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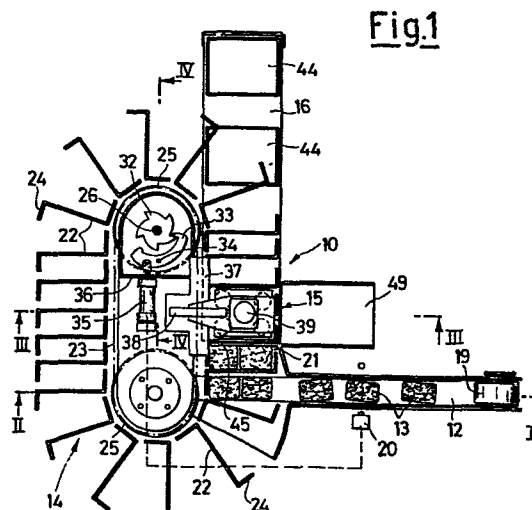
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54 Machine for arranging product units, for example rigid or deformable packages.

57 This invention relates to a machine for arranging
 product units, for example rigid or deformable packages,
 comprising, in combination: a feed unit for the packages,
 and a unit for arranging these latter and conveying them to a
 unit for depositing the so arranged packages on to an
 underlying discharge unit.



"MACHINE FOR ARRANGING PRODUCT UNITS, FOR EXAMPLE RIGID OR
DEFORMABLE PACKAGES."

This invention relates to a machine able to position product units, for example rigid or deformable packages, in an ordered manner.

In this respect, one example of the problem to be solved is
5 to position the individual packages in boxes of determined dimensions in an ordered manner, making optimum use of the available space.

The packages, fed to the boxing station in continuous flow one after the other, must be able to be arranged for example in
10 rows of a certain number of units, in groups of a required number of rows and columns, or more simply individually.

A further problem can be represented by the need to arrange the product units in superposed layers in the box.

The object of the present invention is to provide a machine
15 which automatically arranges the product units in accordance with predetermined arrangements and in groups of required quantities.

This object is attained according to the present invention by a machine for arranging product units, for example rigid or deformable packages, characterised by comprising, in combination:
20 a feed unit for the packages, and a unit for arranging these latter and conveying them to a unit for depositing the so arranged

packages on to an underlying discharge unit, said arranging unit being constituted by a turntable mobile stepwise and comprising interspaced blades arranged to embrace the packages to withdraw them from said feed unit and move them into a position corresponding with said depositing unit, this latter being provided with expulsion means for the packages contained between at least two consecutive blades of the turntable in order to deposit them on to said discharge unit, drive means being provided for said feed, arranging, depositing and discharge units.

10 The structural and operational characteristics of an arranging machine according to the present invention will be more apparent from the accompanying diagrammatic drawings relative to one embodiment thereof, in which:

15 Figure 1 is a plan view of a machine according to the invention;

 Figure 2 is a partly sectional elevation on the line II-II of Figure 1;

 Figure 3 is a partly sectional elevation on the line III-III of Figure 1;

20 Figure 4 is a detail of the machine shown in section on the line IV-IV of Figure 1, and

 Figure 5 is a view analogous to that of Figure 3, but comprising a different device for expelling the arranged packages.

25 With reference to the drawing, an arranging machine according to the invention, indicated overall by the reference numeral 10, is composed essentially of a load-bearing structure 11 to which are connected a first belt conveyor 12 for feeding units such as

packages 13, a turntable device 14 for separating and arranging the packages 13, and a unit 15 for moving the arranged packages on to a second discharge belt conveyor 16.

5 The first belt conveyor 12, driven for example by a drive roller 17 rotated by a geared motor unit 18 is provided with a wheel 19 of elastic material operationally connected to the conveyor 12 and rotating at the same peripheral speed thereof. Said wheel 19 acts as a presser for the packages 13 which pass into the space defined between it and the belt, so as to ensure
10 correct feed.

There are also provided a photoelectric checking cell 20 and a surface 21 on which the units 13 rest during their withdrawal from the conveyor 12, as is described in detail hereinafter.

Said device 14 for separating and arranging the product units
15 13 is constituted by a stepwise-rotating turntable comprising a plurality of blades 22 which are connected in a suitably interspaced manner to a conveying chain 23.

The blades 22 are bent at their free end, as at 24, in order to separate the units 13 fed by the conveyor 12, and to compact
20 them if several units are withdrawn from the conveyor 12.

The chain 23 extends between two sprocket wheels 25, one of which is driven by a crankshaft 26 formed from three cranks 27 offset by 120° from each other (Figure 4).

To each of said cranks 27 there is connected a relative rod
25 28 of a pneumatic cylinder 29, which is swivel-mounted on the load-bearing structure.

Three valves 30, operated by cams 31 which are offset by

120° from each other and are axially fixed on the crankshaft 26, control the sequential operation of the cylinders 29, which together determine the stepwise rotation of said shaft 26.

The stepwise rotation of the shaft 26, and thus of the chain 5 23, is controlled by a ratchet mechanism composed of a sawtoothed wheel 32 rigid with the shaft 26, and a cooperating pawl 33.

The pawl 33 swivels at 34, and is controlled by a pneumatic cylinder 35.

Said ratchet mechanism is enclosed in a sealed box 36 10 containing a shock-absorbing substance.

The chain 23 runs laterally in a guide 37 positioned at the movement or expulsion unit 15 which is connected to the load-bearing structure, (Figure 3).

Said unit 15 is constituted by a ledge 38 carrying a cylinder 15 39, of which the rod 40 is provided with expulsion means 41 for the packages 13 held between two consecutive blades 22.

The second belt conveyor 16, which is also connected to the load-bearing structure 11, is also driven by a drive roller 42 operated by a geared motor 43, and can for example convey boxes 20 44 under the expulsion unit 15, into a position corresponding with a stop 45.

A cylinder 46, normal to the belt conveyor 16 and carrying at the end of its rod 47 a thrust plate 48, pushes the filled box 44 on to a discharge chute 49.

25 The operation of the machine heretofore described is as follows.

The product packages 13 reach the first belt conveyor 12 from a packaging machine or refrigeration tunnel.

In passing between the wheel 19 and belt 12, the packages 13 are obliged to assume the same speed as the belt 12, by which they are fed between two consecutive blades 22 of the turntable 14 (Figure 1).

5 The photoelectric cell 20 counts the packages 13, and provides for operating the cylinder 35 which disengages the pawl 33 from the toothed wheel 32, thus releasing the crankshaft 26.

When operating, the pneumatic cylinders 29 induce a one-step rotation of said shaft 26 and consequently of the chain 23, which
10 ceases when the pawl 33 engages with the next tooth of the wheel 32.

The packages 13 thus lying between two consecutive blades 22 move along the fixed surface 21 by virtue of the movement of the chain 23, until they arrive below the expulsion unit 15, when
15 they stop.

On operating the cylinder 39, the relative expulsion members 41 cause the packages 13 to fall into a box 44 positioned underneath on the second belt conveyor 16, which conveys said boxes 44 as far as the stop 45.

20 When the box 44 is filled with one or more layers, a cylinder 46 is operated to cause the thrust plate 48 to discharge said box 44 by pushing it on to the chute 49.

Figure 5 shows a further embodiment of the expulsion device 15, which is used in machines for arranging deformable packages
25 which can therefore assume changing shapes.

In this respect, a suction unit 50 is disposed on the ledge 38 to provide a vacuum by means of an electrically driven fan 51.

Below the unit 50 there is disposed a grid 52 comprising fine meshes through which pass the prongs 53 of an expulsion member 54 operated by an overlying cylinder 55 supported within the unit 50.

The packages 13 reaching the fixed surface 21 are pushed by
5 the blades 22 into the zone of influence of the suction unit 50,
which is under vacuum and where they are sucked against the grid
52, to remain suspended.

The prongs 53 of the expulsion member 54, on operation by the
cylinder 55, push the packages 13 outside the zone of influence of
10 the unit 50, and thus into the underlying box 44.

It can therefore be seen that such a machine enables rigid or
deformable packages to be arranged with great accuracy, and if
necessary to be disposed in boxes ready for despatch to the various
sales outlets.

15 In the illustrated example, two packages are located between consecutive blades, and four packages are disposed in two rows and two columns in the boxes. This example is obviously not limitative with regard to the number and arrangement.

CLAIMS :

1. A machine for arranging product units, for example rigid or deformable packages, characterised by comprising, in combination:
a feed unit for the packages, and a unit for arranging these
5 latter and conveying them to a unit for depositing the so arranged packages on to an underlying discharge unit, said arranging unit being constituted by a turntable mobile stepwise and comprising interspaced blades arranged to embrace the packages to withdraw them from said feed unit and move them into a position correspond-
10 ing with said depositing unit, this latter being provided with expulsion means for the packages contained between at least two consecutive blades of the turntable in order to deposit them on to said discharge unit, drive means being provided for said feed, arranging, depositing and discharge units.
- 15 2. An arranging machine as claimed in claim 1, characterised in that said mobile turntable is constituted by a chain which supports and drives said blades, and passes endlessly around two toothed wheels.
3. An arranging machine as claimed in claim 2, characterised in
20 that to one of said toothed wheels there is connected a ratchet mechanism which is controlled by operating means and controls the stepwise motion of the turntable.
4. An arranging machine as claimed in claim 1, characterised in that the drive means which operate the turntable are constituted by
25 a crankshaft comprising several mutually offset cranks, to which are connected relative rods of actuator cylinders controlled by valves which are operated in sequence by cams which rotate rigidly

with said crankshaft.

5. An arranging machine as claimed in claim 1, characterised in that said feed and discharge units are belt conveyors.

6. An arranging machine as claimed in claim 5, characterised in
5 that the feed belt conveyor is provided with a presser unit constituted by a wheel of yieldable material which is disposed above the belt in order to define a passage slightly smaller than the dimensions of the package, and which rotates with a peripheral speed equal to that of said belt.

10 7. An arranging machine as claimed in claim 5, characterised in that said discharge belt is provided with a stop in a position corresponding with the depositing unit, and with a device for expelling the received packages on to a discharge chute.

8. An arranging machine as claimed in claim 1, characterised in
15 that said depositing unit is essentially constituted by a ledge carrying a cylinder which operates said means for expelling the packages contained between at least two consecutive blades.

9. An arranging machine as claimed in claim 1, characterised in that said depositing unit is constituted by a suction unit compris-
20 ing a package halting grid through which slide prongs for expelling the packages, and driven by relative motion means.

Fig.1

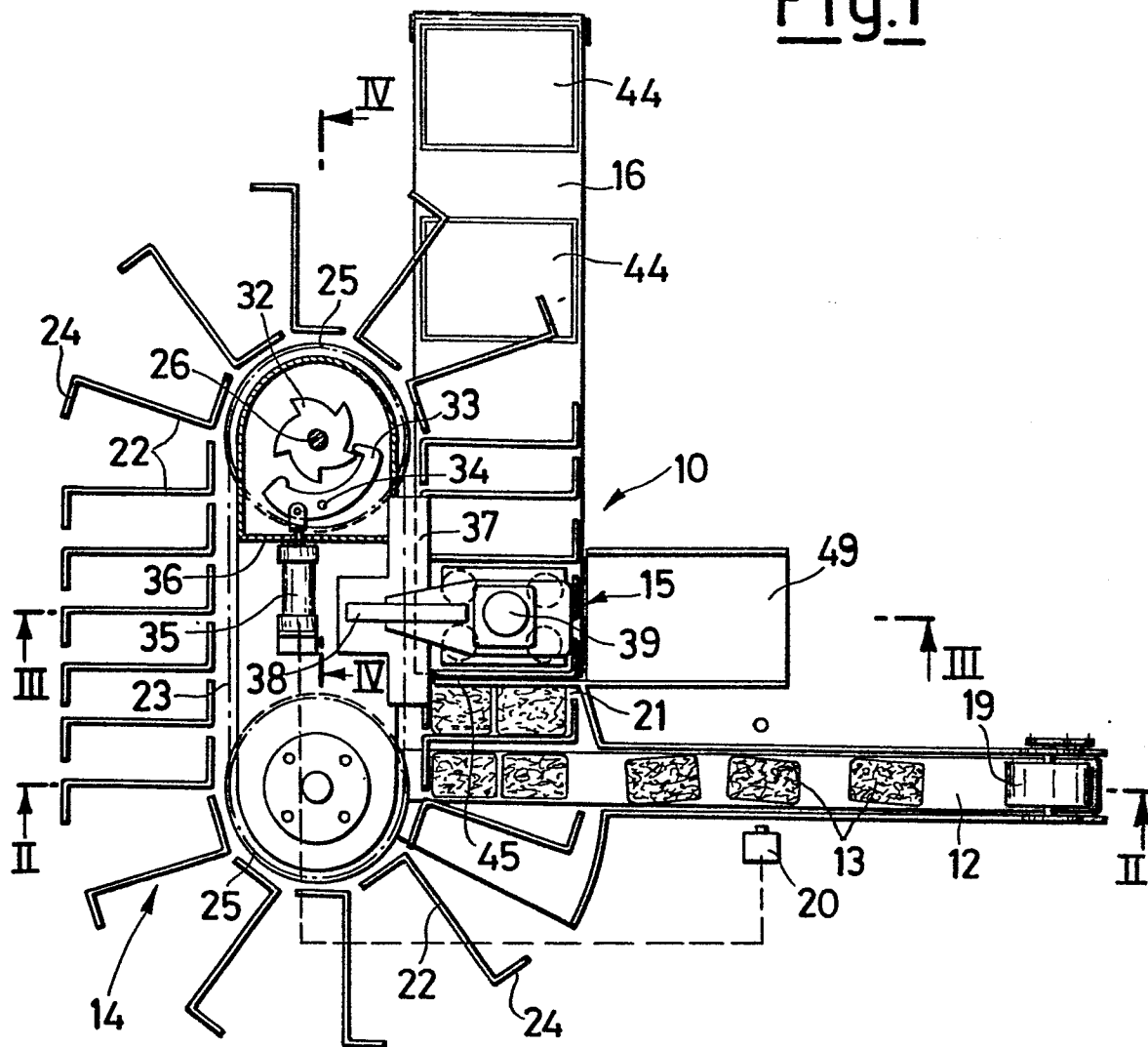


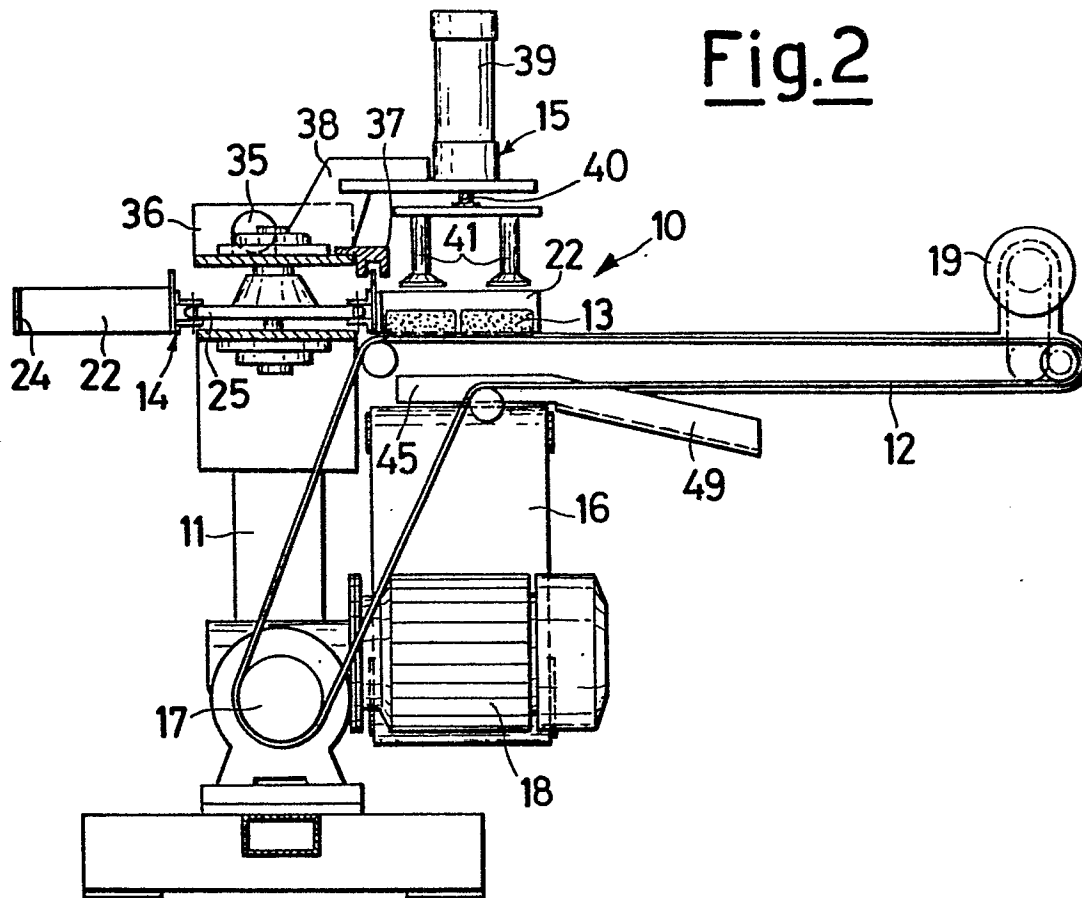
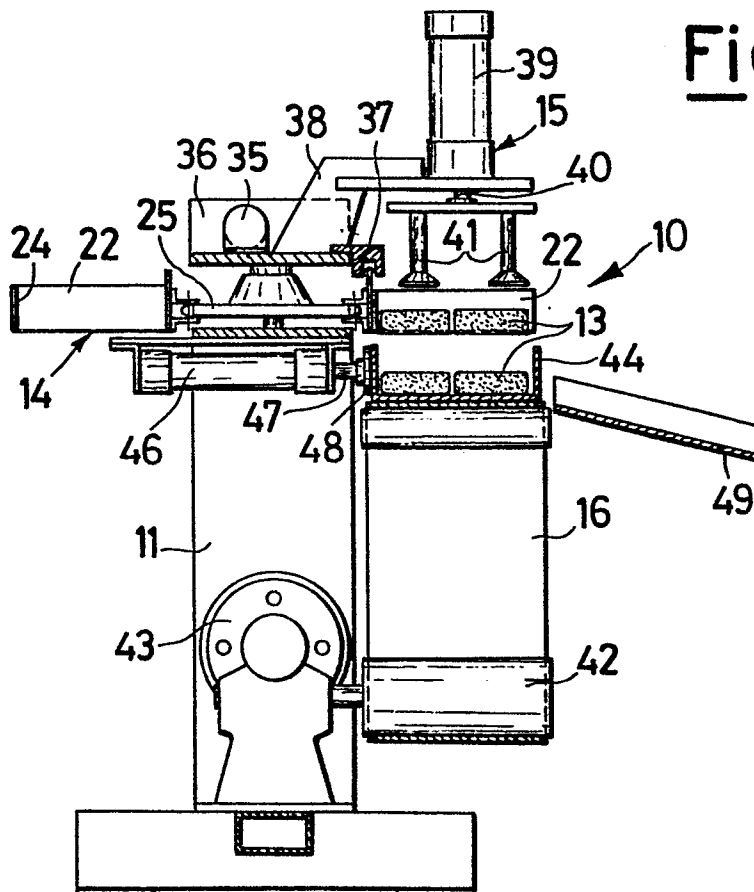
Fig.2Fig.3

Fig.4

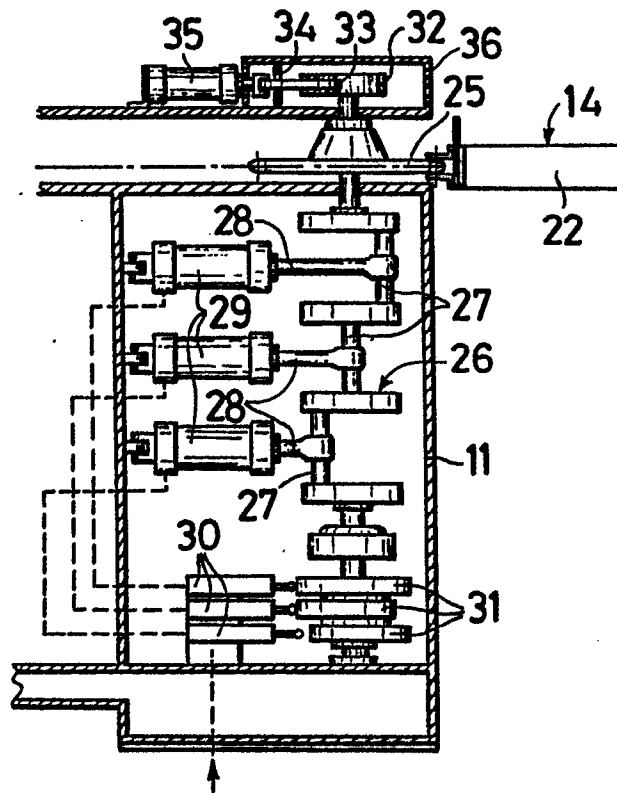


Fig.5

