Combinational weighing apparatus

Apparat zur kombinatorischen Wägung

Dispositif pour la pesée combinatoire

(54) Combinational weighing apparatus

(84) Designated Contracting States:
DE FR GB IT

(54) Combinational weighing apparatus

(30) Priority: 02.02.1995 JP 3935095

(84) Designated Contracting States:
DE FR GB IT

(43) Date of publication of application:
07.08.1996 Bulletin 1996/32

(73) Proprietor: ISHIDA CO., Ltd.
Kyoto-shi, Kyoto 606 (JP)

(72) Inventors:
• Konishi, Hiroe, c/o Ishida Co., Ltd.
Ritto-cho, Kurita-gun, Shiga 520-30 (JP)

• Murata, Shuji, c/o Ishida Co., Ltd.
Ritto-cho, Kurita-gun, Shiga 520-30 (JP)

(74) Representative: Altenburg, Udo, Dipl.-Phys. et al
Patent- und Rechtsanwälte
Geissler. Isenbruck
Postfach 86 06 20
81633 München (DE)

(56) References cited:
EP-A- 0 267 664
GB-A- 2 074 329

EP-A- 0 298 736

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
Description

BACKGROUND OF THE INVENTION

(Field of the Invention)

[0001] The present invention relates to a combinational weighing or counting apparatus of a type wherein articles to be weighed such as, for example, snacks and/or candies are dispersed into a plurality of weighing devices so that a combination of the weighing devices giving respective results of measurement which approximate to a target supply value is selected and the articles are then discharged. More specifically, the present invention relates to the combinational weighing or counting apparatus of the type referred to above, wherein change of one kind of the articles to be weighed over to another kind of the articles to be weighed can be accomplished quickly.

(Description of the Prior Art)

[0002] A combinational weighing or counting apparatus is known as an apparatus for weighing to-be-weighed articles such as snacks and/or candies of a varying size and/or shape, of which weight is not fixed and varies from one article to another, so as to fall within a target range of weight. (U.S. Patent No. 4,398,612, issued August 16, 1993.) Such apparatus comprise also computers and processors as f.e. known from EP-A-0 267 664 and EP-A-0 298 736.

[0003] This type of prior art combinational weighing or counting apparatus comprises a plurality of weighing heads each including a driving feeder for supplying the articles to be weighed, a pool hopper, and a weighing device having a weighing hopper coupled with a weighing means. This prior art combinational weighing or counting apparatus is so designed as to perform a combinational calculation of weights measured by the respective weighing devices, then to select a combination of the weighing hoppers which eventually gives the weight or number falling within a permissible range and finally to discharge the articles, for obtaining the articles falling within the target weight or number range.

[0004] In this prior art combinational weighing or counting apparatus, where the kinds of the articles to be weighed are desired to be changed, an attendant worker has to manually change an operating mode to assume a discharge mode so that by selectively opening and closing the pool and weighing hoppers of each weighing heads in a predetermined pattern, for example, by dividing the entire weighing heads into three groups and selectively opening and closing the weighing and pool hoppers of each group, the remaining articles can be discharged to the outside of the apparatus.

[0005] After the all remaining articles have been recovered in the manner described above, the discharge mode is brought to a halt, and the subsequent cycle of operation of the apparatus under the weighing mode with succeeding articles supplied into the apparatus is initiated after the supply passages for the supply of the articles therethrough in the apparatus have been rinsed and/or cleaned.

[0006] The prior art combinational weighing or counting apparatus has, however, the following problems. Specifically, when the articles remaining in the apparatus are to be discharged in anticipation of change of the articles to be weighed, a relatively long period of time is required before complete discharge of the remaining articles by opening and closing the pool and weighing hoppers in a predetermined pattern, accompanied by reduction in net operating rate of the apparatus as a whole.

[0007] In addition, since the selective opening and closing of the pool and weighing hoppers are repeated for each group, obnoxious slamming sounds tend to be generated.

SUMMARY OF THE INVENTION

[0008] The present invention has been devised to substantially eliminate the above discussed problems and is intended to provide an improved combinational calculating or counting apparatus wherein the tact time of the apparatus is increased by reducing the time required to change the articles to be weighed and which would not generate slamming sounds when hoppers are selectively opened and closed.

[0009] To this end, a combinational weighing or counting apparatus according to one aspect of the present invention comprises a plurality of weighing devices each having a weighing hopper for weighing articles to be weighed while the articles are accommodated within the weighing hopper; a plurality of supply means for supplying the articles to the weighing hoppers, respectively; a combinational calculating means for performing a combinational calculation of a measured value of the articles measured by each of the weighing devices or a number obtained from the measured value to give a weight or a number falling within a permissible range; a mode selecting means for selecting one of weighing and discharge modes; and a mode control means. The mode control means is operable, when the weighing mode is selected by the mode selecting means, to activate the combination calculating means and also to activate the supply means in association with selective opening and closing of the weighing hoppers, but operable, when the discharge mode is selected by said mode selecting means, to activate all the supply means while all the weighing hoppers are kept opened fully to thereby continuously discharge the articles remaining within the supply means to an outside of the apparatus.

[0010] According to the above described construction, when the mode selecting means is set to the discharge mode at the time the kind of the articles to be weighed is desired to be changed, all the weighing hoppers are retained fully opened and all the supply means
are successively driven to allow the remaining to-be-weighed articles to be discharged continuously to the outside of the apparatus through the weighing hoppers then held in a fully opened position. Moreover, since the weighing hoppers are held in the fully opened position, even though the feed capability of the supply means to supply the articles to be weighed is increased, a smooth flow of the articles can be created. For these reasons, the articles remaining in the apparatus can quickly be discharged in readiness for the subsequent cycle of weighing of the articles to be weighed and accordingly, the net operating rate of the apparatus can be increased. Also, since the weighing hoppers are retained in the fully opened position, the hoppers will not generate any obnoxious slamming sound, making it possible to create a quiet working environment with noise level reduced.

According to another aspect of the present invention, there is provided a combinational weighing or counting apparatus which comprises a plurality of weighing devices including a corresponding number of weighing hoppers for weighing articles to be weighed while the articles are accommodated within the weighing hoppers; a plurality of supply means for supplying the articles to the weighing hoppers, respectively; a group dividing means for dividing into a plurality of groups supply passages each leading from each of the supply means to the associated weighing hopper; an article delivery means employed for each of the groups for delivering the articles; a combination calculating means for performing a combinational calculation of a measured value of the articles measured by each of the weighing devices of each group or a number obtained from the measured value to give a weight or a number falling within a permissible range for each group; a mode selecting means for selecting one of weighing and discharge modes; a group specifying means for specifying one of the groups to be set in the discharge mode by the mode selecting means; and a mode control means.

The mode control means is operable, when the weighing hoppers are held in the fully opened position, to activate all the supply means while all the weighing hoppers are held in a fully opened position. Moreover, since the weighing hoppers are held in the fully opened position, even though the feed capability is set to a maximum value, a smooth flow of the articles through the weighing hoppers is created and, for this reason, the articles can quickly be accomplished by allowing the remaining articles to continuously flow through the weighing hoppers then retained in the fully opened position. For this reason, the net operating rate of the apparatus can further be increased.

According to another preferred embodiment of the present invention further comprises a supply control means which, when the weighing mode is selected, controls a feed capability of each of the supply means on the basis of a weighed value, but which, when the discharge mode is selected, controls the feed capability to a predetermined level.

The use of the supply control means is effective in that since during the weighing mode having been selected the feed capability of the supply means is controlled on the basis of the weighed value, the accuracy of combination can advantageously be increased and also in that during the discharge mode having been selected the feed capability of the supply means can be controlled to a predetermined value. At this time, since the weighing hoppers are held in the fully opened position, even though the feed capability is set to a maximum value, a smooth flow of the articles through the weighing hoppers can be created and, for this reason, the articles remaining in the apparatus can quickly be discharged. On the other hand, where the articles to be weighed are of a type large in size and tending to form bridges at discharge ports, the remaining articles can be smoothly discharged by suitably adjusting the feed capability to a value required to avoid any possible occurrence of clogging.

According to another preferred embodiment of the present invention, each of said supply means may preferably include a driving feeder for supplying the articles, and a pool hopper for storing the articles supplied from the driving feeder. In such case, the combinational weighing or counting apparatus may further comprises a feed parameter setting means for regulating a feed capability of each of the driving feeders and may be so designed that when the weighing mode is selected, the mode control means can cause the feed parameter set-
ting means to set the feed capability of each of the driving feeders to a value required for the weight or number of the articles, stored in the respective pool hopper, to attain a predetermined target supply value, and that when the discharge mode is selected, the mode control means can cause all of the pool hoppers and, also, all of the weighing hoppers to be fully opened and also cause the feed parameter setting means to set the feed capability of all of the driving feeders to a value greater than that sustained during the weighing mode.

[0016] According to this another preferred embodiment of the present invention, when the discharge mode is selected, not only can the pool hoppers and the weighing hoppers of all of the weighing heads be controlled to assume the fully opened position, but also the feed capability of the driving feeders of all of the weighing heads can be set to a value greater than the feed capability assumed during the weighing mode. Accordingly, the articles remaining in the apparatus can be quickly discharged through the pool hoppers and the weighing hoppers both then fully opened.

[0017] The present invention also pertains to a combinational weighing or counting method in which articles to be weighed are supplied from a plurality of supply means to a plurality of weighing devices each having a weighing hopper and a combinational calculation of a measured weight or number of the articles measured by each of the weighing devices is then performed to determine a combination in which the weight or number of the articles may fall within a permissible range. This combinational weighing or counting method includes a step of selecting one of weighing and discharge modes such that when the weighing mode is selected, the combinational calculation is performed and, also, the supply means are activated in association with selective opening and closing of the weighing hoppers, and that when the discharge mode is selected, all the supply means are activated while all the weighing hoppers are kept fully opened to thereby continuously discharge the articles remaining within the supply means to the outside of the apparatus.

[0018] According to this combinational weighing or counting method, effects similar to those brought about by the combinational weighing or counting apparatus according to the first mentioned aspect of the present invention can be obtained.

[0019] Another aspect of the combinational weighing or counting method according to the present invention is such that supply passages through which articles to be weighed are supplied from a plurality of supply means towards a corresponding number of weighing devices each having a weighing hopper are divided into a plurality of groups so that the articles can be supplied for each group and a combinational calculation of a measured weight or number of the articles measured by the weighing devices of each of the groups is then performed to determine a combination in which the weight or number of the articles may fall within a permissible range for each group. This alternative combinational weighing or counting method includes the steps of selecting one of weighing and discharge modes, specifying one of the groups which is to be set under the discharge mode, performing the combinational calculation and activating the supply means in association with selective opening and closing of the weighing hoppers, when the weighing mode is selected, and activating all the supply means while all the weighing hoppers of the specified group are kept fully opened to thereby continuously discharge the articles belonging to the group to an outside, when the discharge mode is selected.

[0020] Even this alternative combinational weighing or counting method can bring about effects similar to those brought about by the combinational weighing or counting apparatus according to the second mentioned aspect of the present invention can be obtained.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] In any event, the present invention will become more clearly understood from the following description of preferred embodiments thereof, when taken in conjunction with the accompanying drawings. However, the embodiment and the drawings are given only for the purpose of illustration and explanation, and are not to be taken as limiting the scope of the present invention in any way whatsoever, which scope is to be determined by the appended claims. In the accompanying drawings, like reference numerals are used to denote like parts throughout the several views, and:

Fig. 1 is a schematic front elevational view, with portions cut away, of a combinational weighing apparatus according to a first preferred embodiment of the present invention;
Fig. 2 is a circuit block diagram showing a control system employed in the combinational weighing apparatus according to the embodiment shown in Fig. 1;
Fig. 3 is a schematic front elevational view, with portions cut away, of a combinational weighing apparatus according to a second preferred embodiment of the present invention; and
Fig. 4 is a circuit block diagram showing a control system employed in the combinational weighing apparatus according to the embodiment shown in Fig. 3.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0022] Referring first to Fig. 1 showing a combinational weighing apparatus according to a first preferred embodiment of the present invention, articles M to be weighed supplied by means of a transport conveyor 1 are supplied onto a dispensing feeder 3 of a generally flattened conical configuration through a guide chute 2. The dispensing feeder 3 is drivingly coupled with an os-
cillator 4 so that the dispensing feeder 3 can be vibrated to facilitate dispersion of the articles M so supplied onto the dispensing feeder 3. A plurality of driving feeders 7 each drivingly coupled with a respective oscillator 8 are positioned in a circular row below an outer periphery of the dispensing feeder 3 and spaced a distance from each other in a direction circumferentially of the dispensing feeder 3. A pool hopper 9 having a bottom opening adapted to be selectively opened and closed by a respective gate 13 is disposed beneath an outer portion of each of the driving feeders 7 remote from the dispensing feeder 3. A plurality of weighing hoppers 10 equal in number to that of the pool hoppers 9 and each having a bottom opening adapted to be selectively opened and closed by a respective gate 14 are disposed beneath the respective pool hoppers 9.

[0023] It is to be noted that a combination of each driving feeder 7 and the associated pool hopper 9 forms a supply means S for supplying the articles M to be weighed onto the respective weighing hopper 10. Thus, it will readily be understood that each driving feeder 7 is, when vibrated by the associated oscillator 8, operable to supply the articles M to be weighed, supplied from the dispensing feeder 3, onto the respective pool hopper 9 and that the respective pool hopper 9 after having temporarily pooled the articles M discharges the articles M onto the corresponding weighing hopper 10 when the gate 13 is opened.

[0024] Each of the weighing hoppers 10 is supported by a weighing means 11 such as, for example, a load cell, for measuring the weight of the articles M supplied into such weighing hopper 10. Each weighing hopper 10 and the associated weighing means 11 supporting such weighing hopper 10 form a respective weighing device 12. A downwardly oriented collecting chute unit 17 is disposed below the weighing hoppers 10 for collecting the articles M discharged from the weighing hoppers 10 at a lower center location. This downwardly oriented collecting chute unit 17 comprises a fixedly supported common lower chute 17b and a plurality of removable supported upper chutes 17a disposed circumferentially of the lower chute 17b each associated with the respective weighing device 12 and having a lower end communicated with the common lower chute 17b. The common lower chute 17b has a discharge opening defined at the bottom thereof, which discharge opening is communicated with a pivotally supported chute 18. As will become clear from the subsequent description, the articles M discharged from one or more of the weighing hoppers 10 which have been selected are collected by the collecting chute unit 17 and are then supplied to a packaging machine 19 through the pivotally supported chute 18.

[0025] Each of the component parts of the combinational weighing apparatus discussed above is supported in a manner which will now be described. A casing 23 is supported through a plurality of support legs 22 by a machine framework 21 fixedly mounted on a machine bench 20. The guide chute 2, the dispensing feeders 3 and the supply means S are arranged above the casing 23 with the weighing devices 12 disposed adjacent to and around an outer periphery of the casing 23. The casing 23 has a hollow chamber defined therein, and close/open controls and drive motors for the pool hoppers 9 and the weighing hoppers 10 are accommodated within the hollow chamber of the casing 23.

[0026] A control system for controlling the sequence of operation of the combinational weighing apparatus of the structure described above is shown in a block representation in Fig. 2.

[0027] Referring now to Fig. 2, a gate drive unit 27 for selectively opening and closing the gate 13 for each pool hopper 9 is controlled by a pool hopper control 29 and a gate drive unit 28 for selectively opening and closing the gate 14 for each weighing hopper 10 is controlled by a weighing hopper control 30. Each of the supply means S for supplying the articles M to be weighed, the weighing device 12 associated with such each supply means S and the associated drive units 27 and 28 constitute a weighing head WH. The plural weighing heads WH equal in number to the number of the supply means S are arranged around the dispensing feeder 3 and spaced a distance circumferentially of the dispensing feeder 3. A chute drive unit 34 for rocking the pivotally supported chute 18 is controlled by a chute control 35.

[0028] A control device 32 comprising, for example, a central processing unit (CPU) has a feed parameter setting means 33, which is a kind of a supply control means, and a combination calculating means 37 both built therein. Values of feed parameters (such as, for example, the amplitude and the duration of vibration of the driving feeders), that is, preset value for supply capabilities of the articles M to be weighed, are outputted from the feed parameter setting means 33 to a feeder control 31 to control the operation of each of the driving feeders 7 to thereby adjust the supply capability thereof.

[0029] The control device 32 is controlled by a mode control means 39. The mode control means 39 controls the control means 32 according to a mode of operation selected by a manual mode selector means 38. This manual mode selector means 38 is capable of manually selecting one of a weighing mode, in which an ordinary weighing operation is carried out, and a discharge mode in which the articles M to be weighed remaining in the apparatus are discharged outside the apparatus to make it possible to change the articles M.

[0030] The operation of the combinational weighing apparatus according to the foregoing embodiment will now be described.

[0031] Assuming that the combinational weighing apparatus is powered on and an attendant worker manipulates the mode selector means 38 to select the weighing mode, the manual mode selector means 38 outputs a change-over signal c indicative of selection of the weighing mode to the mode control means 39. In re-
response to receipt of this change-over signal c indicative of the selection of the weighing mode, the mode control means 39 outputs a weighing mode signal a to both of the feed parameter setting means 33 and the combination calculating means 37 within the control device 32. In response to receipt of the weighing mode signal a, the feed parameter setting means 33 feeds a predetermined parameter for each driving feeder 7 to the feeder drive control 31 which in turn controls the driving feeder 7 of each of the weighing heads WH so that the amplitude of and the duration of vibration of the respective driving feeder 7 can be varied to attain the predetermined feed capability necessary to permit the to-be-weighed articles M within the associated pool hopper 9 to be supplied onto the pool hoppers 9 associated weighing hopper 10 can match with the target value which varies from one weighing head WH to another weighing head WH with reference to the quotient of a target weight divided by the number of combinations that can be selected. This can be achieved through a feedback of the weight (the measured weight) of the articles M within the associated weighing hopper 10 to adjust the feed capability required for the weight to attain the target supply value. In other words, the feed capability is automatically controlled according to the measured weight of the associated weighing hopper 10 so that the weight of the articles M supplied into such associated weighing hopper 10 can match with the target supply value.

[0032] During the weighing mode so selected, the feed capability of each driving feeder 7 is so chosen that the total weight of the to-be-weighed articles M within the associated pool hopper 9 can attain a target supply value which varies from one weighing head WH to another weighing head WH with reference to the quotient of a target weight divided by the number of combinations that can be selected. This can be achieved through a feedback of the weight (the measured weight) of the articles M within the associated weighing hopper 10 to adjust the feed capability required for the weight to attain the target supply value. In other words, the feed capability is automatically controlled according to the measured weight of the associated weighing hopper 10 so that the weight of the articles M supplied into such associated weighing hopper 10 can match with the target supply value.

[0033] On the other hand, the combination calculating means 37 is operable in response to a weight signal d fed from the weighing means 11 of each of the weighing devices 12 to perform calculation of a combination of measured weights thereof so as to select a combination of the weighing hoppers 10 which may eventually give the total of the weights of the articles M in the respective weighing hoppers 10 that falls within a permissible range determined according to the target value. After the calculation, the combination calculating means 37 outputs a select signal e to the weighing hopper controls 30 associated with some of the weighing hoppers 10 so selected to open the corresponding gates 14 to allow the articles M to be discharged from the selected weighing hoppers 10. Then, based on the select signal e and delayed a predetermined timing, the pool hopper control 29 of each of the pool hoppers 9 associated with some of the weighing hoppers 10 selected is activated to open the gates 13 of the pool hoppers 9 of the weighing heads WH which have discharged the articles M to allow the subsequent articles M within the pool hoppers 9 to be supplied into the empty weighing hoppers 10.

[0034] Also, based on the select signal e, the feeder drive control 31 of each of the driving feeders 7 associ-
be quickly discharged, the length of time required to initiate the subsequent cycle of combination weighing of the articles M can be advantageously reduced considerably as compared with that exhibited by the prior art combinational weighing apparatus, resulting in increase in efficiency. It is to be noted that, where the packaging machine 19 is of a vertical pillow-type, it may occur that without the pivotally supported chute 18 being employed, the remaining articles M may be directly discharged to the packaging machine 19 during the discharge mode. In such case, the bottom of a bag being manufactured may be broken to allow a tubular film being manufactured to serve as a chute through which the remaining articles M can be recovered.

[0039] Fig. 3 illustrates in a schematic front elevational representation the combinational weighing apparatus according to a second preferred embodiment of the present invention. This combinational weighing apparatus shown therein is so designed that all of the weighing heads are divided into a plurality of groups so that in each of the groups calculation is carried out to determine a respective combinations within the permissible range to allow the articles to be weighed, which have been determined, to be discharged independently for each group or to be discharged after having been mixed together. For the purpose of description of the second preferred embodiment of the present invention, reference is made to mixing of two types of articles M1 and M2 to be weighed.

[0040] Referring particularly to Fig. 3, a vertical partition plate 40 is disposed above the dispensing feeders 31 and 32 each forming a half of generally flattened conical plate so that two groups of articles M1 and M2 can be supplied onto the associated dispensing feeder 31 or 32. The respective groups of the articles M1 and M2 are transported by separate transport conveyors 11 and 12 and are supplied onto the associated feeder 31 or 32, delimited by the partition plate 40, through dividing chutes 21 and 22 which form respective parts of the guide chute 2. Each of the dispensing feeders 31 and 32 is adapted to be oscillated by a respective oscillator 41 or 42 drivingly coupled therewith. Fourteen driving feeders 7 and an equal number of the pool hoppers 9 are employed for each group, and these fourteen supply means 7 and 9 form 14 supply passages through which the associated group of articles M1 and M2 can be supplied. For each group of the articles M1 and M2, 7 supply passages are allocated. The partition wall 40 referred to above forms a group dividing means for dividing the fourteen supply passages into two groups having respective supply means S1 and S2, and by this partition plate 40, the articles M1 and M2 of different kinds can be supplied from the associated groups of the supply means S1 and S2 to the associated groups of the weighing devices 121 and 122. Each transport conveyor 11 or 12 and the associated dividing chute 21 or 22 form respective parts of an article delivery means P for delivering the corresponding kinds of the articles M1 or M2.

[0041] The to-be-weighed articles M1 and M2 weighed by the respective groups of the weighing hoppers 10 are delivered into associated booster hoppers 43 with the weighing hoppers 10 consequently emptied subsequently loaded again with the to-be-weighed articles M1 and M2. The to-be-weighed articles M1 and M2 discharged respectively from the hoppers which have been selected by calculation of a combination of the hoppers 10 and the booster hoppers 43 are, after having been collected by collecting chutes 411 and 412 respectively, supplied to the packaging machine 19 through the associated pivotally supported chutes 181 and 182. Each of the collecting chutes 411 and 412 is of a structure including an upper chute portion 41a, intermediate chute portion 41b positioned below the upper chute portion 41a in communication therewith and a lower chute portion 41c positioned below the intermediate chute portion 41b in communication therewith, all of which are assembled so as to represent the inverted shape of a generally frusto-conical shape. Each upper chute portion 41a accommodates therein a respective booster chute 43 for temporarily storing the to-be-weighed articles M1 or M2 which have been discharged from the associated weighing hopper 10. Each of the pivotally supported chute 181 or 182 is pivotable between the position, in which the pivotally supported chute 181 or 182 is orientated towards the packaging machine 19 and the recovery position in which the pivotally supported chute 181 or 182 is orientated towards a recovery site A1 and A2 as shown by the phantom line in Fig. 3. As will be described later, each pivotally supported chute 181 or 182 assumes, independently to the other one, the position facing the packaging machine 19 during the weighing mode, but the recovery position A1 and A2 during the discharge mode.

[0042] A control system for controlling the sequence of operation of the combinational weighing apparatus according to the second preferred embodiment described above is shown in a block representation in Fig. 4.

[0043] Referring now to Fig. 4, the plural weighing heads WH are divided by the group dividing means (the partition plate) 40 into two groups each including the driving feeders 7, the pool hoppers 9, the weighing hoppers 10 and the booster hoppers 43. For each of the groups of the weighing heads WH1 and WH2, the pool hopper controls 29 and 29, the weighing hopper controls 30 and 30, booster hopper controls 46 and 46, and the feeder drive controls 31 and 31 are employed. In addition, for each group of the weighing heads WH1 or WH2 the control device 32 or 32, the chute drive unit 34 or 34, and the chute control 35 or 35 are employed. Also, the mode control means 39 is connected not only with the mode selector means 38, but also with a group specifying means 48. The group specifying means 48 is operable to output a group specifying signal when one of the groups to be set under the discharge mode is selected by an external manipulation so that the
discharge mode signal b from the mode control means 39 can be directed to one of the control devices 321 and 322 which is associated with the specified group.  

[0044] The combinational weighing apparatus shown in and described with reference to Fig. 4 operates in the following manner.  

[0045] Assuming that the combinational weighing apparatus is powered on and an attendant worker manipulates the mode selector means 38 to select, for example, the weighing mode, the weighing mode signal a is outputted from the mode control means 39 to each of the control devices 321 and 322 to allow each of the control devices 321 and 322 to control the associated weighing heads WH1 or WH2 in a manner similar to that described with reference to Fig. 2. In other words, the feed parameter setting means 33 and 33 of the respective control devices 321 and 322 apply individually predetermined feed parameters to the associated feeder driving means 311 and 312 to thereby control the driving feeders 7 and 7. On the other hand, each of the combination calculating means 37 and 37 operate in response to receipt of a corresponding weighing signal d1 or d2 fed from one of the weighing devices 12 and 12, which belongs to the associated group, to perform a combinational calculation with respect to the weight of the to-be-weighed articles and the weight (represented by the weight signal generated from the weighing devices 121 or 122 during the previous cycle of weighing) of the to-be-weighed articles transferred onto the booster hoppers 43 to thereby select a combination of the weighing hoppers 10 and the booster hoppers 43 falling within a permissible range for each group so that the gates 14 of the selected weighing hoppers 10 can be opened by the gate drive units 281 or 282 through the weighing hopper control 301 or 302 and, at the same time, gates 44 of the selected booster hoppers 43 can be opened by gate units 45 through the booster hopper control 461 or 462. The articles M1 and M2 discharged from the weighing hoppers 10 of the respective groups and the associated booster hoppers 43 are, after having been mixed together through the chute control means 351 and 352, supplied to the packaging machine 19. It is to be noted that the pivotally supported chutes 181 and 182 may be operatively coupled with separate packaging machines so that the articles M1 and M2 can be supplied to separate packaging machines, respectively.  

[0046] The operation of the weighing apparatus which takes place during the discharge mode will now be described.  

[0047] In the first place, the mode selector means 38 has to be manipulated to select the discharge mode and the group specifying means 48 is also operated to specify one of the groups. By so doing, the mode control means 39 supplies the discharge mode signal b to one of the control devices of the specified group, for example, the control device 311, causing the control device 321 to retain the pool hoppers 9, the weighing hoppers 10 and the booster hoppers 43 of the corresponding weighing heads WH1 in a full open position in a manner similar to that described in connection with the control system shown in Fig. 2. Accordingly, the to-be-weighed articles M1 remaining on the transport conveyor 1 and the dispensing feeder 3 successively flow and are quickly discharged through the pool hoppers 9 and the weighing hoppers 10 and, at the same time, the to-be-weighed articles remaining within the booster hoppers 43 are also discharged. At this time, the feed capability of the dispensing feeder 3 is preferred to be of a value higher than that exhibited during the weighing mode.  

[0048] When after the attendant worker has ascertained a complete discharge of the articles M1 with his or her live eyes, the other of the groups is specified by the group specifying means 48. Thereupon, the to-be-weighed articles M2 are similarly allowed to flow and be quickly discharged through the pool hoppers 9 and the weighing hoppers 10 of the weighing heads WH2 then retained in the opened position and, at the same time, the articles remaining within the booster hoppers 43 are also discharged. At this time, the pivotally supported chute 181 or 182 of the specified group which has received the discharge mode signal b are pivoted from the position facing the packaging machine 19 to the discharge position facing the recovery site A1 and A2 shown in Fig. 3 by the chute drive unit 34 then activated by the chute control means 351 and 352 which have received the discharge mode signal b. Accordingly, the two kinds of the articles M1 and M2 are recovered for reuse without being mixed together.  

[0049] The system is not the one in which the two groups are continuously switched over to the discharge mode as hereinabove described, but the two groups may be switched over to the discharge mode simultaneously. Or either one of the groups can be switched over to the discharge mode. Where the two groups are switched over to the discharge mode at different timings delayed relative to each other, not simultaneously, it is sufficient to use a single pivotally supported chute 18 for both of the groups.  

[0050] Where either one of the groups is switched over to the discharge mode, one of the groups is specified by the group specifying means 48. By way of example, if the first group is specified, the discharge mode signal b is supplied only to the control device 321 associated with the specified group so that the control device 321 can control the weighing heads WH2 in the manner described above to facilitate a quick discharge of the articles M1, the control device 322 associated with the non-specified group receives neither the weighing signal nor the discharge mode signal b and, therefore, such control device 322 is held in an inactive state. Accordingly, since the articles M2 are left remaining in the supply passages belonging to the non-specified group, no preparation for the supply of the articles M2 for the subsequent cycle of combination weighing is required, thereby increasing the net operating rate of the combi-
national weighing apparatus. In contrast thereto, with the prior art combinational weighing apparatus, when the discharge mode is selected, all kinds of articles must unnecessarily be discharged even though only one or some kinds of the articles are to be changed.

[0051] It is to be noted that the present invention can be equally applied to the case in which the single apparatus is divided into three or more groups so that three or more kinds of articles can be handled.

[0052] Although the present invention has been fully described in connection with the preferred embodiments thereof with reference to the accompanying drawings which are used only for the purpose of illustration, those skilled in the art will readily conceive numerous changes and modifications within the framework of obviousness upon the reading of the specification herein presented of the present invention. For example, in any one of the foregoing preferred embodiments of the present invention, description has been made in connection with determination of a combination within the permissible range with the weight of the articles taken as a measured weight value. However, in the case of the articles to be weight such as, for example, snacks and candies of a kind having slightly varying weights, the number of pieces within the permissible range may be determined and conversion of the measured weight into the number of pieces may be made so that a combination can be selected to allow the converted number of pieces to fall within the permissible range.

[0053] Also, while plural supply means S or S 1 and S 2 for supplying the to-be-weighed articles to the weighing hoppers 10 have been described as constituted by the driving feeders 7 and the pool hoppers 9, the supply means may not be always limited thereto, but may be of a type having, for example, no pool hopper.

[0054] Accordingly, such changes and modifications are, unless they depart from the scope of the present invention as delivered from the claims annexed hereto, to be construed as included therein.

Claims

1. A combinational weighing or counting apparatus which comprises:

   - a plurality of weighing devices (12) each having a weighing hopper (10) for weighing articles (M) to be weighed while the articles are accommodated within the weighing hopper;
   - a plurality of supply means (S,7,9) for supplying the articles to the weighing hoppers (10), respectively;
   - a combination calculating means (37) for performing a combinational calculation of a measured value of the articles measured by each of the weighing devices (12) or a number obtained from the measured value to give a weight or a number falling within a permissible range; characterized by

   - a mode selecting means (38) for selecting one of weighing and discharge modes; and
   - a mode control means (39) operable when the weighing mode is selected by the mode selecting means (38) to activate the combination calculating means (37) and also to activate the supply means (S,7,9) in association with selective opening and closing of the weighing hoppers (10), but operable when the discharge mode is selected by said mode selecting means (38) to activate all the supply means (S,7,9) while the weighing hoppers (10) are kept opened fully to thereby continuously discharge the articles remaining within the supply means (S,7,9) to an outside of the apparatus (Fig 1,2).

2. A combinational weighing or counting apparatus which comprises:

   - a plurality of weighing devices (12 1,12 2) each having a weighing hopper (10) for weighing articles (M 1, M 2 ) to be weighed while the articles are accommodated within the weighing hopper;
   - a plurality of supply means (S 1,S 2 ) for supplying the articles to the weighing hoppers (10), respectively;
   - a group dividing means (40) for dividing into a plurality of groups supply passages each leading from each of the supply means (S 1,S 2 ) to the associated weighing hoppers (10);
   - an article delivery means (P) employed for each of the groups for delivering the articles (M 1, M 2 );
   - a combination calculating means (37) for performing a combinational calculation of a measured value of the articles measured by each of the weighing devices (12) of each group or a number obtained from the measured value to give a weight or a number falling within a permissible range for each group; characterized by

   - a mode selecting means (38) for selecting one of weighing and discharge modes;
   - a group specifying means (48) for specifying one of the groups to be set in the discharge mode by the mode selecting means (38); and
   - a mode control means (39) operable when the weighing mode is selected by the mode selecting means (38) to activate the combination calculating means (37) and also to activate the supply means (S 1,S 2 ) in association with selective opening and closing of the weighing hoppers (10), but operable when the discharge mode is selected by the mode selecting means (38) to activate all the supply means (S 1,S 2 ) while all the weighing hoppers (10) of one of the groups specified by the group specifying means (48) are kept opened fully to thereby
continuously discharge the articles remaining within the supply means \((S_1, S_2)\) to an outside of the apparatus. (Fig 3,4)

3. The combinational weighing or counting apparatus as claimed in Claim 1 or Claim 2, further comprising a supply control means \((S1, S1_1, S1_2)\) operable when the weighing mode is selected to control a feed capability of each of the supply means \((S, S_1, S_2)\) on the basis of a weighed value, but operable when the discharge mode is selected to control the feed capability to a predetermined level.

4. The combinational weighing or counting apparatus as claimed in Claim 1, further comprising a feed parameter setting means \((33)\) for regulating a feed capability of each of the driving feeders \((7)\), wherein each of said supply means \((S)\) includes a driving feeder \((7)\) for supplying the articles, and a pool hopper \((9)\) for storing the articles supplied from the driving feeder, and wherein said mode control means \((39)\) is operable, when the weighing mode is selected, to cause the feed parameter setting means \((33)\) to set the feed capability of each of the driving feeders \((7)\) to a value required for the weight or number of the articles, stored in the respective pool hopper \((9)\), to attain a predetermined target supply value, but is operable, when the discharge mode is selected, to cause all of the pool hoppers \((9)\) and, also, all of the weighing hoppers \((10)\) to be fully opened and also to cause the feed parameter setting means \((33)\) to set the feed capability of all of the driving feeders \((7)\) to a value greater than that sustained during the weighing mode. (Fig 1,2)

5. The combinational weighing or counting apparatus as claimed in Claim 2, further comprising a feed parameter setting means \((33)\) for regulating a feed capability of each of the driving feeders \((7)\), wherein each of said supply means \((S_1, S_2)\) includes a driving feeder \((7)\) for supplying the articles, and a pool hopper \((9)\) for storing the articles supplied from the driving feeder, and wherein said mode control means \((39)\) is operable, when the weighing mode is selected, to cause the feed parameter setting means \((33)\) to set the feed capability of each of the driving feeders \((7)\) to a value required for the weight or number of the articles, stored in the respective pool hopper \((9)\), to attain a predetermined target supply value, but is operable, when the discharge mode is selected, to cause all of the pool hoppers \((9)\) and, also, all of the weighing hoppers \((10)\) to be fully opened and also to cause the feed parameter setting means \((33)\) to set the feed capability of all of the driving feeders \((7)\) to a value greater than that sustained during the weighing mode. (Fig 1,2)

6. A combinational weighing or counting method which comprises the steps of:

- supplying articles \((M)\) to be weighed from a plurality of supply means \((S, 7, 9)\) to a plurality of weighing devices \((12)\) each having a weighing hopper \((10)\);
- performing a combinational calculation of a measured weight or number of the articles measured by each of the weighing devices \((12)\) to determine a combination in which the weight or number of the articles may fall within a permissible range; characterized by selecting one of weighing and discharge modes;
- when the weighing mode is selected, performing the combinational calculation and activating the supply means \((S, 7, 9)\) in association with selective opening and closing of the weighing hoppers \((10)\); and
- when the discharge mode is selected, activating all the supply means \((S, 7, 9)\) while all the weighing hoppers \((10)\) are kept fully opened to thereby continuously discharge the articles remaining within the supply means \((S, 7, 9)\) to an outside (Fig. 1,2).

7. A combinational weighing or counting method which comprises the steps of:

- dividing into plurality of groups a plurality of supply passages through which articles \((M_1, M_2)\) to be weighed are supplied, each of said supply passages leading from a supply means \((S_1, S_2)\) to a corresponding weighing device \((12_1, 12_2)\) having a weighing hopper \((10)\);
- delivering the articles for each group;
- performing a combinational calculation of a measured weight or number of the articles measured by the weighing devices \((12_1, 12_2)\) of each of the groups to determine a combination in which the weight or number of the articles may fall within a permissible range for each group; characterized by selecting one of weighing and discharge modes;
- specifying one of the groups which is to be set under the discharge mode;
- when the weighing mode is selected, performing the combinational calculation and activating the supply means \((S_1, S_2)\) in association with
selective opening and closing of the weighing hoppers (10), and when the discharge mode is selected, activating all the supply means (S₁, S₂) while all the weighing hoppers (10) of the specified group are kept fully opened to thereby continuously discharge the articles belonging to the group to an outside (Fig. 3, 4).

**Patentansprüche**

1. Kombinierte Wäge- oder Zählvorrichtung, die aufweist:

   eine Mehrzahl von Wägemitteln (12), von welcher jedes einen Wägetrichter (10) zum Wägen von Artikeln (M) aufweist, die zu wägen sind, während die Artikel sich im Wägetrichter befinden;
   eine Mehrzahl von Liefereinrichtungen (S, 7, 9) zum Liefern der Artikel zu den jeweiligen Wägetrichtern (10);
   ein Kombinations-Recheneinrichtung (37) zum Durchführen einer kombinierten Rechnung eines gemessenen Wertes, der von jedem der Wägemittel (12) gemessen wurde, oder einer Zahl, die von dem gemessenen Wert erhaltan wurde, um ein Gewicht oder eine Zahl anzugeben, die in einen zulässigen Bereich fällt, zu geben, gekennzeichnet durch ein Modus-Wahleinrichtung (38) zum Wählen von einem von Wäge- und Entlademoden; und
   eine Modus-Steuereinrichtung (39), die betreibbar ist, wenn der Wägemodus durch die Modus-Wahleinrichtung (38) gewählt ist, um die Kombinations-Recheneinrichtung (37) zu aktivieren und auch um die Liefereinrichtung (S₁, S₂) in Verbindung mit einem selektiven Öffnen und Schließen der Wägetrichter (10) zu aktivieren, aber betreibbar ist, wenn der Entlademodus durch die Modus-Wahleinrichtung (38) gewählt ist, um die Kombinations-Recheneinrichtung (37) zu aktivieren, während alle Wägetrichter (10) vollkommen offengehalten werden, um dadurch die in den Liefereinrichtungen (S₁, S₂) verbleibenden Artikel kontinuierlich von der Vorrichtung nach außen zu entladen (Fig. 3, 4).

2. Kombinierte Wäge- oder Zählvorrichtung, die aufweist:

   eine Mehrzahl von Wägemitteln (12₁, 12₂), von welchen jedes einen Wägetrichter (10) aufweist, zum Wägen von Artikeln (M₁, M₂), die zu wägen sind, während sich die Artikel im Wägetrichter befinden;
   eine Mehrzahl von Liefereinrichtungen (S₁, S₂) zum Liefern der Artikel zu den jeweiligen Wägetrichtern (10); eine Gruppenteileinrichtung (40) zum Aufteilen von Lieferkanälen in eine Mehrzahl von Gruppen, von welchen jede von jeder der Liefereinrichtungen (S₁, S₂) zu dem zugeordneten Wägetrichter (10) führt; eine Artikel-Zuführeinrichtung (P), die für jede der Gruppen zum Zuführen der Artikel (M₁, M₂) verwendet wird; eine Kombinations-Recheneinrichtung (37) zum Durchführen einer kombinierten Rechnung eines gemessenen Wertes der Artikel, der durch jedes der Wägemittel (12) von jeder Gruppe gemessen wurde, oder einer Zahl, die von dem gemessenen Wert erhalten wurde, um ein Gewicht oder eine Zahl anzugeben, die in einen zulässigen Bereich für jede Gruppe fällt, gekennzeichnet durch eine Modus-Wahleinrichtung (38) zum Wählen eines von Wäge- und Entlademoden; eine Gruppen-Spezifiziereinrichtung (48) zum Spezifizieren einer der Gruppen, die durch die Modus-Wahleinrichtung (38) in den Entlademodus zu setzen sind; und
   eine Modus-Steuereinrichtung (39), die betreibbar ist, wenn der Wägemodus durch die Modus-Wahleinrichtung (38) gewählt ist, um die Kombinations-Recheneinrichtung (37) zu aktivieren, aber betreibbar ist, wenn der Entlademodus durch die Modus-Wahleinrichtung (38) gewählt ist, um alle Lieferinneinrichtungen (S₁, S₂) zu aktivieren, während alle Wägetrichter (10) einer der durch die Gruppen-Spezifiziereinrichtung (48) spezifizierten Gruppen vollkommen offengehalten werden, um dadurch die in den Liefereinrichtungen (S₁, S₂) verbleibenden Artikel kontinuierlich von der Vorrichtung nach außen zu entladen (Fig. 3, 4).

3. Kombinierte Wäge- oder Zählvorrichtung nach Anspruch 1 oder Anspruch 2, welche weiter eine Liefersteuereinrichtung (31, 31₁, 31₂) aufweist, die betreibbar ist, wenn der Wägemodus gewählt wurde, um ein Zuführungsmöglich einer jeden der Liefereneinrichtungen (S₁, S₂) auf der Basis eines gewichteten Wertes zu steuern, die aber betreibbar ist, wenn der Entlademodus gewählt ist, um das Zuführungsmöglich auf ein vorbestimmtes Niveau zu steuern.

4. Kombinierte Wäge- oder Zählvorrichtung nach Anspruch 1, welche weiter eine Zuführungsmöglich-Einstelleinrichtung (33) aufweist, zum Regulieren eines Zuführungsmöglich jedes der angetriebenen Zu-
5. Kombinierte Wäge- oder Zählvorrichtung nach Anspruch 2, welche weitere eine Zuführparameter-Einstelleinrichtung (33) aufweist zum Regulieren eines Zuführvermögens eines jeden der angetriebenen Zuführer (7); wobei jede der Liefereinrichtungen (S₁, S₂) einen angetriebenen Zuführer (7) zum Liefern der Artikel und einen Poolrichter (9) zum Speichern der vom angetriebenen Zuführer gelieferten Artikel; und wobei die Modus-Steuer einrichtung (39) betreibbar ist, wenn der Wägemodus gewählt wurde, um zu bewirken, daß die Zuführparameter-Einstelleinrichtung (33) das Zuführvermögen eines jeden der angetriebenen Zuführer (7) auf einen Wert einstellt, der für das Gewicht oder die Anzahl der Artikel erforderlich ist, die in dem jeweiligen Poolrichter (9) gespeichert sind, um einen vorbestimmten Ziel-Lieferwert zu erreichen, aber betreibbar ist, wenn der Entlademodus gewählt wurde, um zu bewirken, daß alle Poolrichter (9) und alle von den Wägetrichtern (10) vollkommen geöffnet sind und auch um zu bewirken, daß die Zuführparameter-Einstelleinrichtung (33) das Zuführvermögen von allen der angetriebenen Zuführer (7) auf einen Wert einstellt, der größer ist als der, welcher während des Wägemodus beibehalten wird (Fig. 1, 2).

10. Durchführen einer kombinierten Rechnung eines gemessenen Gewichts oder einer Anzahl der Artikel, die durch jedes der Wägetrichter (10) gemessen wurde, um eine Kombination zu bestimmen, in welcher das Gewicht oder die Anzahl der Artikel in einen zulässigen Bereich fallen kann, gekennzeichnet durch das Auswählen von einem von Wäge- und Entlademoden; wenn der Wägemodus gewählt wurde, Durchführen der kombinierten Rechnung und Aktivieren der Liefereinrichtung (S₁, S₂) in Verbindung mit einem selektiven Öffnen und Schließen der Wägetrichter (10); und wenn der Entlademodus gewählt wurde, Aktivieren von allen der Liefereinrichtungen (S₁, S₂), während alle der Wägetrichter (10) vollkommen offengehalten werden, um dadurch die in der Liefereinrichtung (S₁, S₂) verbleibenden Artikel kontinuierlich nach außen zu entladen (Fig. 1, 2).

6. Kombiniertes Wäge- oder Zählverfahren, welches die Schritte aufweist: Liefern von Artikeln (M), die von einer Mehrzahl von Liefereinrichtungen (S₁, S₂) zu wägen sind, zu einer Mehrzahl von Wägetrichtern (10), von welchen jede einen Wägetrichter (10) aufweist, wobei jede der Liefereinrichtungen (S₁, S₂) einen angetriebenen Zuführer (7) zum Liefern der Artikel beinhaltet und einen Poolrichter (9) zum Speichern der vom angetriebenen Zuführer gelieferten Artikel; und wobei die Modus-Steuer einrichtung (39) betreibbar ist, wenn der Wägemodus gewählt wurde, um zu bewirken, daß die Zuführparameter-Einstelleinrichtung (33) das Zuführvermögen eines jeden der angetriebenen Zuführer (7) auf einen Wert einstellt, der für das Gewicht oder die Anzahl der Artikel erforderlich ist, die in dem jeweiligen Poolrichter (9) gespeichert sind, um einen vorbestimmten Ziel-Lieferwert zu erreichen, aber betreibbar ist, wenn der Entlademodus gewählt wurde, um zu bewirken, daß alle Poolrichter (9) und alle von den Wägetrichtern (10) vollkommen geöffnet sind und auch um zu bewirken, daß die Zuführparameter-Einstelleinrichtung (33) das Zuführvermögen von allen der angetriebenen Zuführer (7) auf einen Wert einstellt, der größer ist als der, welcher während des Wägemodus beibehalten wird (Fig. 1, 2).

7. Kombiniertes Wäge- oder Zählverfahren, welches die Schritte aufweist: Teilen in eine Mehrzahl von Gruppen eine Mehrzahl von Lieferkanälen, durch welche Artikel (M₁, M₂), die zu wägen sind, geliefert werden, wobei jeder der Lieferkanäle von einer Liefereinrichtung (S₁, S₂) zu einem entsprechenden Wägemittel (12₁, 12₂) führt, welche einen Wägetrichter (10) aufweist; Zuliefern der Artikel für jede Gruppe; Durchführen einer kombinierten Rechnung eines gemessenen Gewichts oder einer Anzahl der Artikel, die durch jedes der Wägetrichter (10) gemessen wurden, von jeder der Gruppen, um eine Kombination zu bestimmen, in welcher das Gewicht oder die Anzahl der Artikel in einen zulässigen Bereich für jede Gruppe fallen kann, gekennzeichnet durch wählen von einem von Wäge- und Entlademoden; Spezifizieren von einer der Gruppen, welche unter dem Entlademodus einzustellen ist; wenn der Wägemodus gewählt wurde, Durchführen der kombinierten Rechnung und Aktivieren der Liefereinrichtung (S₁, S₂) in Verbindung mit einem selektiven Öffnen und Schließen der Wägetrichter (10); und wenn der Entlademodus gewählt wurde, Aktivieren von allen der Liefereinrichtungen (S₁, S₂), während alle der Wägetrichter (10) der
revendications

1. Dispositif de pesage ou de comptage combinatoire qui comprend :

   une pluralité de dispositifs de pesage (12) comportant chacun une trémie de pesage (10) pour peser des articles (M) devant être pesés alors que les articles sont reçus à l'intérieur de la trémie de pesage ;

   une pluralité de moyens d'alimentation (S, 7, 9) pour délivrer les articles aux trémies de pesage (10), respectivement ;

   un moyen de calcul de combinaison (37) pour effectuer un calcul combinatoire d'une valeur mesurée des articles mesurés par chacun des dispositifs de pesage (12) ou d'un nombre obtenu à partir de la valeur mesurée afin de donner un poids ou un nombre rentrant à l'intérieur d'une plage admissible ;

   caractérisé par :

   un moyen de sélection de mode (38) pour sélectionner l'un des modes de pesage et de déchargement ;

   un moyen de commande de mode (39) fonctionnant lorsque le mode de pesage est sélectionné par le moyen de sélection de mode (38) de façon à activer le moyen de calcul de combinaison (37), et, également, à activer les moyens d'alimentation (S, 7, 9) en association avec l'ouverture et la fermeture sélectives des trémies de pesage (10), mais pouvant fonctionner lorsque le mode de déchargement est sélectionné par le moyen de spécification de groupe (48) pour spécifier l'un des groupes devant être mis dans le mode de déchargement par le moyen de sélection de mode (38) ; et

   un moyen de commande de mode (39) pouvant fonctionner lorsque le mode de pesage est sélectionné par le moyen de spécification de groupe (48) pour spécifier l'un des groupes devant être mis dans le mode de déchargement par le moyen de sélection de mode (38) ;

   un moyen de commande de mode (39) pouvant fonctionner lorsque le mode de pesage est sélectionné par le moyen de spécification de groupe (48) pour spécifier l'un des groupes devant être mis dans le mode de déchargement par le moyen de sélection de mode (38) ;

   un moyen de commande de mode (39) pouvant fonctionner lorsque le mode de pesage est sélectionné par le moyen de spécification de groupe (48) pour spécifier l'un des groupes devant être mis dans le mode de déchargement par le moyen de sélection de mode (38) ;

   un moyen de commande de mode (39) pouvant fonctionner lorsque le mode de pesage est sélectionné par le moyen de spécification de groupe (48) pour spécifier l'un des groupes devant être mis dans le mode de déchargement par le moyen de sélection de mode (38) ;

   un moyen de commande de mode (39) pouvant fonctionner lorsque le mode de pesage est sélectionné par le moyen de spécification de groupe (48) pour spécifier l'un des groupes devant être mis dans le mode de déchargement par le moyen de sélection de mode (38) ;

   un moyen de commande de mode (39) pouvant fonctionner lorsque le mode de pesage est sélectionné par le moyen de spécification de groupe (48) pour spécifier l'un des groupes devant être mis dans le mode de déchargement par le moyen de sélection de mode (38) ;

   un moyen de commande de mode (39) pouvant fonctionner lorsque le mode de pesage est sélectionné par le moyen de spécification de groupe (48) pour spécifier l'un des groupes devant être mis dans le mode de déchargement par le moyen de sélection de mode (38) ;

   un moyen de commande de mode (39) pouvant fonctionner lorsque le mode de pesage est sélectionné par le moyen de spécification de groupe (48) pour spécifier l'un des groupes devant être mis dans le mode de déchargement par le moyen de sélection de mode (38) ;

   une pluralité de moyens d'alimentation (S₁, S₂) pour délivrer les articles aux trémies de pesage (10), respectivement ;

   un moyen de division de groupe (40) pour diviser en une pluralité de groupes des passages d'alimentation menant chacun de chacun des moyens d'alimentation (S₁, S₂) à la trémie de pesage associée (10),

   un moyen de délivrance d'articles (P) employé pour chacun des groupes pour délivrer les articles (M₁, M₂) ;

   un moyen de calcul de combinaison (37) pour effectuer un calcul combinatoire d'une valeur mesurée des articles mesurés par chacun des dispositifs de pesage (12) de chaque groupe ou d'un nombre obtenu à partir de la valeur mesurée afin de donner un poids ou un nombre rentrant à l'intérieur d'une plage admissible pour chaque groupe ;

   caractérisé par :

   un moyen de sélection de mode (38) pour sélectionner l'un des modes de pesage et de déchargement ;

   un moyen de spécification de groupe (48) pour spécifier l'un des groupes devant être mis dans le mode de déchargement par le moyen de sélection de mode (38) ;

   un moyen de commande de mode (39) pouvant fonctionner lorsque le mode de pesage est sélectionné par le moyen de spécification de groupe (48) pour spécifier l'un des groupes devant être mis dans le mode de déchargement par le moyen de sélection de mode (38) ; et

   un moyen de commande de mode (39) pouvant fonctionner lorsque le mode de pesage est sélectionné par le moyen de spécification de groupe (48) pour spécifier l'un des groupes devant être mis dans le mode de déchargement par le moyen de sélection de mode (38) ;

2. Dispositif de pesage ou de comptage combinatoire qui comprend :

   une pluralité de dispositifs de pesage (12₁, 12₂) comportant chacun une trémie de pesage (10) pour peser des articles (M₁, M₂) devant être pesés alors que les articles sont reçus à l'intérieur de la trémie de pesage ;

3. Dispositif de pesage ou de comptage combinatoire selon la revendication 1 ou la revendication 2, comprenant de plus un moyen de commande d'alimentation (31, 3₁₁, 3₁₂) pouvant fonctionner, lorsque le mode de pesage est sélectionné, de façon à commander une capacité de délivrance de chacun des moyens d'alimentation (S₁, S₂) en fonction d'une valeur pesée, mais pouvant fonctionner, lorsque le mode de déchargement est sélectionné, de façon
à commander la capacité de délivrance à un niveau prédéterminé.

4. Dispositif de pesage ou de comptage combinatoire selon la revendication 1, comprenant de plus un moyen d'établissement de paramètres de délivrance (33) pour réguler une capacité de délivrance de chacun des chargeurs d'actionnement (7), dans lequel chacun desdits moyens d'alimentation (S) comprend un chargeur d'actionnement (7) pour délivrer les articles, et une trémie commune (9) pour stocker les articles délivrés par le chargeur d'actionnement ; et dans lequel le dit moyen de commande de mode (39) peut fonctionner, lorsque le mode de pesage est sélectionné, de façon à faire établir par le moyen d'établissement de paramètres de délivrance (33) la capacité de délivrance de chacun des chargeurs d'actionnement (7) à une valeur requise pour le poids ou le nombre des articles, stockés dans la trémie commune respective (9), afin d'atteindre une valeur d'alimentation visée prédéterminée, mais peut fonctionner, lorsque le mode de déchargement est sélectionné, de façon à provoquer l'ouverture totale de toutes les trémies communes (9) et les trémies de pesage (10), et, également, à faire établir par le moyen d'établissement de paramètres de délivrance (33) la capacité de délivrance des chargeurs d'actionnement (7) du groupe spécifié par le moyen de spécification de groupe (48) à une valeur supérieure à celle établie durant le mode de pesage (figures 3, 4).

5. Dispositif de pesage ou de comptage combinatoire selon la revendication 2, comprenant de plus un moyen d'établissement de paramètres de délivrance (33) pour réguler une capacité de délivrance de chacun des chargeurs d'actionnement (7) ; dans lequel chacun desdits moyens d'alimentation (Si, S2) comprend un chargeur d'actionnement (7) pour délivrer les articles, et une trémie commune (9) pour stocker les articles délivrés par le chargeur d'actionnement ; et dans lequel le dit moyen de commande de mode (39) peut fonctionner, lorsque le mode de pesage est sélectionné, de façon à faire établir par le moyen d'établissement de paramètres de délivrance (33) la capacité de délivrance de chacun des chargeurs d'actionnement (7) à une valeur requise pour le poids ou le nombre des articles, stockés dans la trémie commune respective (9), afin d'atteindre une valeur d'alimentation visée prédéterminée, mais peut fonctionner, lorsque le mode de déchargement est sélectionné, de façon à provoquer l'ouverture totale de toutes les trémies communes (9) et les trémies de pesage (10), et, également, de façon à provoquer l'établissement par le moyen d'établissement de paramètres de délivrance (33) de la capacité de délivrance de tous les chargeurs d'actionnement (7) à une valeur supérieure à celle établie durant le mode de pesage (figures 1, 2).

6. Procédé de pesage ou de comptage combinatoire qui comprend les étapes suivantes :

- la délivrance d'articles (M) devant être pesés à partir d'une pluralité de moyens d'alimentation (S, 7, 9) à une pluralité de dispositifs de pesage (12) comportant chacun une trémie de pesage (10),
- la réalisation d'un calcul combinatoire d'un poids mesuré ou d'un nombre des articles mesurés par chacun des dispositifs de pesage (12) afin de déterminer une combinaison dans laquelle le poids ou le nombre des articles peut rentrer à l'intérieur d'une plage admissible ;
- la sélection de l'un des modes de pesage et de déchargement ;
- lorsque le mode de pesage est sélectionné, la réalisation du calcul combinatoire et l'activation des moyens d'alimentation (S, 7, 9) en association avec l'ouverture et la fermeture sélectives des trémies de pesage (10) ; et
- lorsque le mode de déchargement est sélectionné, l'activation de tous les moyens d'alimentation (S, 7, 9) alors que toutes les trémies de pesage (10) sont maintenues complètement ouvertes de façon à décharger de façon continue les articles restant à l'intérieur des moyens d'alimentation (S, 7, 9) vers l'extérieur (figures 1, 2).

7. Procédé de pesage ou de comptage combinatoire qui comprend les étapes suivantes :

- la division en une pluralité de groupes d'une pluralité de passages d'alimentation à travers lesquels des articles (M1, M2) devant être pesés sont délivrés, chacun desdits passages d'alimentation menant d'un moyen d'alimentation (S1, S2) à un dispositif de pesage correspondant (121, 122) comportant une trémie de pesage (10) ;
- la délivrance des articles pour chaque groupe ;
- la réalisation d'un calcul combinatoire d'un poids mesuré ou d'un nombre des articles me-
surés par les dispositifs de pesage (12₁, 12₂) de chacun des groupes afin de déterminer une combinaison dans laquelle le poids ou le nombre des articles peut rentrer à l'intérieur d'une plage admissible pour chaque groupe ;

caractérisé par :

la sélection de l'un des modes de pesage et de déchargement ;
la spécification de l'un des groupes qui doit être mis dans le mode de déchargement ;

lorsque le mode de pesage est sélectionné, la réalisation du calcul combinatoire et l'activation des moyens d'alimentation (S₁, S₂) en association avec l'ouverture et la fermeture sélectives des trémies de pesage (10) ; et

lorsque le mode de déchargement est sélectionné, l'activation de tous les moyens d'alimentation (S₁, S₂) alors que toutes les trémies de pesage (10) du groupe spécifié sont maintenues complètement ouvertes pour décharger par conséquent de façon continue les articles appartenant au groupe vers l'extérieur (figures 3, 4).