operate at high rotational speeds, such as the speeds which can be attained by the wrapping machine, the conveyor disc necessarily must operate at lower rotational speeds, since the operation of separating and sorting the candies delivered thereto necessarily takes more time. Therefore, the speed of the feeding disc, and consequently of the whole feeding device, is dependent on and conditioned by the speed attainable by the first disc, or conveyor disc.

Of course, higher operational speeds could be attained by making at least the conveyor disc, on which the articles are separated and sorted, of greater dimensions, but it is evident that this would lead to greater overall dimensions of the feeding device, which are not desirable.

It has been proposed in German Patent 2107744, which is the closest prior art known to the applicants, to provide the conveyor disc with concentric rings of pockets in which the candies are arranged by the separating and positioning means. The candies thus arranged are then transferred by an intermediate transfer device, in the form of a drum rotating about horizontal axis and presenting a number of rows of peripheral transferring pockets corresponding to the number of concentric rings, to the feeding disc, which receives, at each transferring step of the said drum, a number of candies equal to the number of concentric rings on the first (conveyor) disc. In practice, however, for reasons of construction and smooth operation, the number of concentric rings must be limited to two, and therefore, the final feeding speed is necessarily limited.

According to the present invention, there is provided a device for feeding articles, particularly adapted for feeding articles to a wrapping or packaging machine comprising:

a) a first disc or conveyor disc, arranged horizontally and rotatable about a vertical axis, said conveyor disc having a plurality of pockets arranged on concentric circles, each pocket of one circle being adapted to receive an article and being arranged on the said conveyor disc, with respect to a corresponding pocket on each one of the other concentric circles, so as to form a set of pockets arranged on an arc whose notional circumference has a predetermined diameter;

b) a second disc or feeding disc, arranged horizontally and rotatable about a vertical axis, said feeding disc having receiving pockets arranged on the circumference of a circle having a diameter equal to said predetermined diameter; and

c) a transfer device rotatable about a verticle axis arranged between the axes of rotation of said conveyor disc and said feeding disc, said transfer device comprising a plurality of grippers angularly equispaced and rotatable with said conveyor disc, each gripper being adapted to remove a set of articles positioned in a set of pockets on the conveyor disc and to deposit same, without altering the relative position of the articles, in the receiving pockets provided on an arc of the circle of receiving pockets in the feeding disc.

The construction and operation of the feeding device according to the present invention will be evident from the following detailed description of some preferred embodiments, with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic view, from above, of a first form of device according to the invention for feeding candies to a wrapping machine;

Figure 2 is a diagrammatic view, from above, of a second form of feeding device according to the invention;

Figure 3 is a vertical section through the rotary transfer device arranged between the conveyor disc and the feeding disc of the feeding device according to the invention; and

Figure 4 is a view from above of the rotary transfer device of Figure 3.

In Figure 1 there is diagrammatically shown a feeding device for feeding candies to a wrapping machine. The feeding device consists of a first horizontal disc D1, or conveyor disc, which rotates continuously or intermittently about a vertical axis, in the direction of the arrow F1. The conveyor disc D1 is provided on its upper surface with pockets S1 for receiving candies P. Each pocket S1 is open at the top and closed at the bottom, and it is adapted to receive just one candy P. The conveyor disc is constructed as a separating disc, in order to sort in known manner, the candies P which are delivered thereon in a heap H. For this purpose, there is provided, for example, a rotating brush roller W, which by cooperating with the rotating disc D1, causes each single candy P to fall into a corresponding pocket S1.

At a certain distance from the conveyor disc D1, there is arranged, in the same horizontal plane, a second horizontal disc D2, or feeding disc, which has a peripheral ring of edge pockets S2, each pocket S2 being adapted to receive a single candy P. The feeding disc D2 rotates around its vertical axis in a continuous or intermittent manner, in the direction of arrow F2.

The pockets S1 of the conveyor disc D1 are arranged along three concentric circles R1, R2 and R3. Each pocket S1 on one of the circles R1, R2, R3 is oriented with respect to a corresponding pocket on the remaining two circles. The three pockets S1 so oriented with respect to each other are located on an arc indicated by a dash-and-dot line, which arc forms part of a notional circumference having the same diameter as the ring K of pockets S2 of the disc D2. Also the spacing between the three oriented pockets S1 of the conveyor disc D1 is equal to the spacing of the pockets S2 on the feeding disc D2.

Between the axes of rotation of the conveyor disc D1 and the feeding disc D2 there is arranged a rotary transfer device G, diagrammatically indicated in Figures 1 and 2 by dash-and-dot lines, which rotary transfer device G rotates continuously or intermittently about a vertical axis, in the direction of arrow F3. The transfer device G, as shown in Figures 3 and 4, consists of a vertical hollow shaft 4, which is supported through the medium of bearings 3 by a tubular post 2 on a base 1. The hollow shaft 4 is provided at its lower end with conventional driving means 5, while it carries, secured to its upper end, a disc 6, which extends in overlapping relation with respect to the underlying discs D1 and D2, and which carries downwardly directed grippers T movable up and down, but secured against rotation relative thereto.

Each gripper T of the rotary transfer device consists of three downwardly directed suction cups 9, which are mounted on a horizontal hollow carrier arm 108. The carrier arm 108 has a vertical hollow stem 8, which is slidable in a vertical guide sleeve 7 on the disc 6. In the guide sleeve 7 there is provided, surrounding stem 8, an annular chamber 10, which communicates at one side, through a duct 11, with a bore 12 provided in the disc 6, and at the other side, through a radial bore in the hollow stem 8 and the hollow carrier arm 108, with the suction cups 9. The bores 12 are equispaced around a circumference which is concentric with the axis of rotation of the disc 6.

The vertical stem 8 projects through the sleeve 7 above the disc 6 and is provided with a horizontal pin 13 which carries at one end a roller 14, while at its other end it is connected, by means of a link rod 16, to a rocking lever 17. The roller 14 engages a vertical guide 15, secured to the disc 6. This guide 15 allows vertical up and down movement of the stem 8 and of the suction cups 9, but does not permit any rotation of the stem 8 with respect to the disc 6. The rocking lever 17 can oscillate about a horizontal spindle 18 on a support 19 secured to the disc 6, and is provided with a follower roller 20 which engages a groove in an annular face cam 21.

The annular face cam 21 is secured to the upper part of a shaft 22, which passes through the hollow shaft 4 and is housed inside same with the interposition of bearings 23. At its lower end, the shaft 22 is provided with means 24 for controlling its rotational movement.

On the shaft 22, below the cam 21 there is keyed an annular air distributor 25, which is rotatable with the shaft 22 and is capable of limited axial movement, against the action of a spring 36 which urges it downwardly against the disc 6. The air distributor 25 contains a suction chamber 28 and a separate pressure chamber 29, diametrally opposed. The suction chamber 28 is in communication, through a radial bore 32, with a duct 31 formed in the upper section of shaft 22. The

duct 31 is rotatably connected, in air-tight manner, to a top cover 33 which, through a further duct 34 is connected to a vacuum source (not shown). The pressure chamber 29 of the air distributor communicates, through a duct 30, with a source of air under pressure (not shown). The air distributor 25 is provided, in communication with the suction chamber 28, an arc-shaped suction slot 26, which registers with some of the bores 12 in the disc 6. Correspondingly, the pressure chamber 29 is provided with an arc-shaped pressure slot 27, which also registers with some of the bores 12 in the disc 6. The suction slot 26 is located over the conveyor disc D1, while the pressure slot 27 is located over the feeding disc D2. A protective casing 37 covers the upper part of the disc 6 of the transfer device G.

In the transfer device G illustrated in Figures 3 and 4, the grippers T which rotate with the disc 6, can be lifted and lowered by predetermined amounts in response to limited rotation of the shaft 22, through the medium of the face cam 21. Moreover, the grippers T can be put in communication with a suction source when over the conveyor disc D1 and with an air pressure source when over the feeding disc D2. The suction cups 9 of each gripper T, represented diagrammatically by small circles in Figure 1, are arranged on an arc (dash-and-dot line) which corresponds to the arc along which the pockets S1 on the three concentric circles R1, R2, R3 of disc D1 are oriented. This arc corresponds also to an arc of the peripheral ring K of receiving pockets arranged in the feeding disc D2.

The operation of the device is as follows: At each feeding step, a gripper T is positioned over the conveyor disc D1 so as to present its three suction cups 9 exactly over three oriented pockets S1 in the disc D1. The gripper T is then lowered, through the medium of a limited rotation of the shaft 22, so that its suction cups 9 come into contact with the candies P contained in the three pockets S1. At the same time, the suction cups are connected to the vacuum source, since the suction slot 26 of the air distributor 25 registers with the bore 12 in the disc 6, corresponding to the lowered gripper T. Finally, the gripper is lifted in response to subsequent rotation of the shaft 22. In this manner, the suction cups 9 of the gripper T remove, by suction, a set E of three candies, from the pockets S1 of the disc D1.

The lifted gripper T is rotated by the rotary transfer device G in the direction of arrow F3. The suction cups 9 remain in communication with the suction chamber, and the three candies P remain attached to the suction cups during this transfer.

When the gripper T reaches the zone above the feeding disc D2, the three suction cups 9 are positioned exactly above three corresponding receiving pockets S2 in the disc D2. The gripper T is now lowered, in response to limited rotation of the shaft 22, so that the candies P carried by the gripper T are lowered into the receiving pockets S2. At the same time, the air distributor is rotated with the shaft 22 in such a manner that the pressure or blowing slot 27 comes into register with the bore 12 corresponding to the gripper T. The suction cups 9 are therefore put into communication with air under pressure, and the candies P are discharged by a jet of air into the receiving pockets S2 of the disc D2. The gripper T of the transfer device G is then again lifted, and its communication with the pressure slot 27 is interrupted.

In the embodiment diagrammatically shown in Figure 2, the feeding disc D2 has two concentric rings K1 and K2 of receiving pockets S2. The conveyor disc D1 is provided with a plurality of concentric rings of pockets S1. At each feeding step, from the conveyor disc D1 there is removed by the transfer device G a set of candies A, which is composed of two single sets E1 and E2 which follow each other in the circumferential direction of the disc, each set E1 and E2 being made up of three candies P, the said candies being deposited in three receiving pockets S2 of the two rings of pockets K1 and K2 in the feeding disc D2. The pockets S1 in the conveyor disc D1 are therefore arranged in groups, each group comprising two series of three pockets arranged along two arcs of circles having the same diameter as the rings K1, K2 of the feeding disc D2, the pockets being equally spaced. The suction cups 9 (represented by small circles) will be equal in number and have the same disposition and spacing as the pockets S1. For the rest, the transfer device G having the grippers T and the suction cups 9 can be formed in substantially the same manner as the one illustrated in Figure 3.

It is believed that the invention will have been clearly understood from the foregoing detail description of the preferred embodiments. Changes in the details of construction, particularly as concerns the number and disposition of the pockets in the discs, may be resorted to without departing from the scope of the invention as defined in the appended claims.

WHAT WE CLAIM IS:—

1. A device for feeding articles, particularly adapted for feeding articles to a wrapping or packaging machine, comprising:

a) a first disc or conveyor disc, arranged horizontally and rotatable about a vertical axis, said conveyor disc having a plurality of pockets arranged on concentric circles, each pocket of one circle being adapted to receive

an article and being arranged on the said conveyor disc, with respect to a corresponding pocket on each one of the other concentric circles, so as to form a set of pockets arranged on an arc whose notional circumference has a predetermined diameter;

b) a second disc or feeding disc, arranged horizontally and rotatable about a vertical axis, said feeding disc having receiving pockets arranged on the circumference of a circle having a diameter equal to said predetermined diameter; and

c) a transfer device rotatable about a vertical axis arranged between the axes of rotation of said conveyor disc and said feeding disc, said transfer device comprising a plurality of grippers angularly equispaced and rotatable with said conveyor disc, each gripper being adapted to remove a set of articles positioned in a set of pockets on the conveyor disc and to deposite same, without altering the relative position of the articles, in the receiving pockets provided on an arc of the circle of receiving pockets in the feeding disc.

2. A feeding device according to claim 1, in which each set of pockets on the conveyor disc is composed of three pockets arranged on an arc, and the receiving pockets are arranged on a single circle on the feeding disc.

3. A feeding device according to claim 1, in which each set of pockets on the conveyor disc is composed of pockets arranged on two concentric arcs, and the receiving pockets are arranged on concentric circles on the feeding disc.

4. A feeding device according to claim 1, in which each gripper of the rotary transfer device comprises a plurality of suction cups, means being provided for alternately connecting said suction cups to a source of vacuum, in order to take the articles out of the pockets in the conveyor disc, and with a source of fluid under pressure, in order to discharge the said articles into the receiving pockets in the feeding disc.

5. A device for feeding articles, substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon) Ltd. -1981. Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1596463 COMPLETE SPECIFICATION

3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

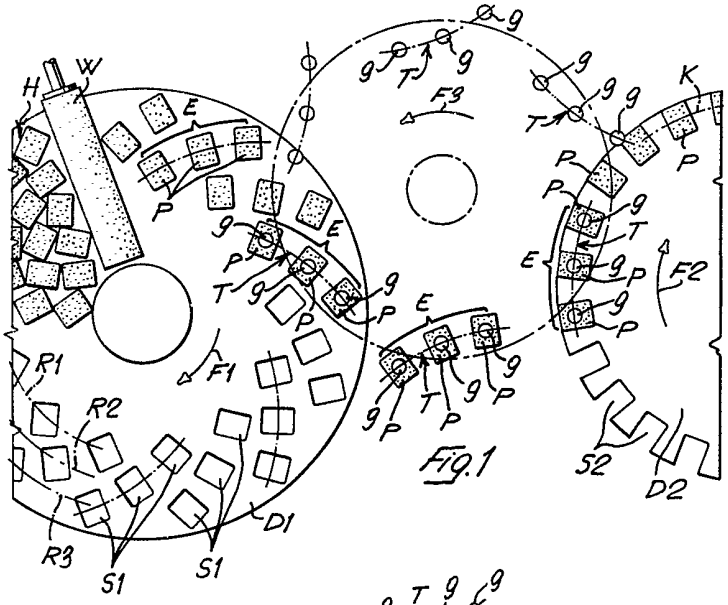

Fig.1

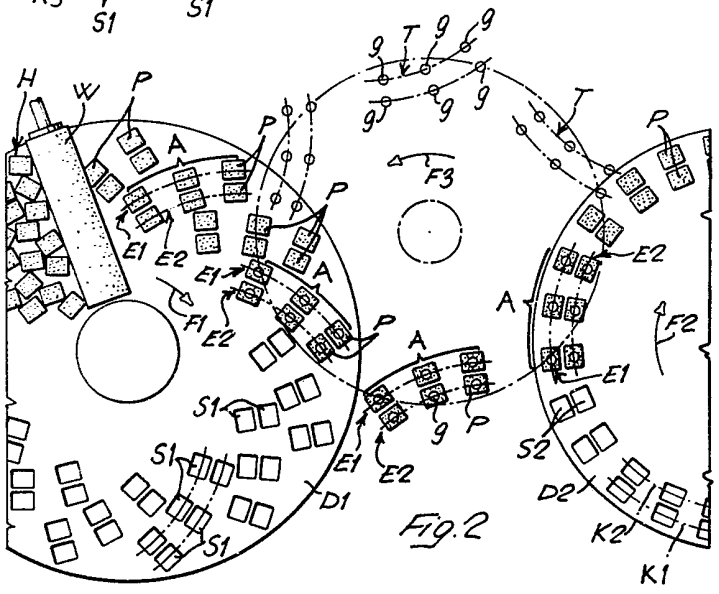

Fig.2

1596463 COMPLETE SPECIFICATION
3 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheet 2

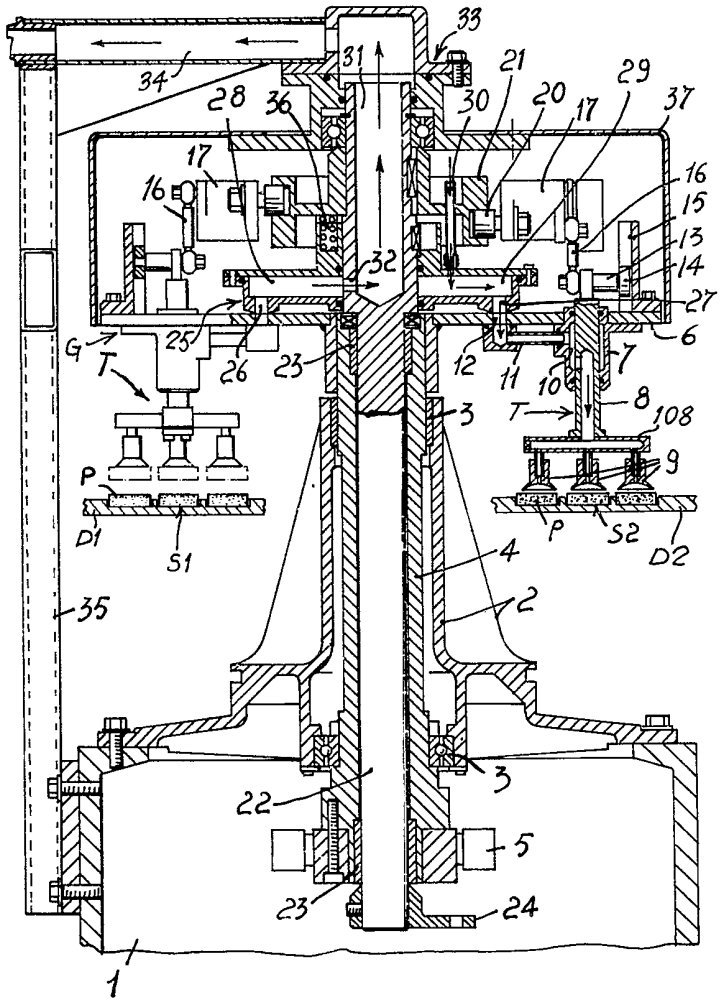

Fig. 3

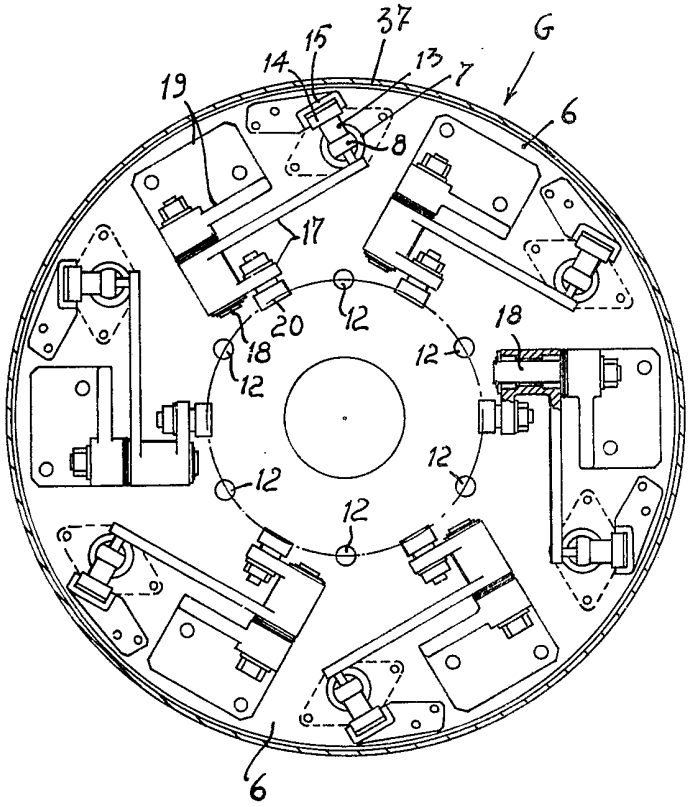

FIG. 4