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[54] **METHOD AND APPARATUS FOR INITIATING COUNTING AND/OR DISCONNECTING PROCESSES, IN PARTICULAR FOR PRINTING PRESSES**

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[51] **Int. Cl.** **G06m 7/02**

[58] **Field of Search**..... 235/92 B, 92 CA, 235/92 CT, 92 PK, 92 SB, 98 R, 132; 198/40; 271/26 R

[56] **References Cited**

UNITED STATES PATENTS

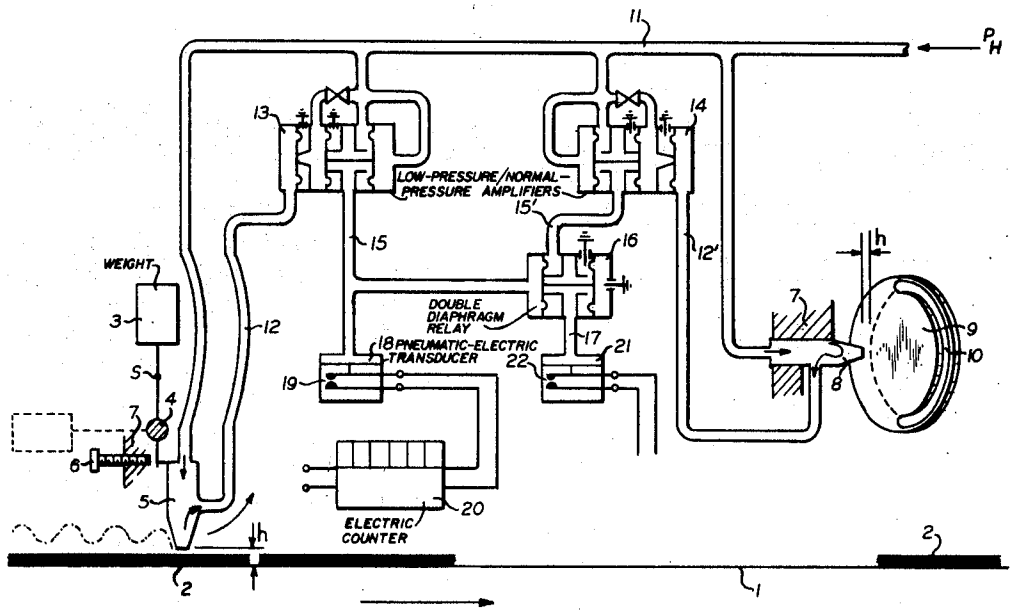
3,571,574 3/1971 Gerber..... 235/92 PK

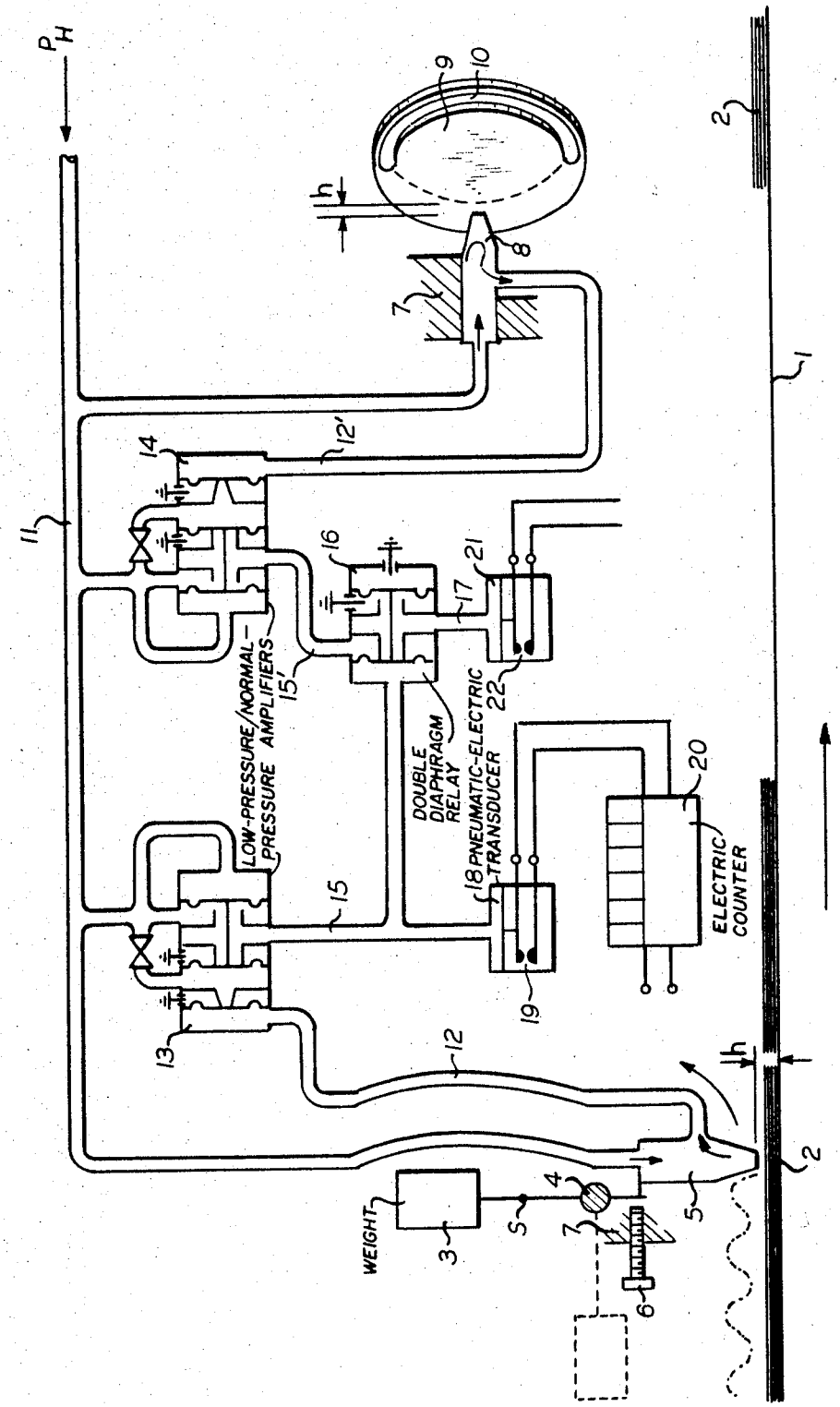
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[57] **ABSTRACT**

A method of initiating and an apparatus for counting and/or disconnecting operations, particularly for printing presses, variations in pressure of an outlet nozzle arranged above a conveyor belt being evaluated for the contact-less evaluation of sheet products or the like moved on a conveyor belt and converted by a pneumatic-electric transducer into electric pulses, which comprises the steps of directing a jet stream against a perforated disc moved in synchronism with the machine and comparing variations in pressure head of two outlet nozzles, then feeding only the result of the comparing step to a pneumatic-electric transducer, is fed and is evaluated by a second pneumatic-electric transducer the result of the variations in pressure head in the first outlet nozzle.

5 Claims, 1 Drawing Figure




P_H
9
10
h
8
7
2
1
12'
14
11
16
21
17
22
LOW-PRESSURE/NORMAL-PRESSURE AMPLIFIERS
15'
DOUBLE DIAPHRAGM RELAY
18 PNEUMATIC-ELECTRIC TRANSDUCER
20
ELECTRIC COUNTER
15
19
13
12
h
2
WEIGHT
3
5
4
7
5
6

METHOD AND APPARATUS FOR INITIATING COUNTING AND/OR DISCONNECTING PROCESSES, IN PARTICULAR FOR PRINTING PRESSES

The present invention relates to a method of and an apparatus for the initiating of counting-and/or disconnecting-processes, particularly for printing presses, in which the articles to be counted or to be checked as to their presence control the means employed without contact. In this connection is is immaterial for the use of the subject matter of the invention whether, for example, the sheet fed to a processing machine or the products leaving it are to be counted or evaluated.

Devices are known with which counting processes are initiated in the most different manners. Thus in particular electronic apparatus are known, with which the products are scanned by means of spring-loaded rollers, in which connection the movement of the rollers is used to control microswitches and the like. Other devices of this type use pinwheel or gear wheels which are driven by the products and which act on corresponding other gear elements, and finally again on electronic apparatus.

All of these devices have the disadvantage that they either do not work without contact or that, for instance, in the case of additional use of light barriers, they require too much equipment and are therefore too expensive. The paper dust which occurs in particular on paper processing machines also frequently prevents dependable operation of the apparatus after a certain time of operation, or it makes further costly measures necessary.

In order to remedy this, there has become known, for instance, from East German Pat. No. 39 768 an apparatus in which, for the scanning of the path of the printed products which come from the printing machine, there is used a pneumatic measuring instrument which is directly followed by a pneumato-electric transducer and the current pulses of which are used as counting pulses. In this apparatus, a jet of air emerging from an outlet nozzle is directed onto the surface of the printed products. The printed products must in this connection be conducted staggered below the nozzle since, depending on whether one or a plurality of products happen to lie below the nozzle, the pressure head within the nozzle changes and these variations in pressure control the pneumato-electric transducer. This apparatus is, however, not universally applicable, but can be used only in connection with a delivery of products fed in staggered form. If products, however, are not present, they merely do not introduce a counting process. The absence of products cannot be indicated or used for disconnecting processes in connection with this apparatus.

It is one object of the present invention, to provide a method and apparatus for initiating counting and/or disconnecting processes, in particular for printing presses which avoids the disadvantages of the prior art and, with extensive use of parts which can be bought, create a sheet or product monitoring and counting device, which is of favorable price and of substantially universal use.

It is another object of the present invention to provide a method of initiating counting and/or disconnecting processes, by means of which only products which are actually present are counted or evaluated without contact and by means of which simultaneously, in the case of absence of products or in the case of deviations from the normal courses, pulses are given off for the disconnecting of the printing press.

It is another object of the present invention, to provide a method of initiating counting and/or disconnecting processes, wherein products which, while present, are crumpled, will in all cases produce a dependable disconnecting of the machine, and finally the result is also to be obtained, that the products which are to be evaluated can exhibit a sufficient tolerance with respect to their position.

It is still another object of the present invention to provide a method and apparatus for initiating counting and/or disconnecting processes, in particular for printing presses wherein the following method steps are carried out: the known outlet nozzle has associated with it a second outlet nozzle in any position which directs its jet against a perforated disc moved in synchronism with the machine as long as the known outlet nozzle directs its jet against the product to be evaluated or the sheet.

The variations in the pressure head of the two outlet nozzles are compared with each other and only the result of the comparison is fed to the known pneumato-electric transducer, while simultaneously the result of the pressure-head variations in the first outlet nozzle can be utilized by a second pneumato-electric transducer.

In accordance with another feature of the present invention, both the outlet nozzle directed onto the path of the products and the second outlet nozzle cooperating with the perforated plate have a separate pressure amplifier arranged behind them. The outlet signals of the two can be fed to a double-diaphragm relay, the signals of which in their turn, via a pneumato-electric transducer, control the means for the disconnecting of the printing press. The outlet nozzle directed against the path of the products is in this connection supported, readily rotatable below its center of gravity, in oscillation around an axis, in which connection the normal position can be accurately set by means of a set screw. Between the pressure amplifier associated with the outlet nozzle directed onto the path of the products and the double-diaphragm relay, a second pneumato-electric transducer is arranged. In accordance with the present invention, in the final analysis, the angular velocity of the perforated disc with respect to the cutouts in the perforated disc is equal to the synchronization speed of the conveyor belt for the sheets or products, respectively, and the cutouts in the perforated disc are, as seen in both directions of its middle line, relatively larger than the distances between the products or larger than the notches of products fed in staggered manner.

By the invention, there are obtained advantages which consist particularly in the fact, that the apparatus of the present invention can be used both in sheet feed and delivery for counting and for controlling the operation of the machine. If the apparatus of the present invention is used, for instance, in the sheet feed, there is directly obtained the possibility, in case of the absence of sheets or the entrance of a deformed sheet, to interrupt the further processing. The use of the apparatus of the present invention is also advantageous in a folder of a roller rotary printing press. Thus, for instance, the contact-free evaluation of the products can be effected in connection with practically all known types of this

kind at a place, where the products leave the last folding cylinder and are fed to belts of a folding mechanism parallel to the direction of travel. In this case the absence of a product would be equivalent to an accumulation of the products in the transverse folding mechanism and an immediate stopping would prevent damage to the machine. It is also particularly advantageous, that the same apparatus give off both the counting pulses and at the same time also the pulses for a disconnection of the machine which may possibly become necessary. The operation of the apparatus is still assured even if the front part of a crumpled sheet comes below the first outlet nozzle. In this case the nozzle tilts with some delay but nevertheless immediately initiates the disconnecting process.

With these and other objects in view, which will become apparent in the following detailed description, the present invention, which is shown by example only, will be clearly understood in connection with the accompanying drawing, in which the only FIGURE discloses one embodiment of the present invention.

Referring now to the drawing, on a conveyor belt **1** sheets or products **2** are fed spaced apart to delivery or further processing stations. Above the conveyor belt **1** below its center of gravity s extended by means of a weight **3** an outlet nozzle **5** is arranged swinging around a shaft **4.** The shaft **4** is displaced vertically, so that the distance h between the outlet nozzle **5** and the upper edge of the conveyor belt **1** can be adjusted in accordance with the varying thickness of the products. For the adjusting of a stable normal position of the outlet nozzle **5,** which, however, permits a slight swinging or tilting, there is provided an adjustment screw **6,** which is contained, like the shaft **4,** in the machine frame **7.** A second outlet nozzle **8** which is substantially similar to the outlet nozzle **5** is arranged at another point. It is directed against a perforated disc **9** in which one or a plurality of arcuate slots **10** are provided. Instead of the slots **10,** a disc **9** consisting of segment pieces can also be used. In the case of products which are fed staggered and in connection with which, in accordance with the prior art, the variations in pressure head produced by the notches in the surface of the product path are utilized, the perforated disc can also be developed correspondingly with notches or the like instead of the slots.

The outlet nozzle **8** is also fastened in variable locations on the machine frame **7** in such manner, that the distance h between it and the perforated disc **9** is adjustable. The outlet nozzle **8** can furthermore be swingable in order to be able to sense different programs of a perforated disc **9** provided with a plurality of longitudinal slots. If the outlet nozzle **8** is adjustable only with respect to the height *h*, the perforated disc **9** can be developed so that it is replaceable with, in each case different programs, depending on whether single-or double-parallel folded, single- or multi-transverse folded products or the like are to be evaluated.

The outlet nozzles **5** and **8** are fed with an auxiliary air pressure P_H via an auxiliary air pressure conduit **11** which is flexible at least in the region of the outlet nozzles **5** and **8.** Depending on whether a product **2** or the material of the perforated disc **9** is in front of the outlet nozzles **5** and **8** or whether the outlet nozzle **5** gives off the auxiliary air pressure P_H into the space between two products or the outlet nozzle **8** gives off the auxiliary air pressure P_H through the slot **10,** a pressure head is developed in the pressure head conduits **12** and **12'**, respectively, which are also flexible in the region of the outlet nozzles **5** and **8.** This pressure head is fed to known low-pressure/normal-pressure amplifiers **13; 14,** which do not form part of the present invention, and on which the auxiliary air pressure P_H of the auxiliary air pressure line **11** is also applied. These low-pressure/-normal-pressure amplifiers **13** and **14** operate in the manner, that they impart the auxiliary air pressure P_H only into the air lines **15** and **15'**, respectively, arranged behind them when the pressure head is fed to them via the pressure-head lines **12** and **12'**, respectively.

In a double-diaphragm relay **16** which also represents a known logic element, not forming part of the present invention, the pressures prevailing in the air lines **15** and **15'** are compared, so that once again the auxiliary air pressure P_H arrives into the outlet air line **17** only when, although the auxiliary air pressure P_H is fed from the air line **15'**, it is not fed from the air line **15.**

As soon now as a product **2** enters into the region of the outlet nozzle **5,** a pressure head is built up via the pressure-head line **12,** by which pressure head the low-pressure/normal-pressure amplifier **13** controls the auxiliary air pressure P_H in the air line **15.** In this way, on the one hand, a pneumatic-electric transducer **18** connected to this line is acted upon, so that the pair of contacts **19** closes, as the result of which a counting pulse is given off for the electric counter **20.** At the same time, the double-diaphragm relay **16** is acted on by the pressure of the air line **15,** as a result of which the path to the outlet air line **17** is closed, so that accordingly the pneumatic-electric transducer **21** is not fed any signal. In the same way, during this time interval, a pressure head results in the pressure-head line **12'**, since the outlet nozzle **8** is controlled by the material of the perforated disc **9.** Accordingly the low-pressure/normal-pressure amplifier **14** permits the passage of the auxiliary air pressure from the auxiliary air pressure line **11** into the air line **15'**. Here, however, as a result of the presence of the pressure from the air line **15,** the further path for the auxiliary air pressure P_H is closed. As soon now, however, as one of the sheets or products **2** is absent, the presence of the auxiliary air pressure P_H in the air line **15'** results. Since, however, no pressure head is produced in the outlet nozzle **5,** the pressure-head air line **12** is not acted on and thus the low-pressure/ normal-pressure amplifier **13** closes and opens the air conduit **15.** In such case there is neither a counting pulse, nor does the double-diaphragm relay **16** close the air line **15'**, so that the pneumatic-electric transducer **21** is fed a control signal via the outlet air line **17,** so that the pair of contacts **22** is closed for the disconnecting of the printing press or the like. The same result takes place if, although a product **2** appears on the conveyor belt **1,** the product, however, is deformed, as indicated in dot-dash line in the drawing. In this case the crumpled sheet tilts the outlet nozzle **5** around the shaft **4,** as a result of which no pressure head is developed either in the pressure-head line **12,** so that once again no counting signal to the double-diaphragm relay **16,** so that the auxiliary air pressure P_H passes up to the pneumato-electric transducer **21** and the disconnecting process is thus introduced.

It is obvious, that it must be possible to work different types of products within one plant. Thus it happens for instance, that singly, doubly or even triply folded products leave the folder of a cylinder rotary printing press.

Depending on this, the ratio between length of product and space between products changes. For this purpose either the outlet nozzle **8** must be swingable, so that it can evaluate different slots **10** arranged on the perforated disc **9**, or the outlet nozzle can be fastened in a fixed manner, variable only with respect to the height h, in which case it is necessary to provide for the different possible lengths of product with different perforated discs **9** which can easily be changed.

Now it is known, that in the present high-speed folders the position of the products **2** with respect to each other must provide for some tolerance. Thus it may readily happen that one of the products **2** is somewhat in advance, while the following product lags by a small amount. Accordingly the invention contemplates the slot **10** in the perforated disc **9** being in each case relatively larger than the distance between the products. In this way the pressure head is built up in the pressure-head line **12'** somewhat later than the building up of the pressure head in the pressure-head line **12.** At the same time, the pressure head in the line **12'** drops before that in the pressure head line **12.** This, however, does not make any change in the overall manner of operation of the apparatus, since upon the absence of a product **2** in front of the outlet nozzle **5**, the disconnecting process is merely delayed by the tolerance range entering into question.

The perforated disc **9** rotates with an angular speed such as results from the speed of synchronism of the conveyor belt **1.** When using the device, for instance, in the folder of a cylinder rotary printing press, the angular speed of the perforated disc **9** may also be equal to the angular speed of a folder cylinder equipped with the same number of grooves.

While I have disclosed several embodiments of the present invention, it is to be understood that these embodiments are given by example only and not in a limiting sense.

I claim:

1. A method of initiating counting and/or disconnecting operations, particularly for printing presses, variations in pressure of an outlet nozzle arranged above a conveyor belt being evaluated for the contact-less evaluation of sheet products or the like moved on a conveyor belt and converted by a pneumatic-electric transducer into electric pulses, comprising the steps of

moving a perforated disc in synchronism with said conveyor belt,

directing a jet stream through one nozzle against said perforated disc moved in synchronism with said conveyor belt,

comparing variations in pressure head of said one nozzle with another nozzle directed against said conveyor belt,

feeding only the result of said comparing step to a first pneumatic-electric transducer the latter producing impulses upon reaching predeterming variations in said pressure head, and

disconnecting a printing press upon production of said impulses,

simultaneously evaluating by a second pneumatic-electric transducer the result of variations in pressure head in said one nozzle and producing corresponding pulses when a product is adjacent said one nozzle, and

counting said pulses.

2. An apparatus for initiating counting and/or disconnecting operations, particularly for printing presses, comprising:

a conveyor belt adapted to feed sheet products,

a perforated plate having at least one slot,

a first outlet nozzle directed to said conveyor belt,

a second outlet nozzle cooperating with said perforated plate,

a low-pressure/normal-pressure amplifier disposed behind said first and second outlet nozzles respectively,

a double-diaphragm relay,

a pneumatic-electric transducer,

output signals of said low-pressure/normal-pressure amplifier being fed to said double-diaphragm relay,

the latter emitting signals via said pneumatic-electric transducer, and

means for switching off a printing press by said last mentioned signals.

3. The apparatus, as set forth in claim **2,** which includes

a shaft supporting said first outlet nozzle in pendulum fashion around said shaft below its center of gravity in rotatable manner, and

a set screw adjusting said first outlet nozzle in the normal position of the latter.

4. The apparatus, as set forth in claim **2,** which includes

an additional pneumatic-electric transducer disposed between and operatively connected with said low-pressure/normal-pressure amplifier and said double-diaphragm relay.

5. The apparatus, as set forth in claim **2,** wherein

said perforated disc has an angular velocity equal to the speed of synchronism of said sheet products on said conveyor belt, and

said slot in said perforated disc is larger in both directions than the distances between said sheet products on said conveyor belt.

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