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(54) **Method of controlling an electrographic device, and a device of this kind for carrying out this method.**

(57) An electrographic device by means of which sheets of receiving material can be printed, the sheets being present in the form of a pile in a magazine, may be controlled as follows.

The number of sheets present in the pile is determined from the height of the pile. This number is compared with a required number of sheets to be printed.

A signal is generated indicating which of the two numbers is the larger.

The electrographic device may be prevented from coming into operation if the required number of sheets to be printed is larger than the determined number of sheets present.

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Method of controlling an electrographic device, and a device of this kind for carrying out this method

This invention relates to a method of controlling an electrographic device by means of which sheets of receiving material can be printed, the sheets being present in the form of a pile in a magazine. The invention also relates to an electrographic device for carrying out the said method  
5 by means of which device sheet-like receiving material can be printed, and comprising a supporting surface on which a pile of the sheets of receiving material can be placed in readiness, a detection device for determining the distance between the top sheet of the pile and the supporting surface, and a means of setting a required number of sheets to be printed by the  
10 device. A method and electrographic device of this kind are known in practice.

A method of this kind is used, for example, in an electrographic device in order to obviate the need to add sheets of paper during a copying run. In order to obviate this, the minimum pile height of the sheets  
15 of receiving material is frequently made larger than the maximum possible run of, for example, 99 copies. If, however, longer copying runs are required, e.g. to 999 copies, problems arise. A copying run will fairly often have to be interrupted because the sheet magazine is empty, and this is considered a disadvantage.

20 The object of the invention is to remedy this problem in a simple manner. To this end, in a method of the kind referred to in the outset, according to the invention, the number of sheets present in the pile is determined from the height of the pile, the number thus determined is compared with a required number of sheets to be printed, and a signal is  
25 generated indicating which of the two numbers is the larger. The method according to the invention enables any operator of the electrographic device to check whether he can have a copying run started by him carried out. If the run length is longer than the stock of sheets, an indication is given, e.g. "add paper" or the number of sheets still present is shown  
30 and, if necessary, the run is blocked. If such blocking is considered an excessive constraint at the start of the run, the copying run can be started with the foreknowledge that there is an insufficient stock, and can be continued until the magazine is empty. To this end, according to the invention, the electrographic device is so constructed that a control

device is provided, which from a signal delivered by the detection device derives a first signal which is an indication of the number of sheets still present in the pile, said control device comparing the first signal with a second signal derived from the setting of the setting means in order to generate a third signal if the required number of sheets to be printed is larger than the number of sheets present in the pile.

In another advantageous way of carrying out the method according to the invention, the electrographic device is prevented from coming into operation if the required number of sheets to be printed is larger than the determined number of sheets present. To this end, the electrographic device can be so constructed that means are provided which can prevent the device from coming into operation, said means being connected to the control device and responding to the third signal.

In another advantageous embodiment, the electrographic device is so constructed that the amount of stock remaining at any time, expressed as the number of sheets present, is indicated to the operator. To this end, the control device may be provided with a selector switch for setting a conversion factor which is used as a parameter according to the type of paper used, said conversion factor indicating the height per sheet in order to determine, from the first signal based on the pile height, the remaining stock.

In an electrographic device comprising a counter for counting the number of sheets removed per run, the control device may also be provided with a sampling circuit to fix the first signals at times determined by the counts of the counter at the beginning and the end of a copying run, and the control device divides the difference in height determined from the first signals on each copy run by the associated difference in counts in order to determine, from the recent first signal based on the pile height, the remaining stock.

The invention will be explained in detail with reference to the drawings, wherein:

Fig. 1 is a block diagram of the circuits used in the control device and

Fig. 2 is a schematic view of the supporting surface, lifting mechanism and detection device used in the magazine of the electrographic device.

In Fig. 1, reference 1 denotes the detection device or height sensor, 2 is a buffer amplifier, 10 a setting means for setting the required

number of sheets to be printed, 3 is a differential amplifier to which a selector switch 4 can be connected, 18 is a differential amplifier, 9 a signalling means, 11 a means of blocking the device to prevent its operation, 5 a conversion unit which can comprise a sampling circuit 6, 5 7 a counter, and 8 an indicator for indicating the number of sheets in the remaining stock in the magazine.

Operation is as follows. The first signal from the detector device 1 is compared, in the differential amplifier 18, with the second signal from the setting means 10. The third signal from amplifier 18 is fed to 10 the signalling means 9 and the means 11. With the help of the third signal the signalling means 9 indicates that the required number of sheets to be printed is larger than the number of sheets present in the pile, e.g. by displaying "add paper", or else the converse, in which case the copying run can be continued to the end. If the required number of 15 sheets to be printed is larger than the number present, means 11 can prevent the device from coming into operation.

The other circuits comprise two variants.

In the one case, the selector switch 4 is set to the basis weight of the type of paper used. For each type of paper this is a conversion factor 20 which can be used as a parameter to indicate the height per sheet. The voltage derived from the selector switch 4 is fed to one input, and the signal from the amplifier 2 is fed to the other input, of the differential amplifier 3. The voltage from the differential amplifier 3 is then converted in the conversion unit 5 to a signal that directly indicates on 25 indicator 8 the remaining stock, accurately expressed as the number of sheets present.

In the second case, the counter 7 which in each case counts the number of sheets removed per run is connected to the conversion unit 5. The latter comprises a sampling circuit 6 which determines the continuous- 30 ly sensed pile height at times determined by counts of the counter which are consecutive at intervals. An interval of this kind may, for example, comprise ten sheets. Preferably, however, the count of the counter is determined at the beginning and end of a run. The height difference determined per interval is divided in the conversion unit by the 35 associated difference in counts which can be used as a parameter and from which division the height per sheet follows. The voltage taken from the differential amplifier 3 is then converted in conversion unit 5 to a signal that directly indicates on indicator 8 the remaining stock,

accurately expressed as the number of sheets present.

In Fig. 2, reference 16 denotes a table or supporting surface in the magazine, on which the pile of sheets 17 rests, 12 is a lifting mechanism, 13 a first potentiometer, and 14 a second potentiometer with  
5 an associated sensor 15.

During operation the pile 17 will frequently be lifted by the table 16 so that the upper surface of the pile or the top sheet is kept at a constant level by means of the sensor 15. The potentiometer 13 coupled to the driving chain wheel of the lift mechanism 12 delivers a specific  
10 voltage for each position of the lifting mechanism, which voltage indicates the pile height. This potentiometer may, for example, be a ten turns potentiometer.

In another embodiment the table 16 can also be kept at a constant level, in which case the potentiometer 14 then delivers a voltage from  
15 which the remaining stock is determined via the conversion unit.

CLAIMS

1. A method of controlling an electrographic device by means of which sheets of receiving material can be printed, the sheets being present in the form of a pile in a magazine, characterised in that the number of sheets present in the pile (17) is determined from the height  
5 of the pile (17), in that the number thus determined is compared with a required number of sheets to be printed, and in that a signal is generated indicating which of the two numbers is the larger.

2. A method according to claim 1, characterised in that the electrographic device is prevented from coming into operation if the  
10 required number is larger than the determined number.

3. An electrographic device by means of which sheet-like receiving material can be printed, comprising a supporting surface on which a pile of the sheets of receiving material can be placed in readiness, a detection device for determining the distance between the top sheet of  
15 the pile and the supporting surface, and a means of setting a required number of sheets to be printed by the device, characterised in that a control device (1,..., 10, 18) is provided, which from a signal delivered by the detection device (1) derives a first signal which is an indication of the number of sheets still present in the pile (17), said control  
20 device (1, ..., 10, 18) comparing the first signal with a second signal derived from the setting of the setting means (10) in order to generate a third signal if the required number of sheets to be printed is larger than the number of sheets present in the pile.

4. An electrographic device according to claim 3, characterised in  
25 that means (11) are provided which can prevent the electrographic device from coming into operation, said means (11) being connected to the control device (1,..., 10,18) and responding to the third signal.

5. An electrographic device according to claim 3 or 4, characterised in that the control device (1,..., 10, 18) contains a  
30 selector switch (4) for setting a conversion factor which is to be used as a parameter according to the type of paper used, said conversion factor indicating the height per sheet in order to determine from the first signal based on the pile height the remaining stock accurately expressed as the number of sheets present.

6. An electrographic device according to claim 3 or 4, provided  
35 with a counter for counting the number of sheets removed per run, characterised in that the control device (1,..., 10, 18) comprises a

sampling circuit (6) to fix first signals at times determined by counts of the counter at the beginning and the end of a copying run, and in that the control device (1,..., 10, 18) divides the difference in height determined from the first signals on each copy run by the associated difference in counts in order to determine, from the recent first signal based on the pile height, the remaining stock accurately expressed as the number of sheets present.

7. An electrographic device according to any one of claims 3 to 6, in which the supporting surface is lifted by a lifting mechanism during operation in such a manner that the upper surface of the pile of sheets is always kept at a constant level, characterised in that a potentiometer (13) is coupled as a detection device to the lifting mechanism (12) and continuously indicates the position of the lifting mechanism and hence the pile height.

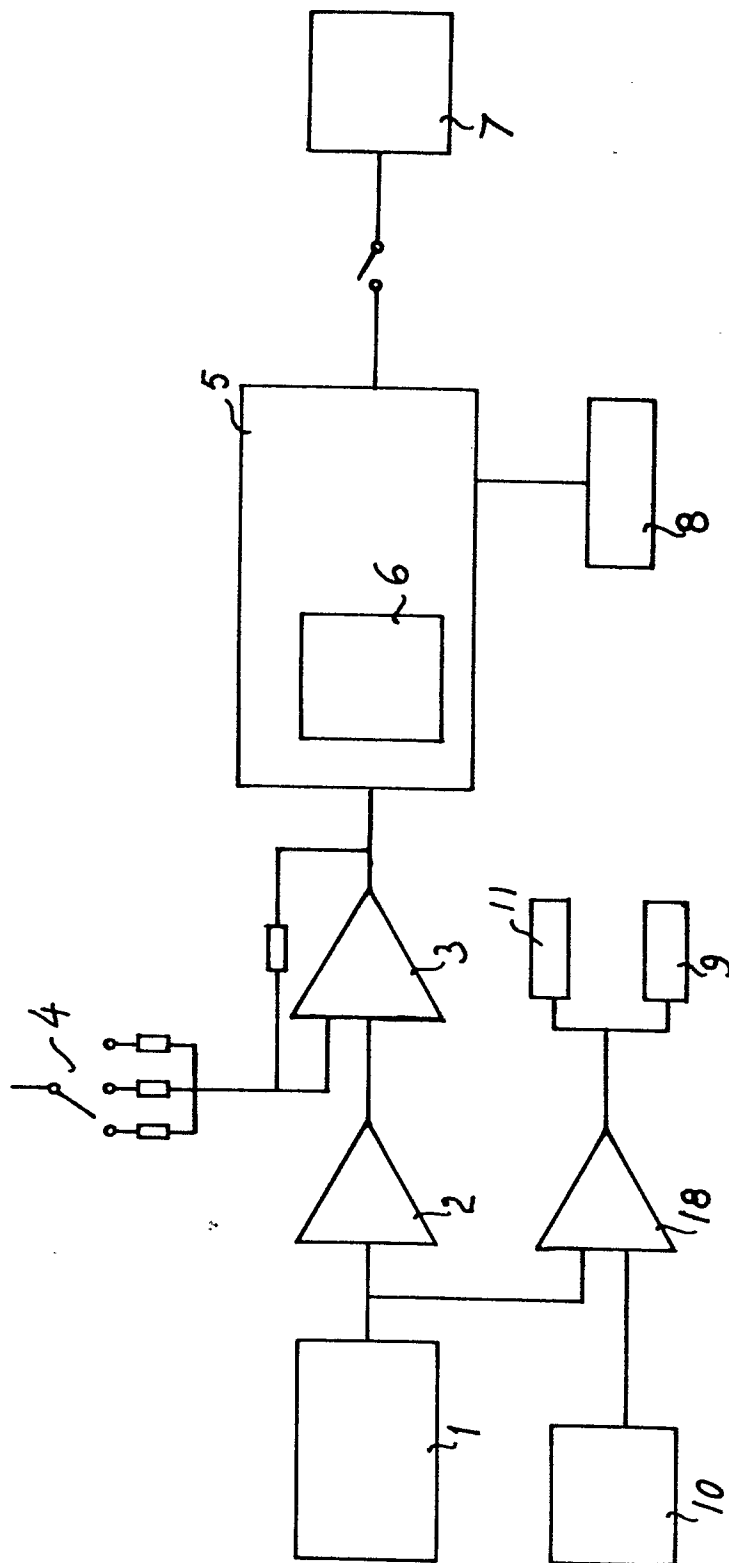


FIG. 1



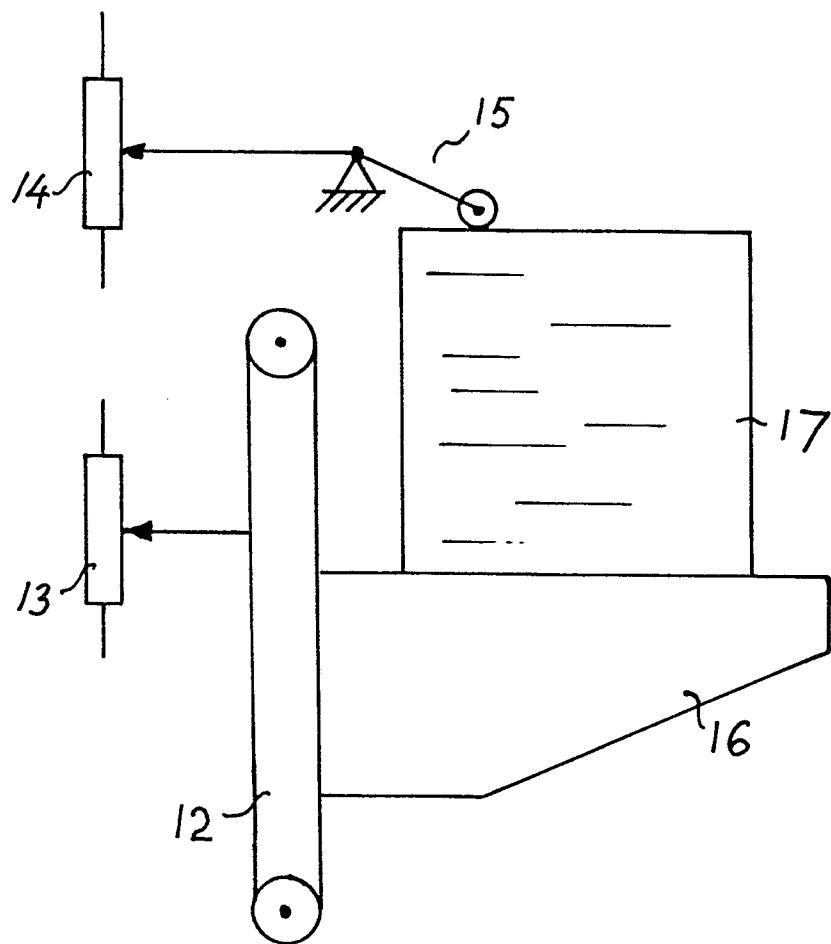


FIG.2



European Patent  
Office

# EUROPEAN SEARCH REPORT

0075974

EP 82 20 1042

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. <sup>3</sup> )
A	--- US-A-4 210 319 (F.R.HYNES) *Claims 1,6* -----	1	G 03 G 15/00 B 65 H 7/20
			TECHNICAL FIELDS SEARCHED (Int. Cl. <sup>3</sup> )
			G 03 G 15/00 B 65 H 7/00 G 03 G 21/00 G 03 B 27/00
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 06-01-1983	Examiner GRASSELLI P.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			