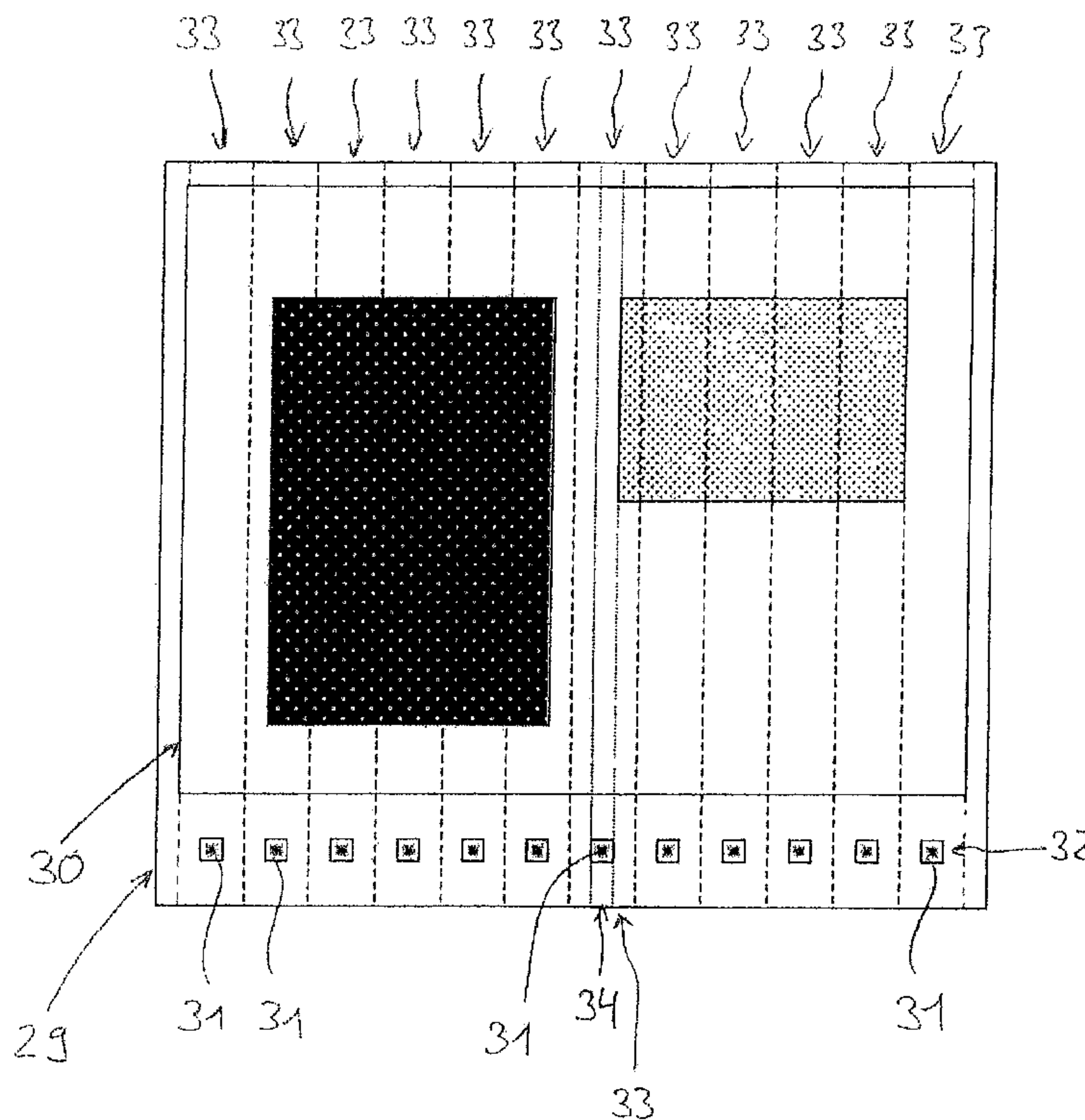




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(54) Titre : METHODE DE COMMANDE DU TRANSFERT D'ENCRE DANS UNE PRESSE OFFSET
(54) Title: METHOD FOR CONTROLLING THE INKING IN AN OFFSET PRESS



(57) **Abrégé/Abstract:**

The invention relates to a method for controlling the inking in at least one inking unit of an offset press, namely for controlling the zonal inking that can be adjusted by inking zone actuating elements of the respective inking unit, measurement regions being measured for this purpose and actual values determined in the process being compared with predefined intended values in order to generate actuating signals for the inking zone actuating elements on the basis of the comparison between the actual values and the intended values. According to the invention, control deviations between the measured actual values and the predefined intended values are modified on the basis of a model of the respective inking unit and/or on the basis of data from the subject.

Abstract

The invention relates to a method for controlling the inking in at least one inking unit of an offset press, namely for controlling the zonal inking that can be adjusted by inking zone actuating elements of the respective inking unit, measurement regions being measured for this purpose and actual values determined in the process being compared with predefined intended values in order to generate actuating signals for the inking zone actuating elements on the basis of the comparison between the actual values and the intended values. According to the invention, control deviations between the measured actual values and the predefined intended values are modified on the basis of a model of the respective inking unit and/or on the basis of data from the subject.

Method for controlling the inking in an offset press**Field of the Invention**

The invention relates to a method for controlling the
5 inking in an offset press.

Background of the Invention

During printing, a printing material is moved
successively through a plurality of printing units of a
10 press, a printing ink normally being applied to the
printing material in each printing unit. During
collective autotype printing, as a rule the four
primary colours black, magenta, cyan and yellow and, if
appropriate, special colours are printed, there being a
15 separate printing unit and therefore inking unit for
each of these printing inks. The inking unit of a each
printing unit has an ink metering device, the ink
metering device comprising a number of inking zone
actuating elements corresponding to the number of
20 inking zones. The inking zone actuating elements are
also designated ink slides or ink knives. Depending on
the position of the inking zone actuating elements,
printing ink is applied to an ink fountain roll, which
is also designated a ductor roll. The quantity of ink
25 applied to the ductor roll for each inking zone as a
function of the inking zone actuating elements is
transferred by a vibrator roll or film roll to an
inking unit roll of the inking unit, which is arranged
downstream of a vibrator roll or film roll. The
30 printing ink is moved via a plurality of inking unit
rolls in the direction of a forme cylinder or plate
cylinder of the respective printing unit. At least one
inking unit roll of the respective inking unit, serving
as an ink applicator roll, rolls on the forme cylinder
35 of a printing unit. Via the or each ink applicator
roll, the printing ink accordingly arrives on at least
one printing plate positioned on the forme cylinder.
What is known as a transfer cylinder or rubber-covered

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cylinder interacts with the forme cylinder and transfers the printing ink from the forme cylinder to the printing material.

- 5 The colour configuration of a printed product to be printed is defined in a prepress stage, as it is known. In this case, for example for all the printing inks to be printed and therefore for all the inking units of the press involved in the printing, what are known as
10 area coverage values are defined for each inking zone. On the basis of these area coverage values, the inking zone actuating elements are set and therefore the zonal inking is determined.
- 15 From the prior art, it is already known to measure the inking established on the printing material during printing and, on this basis, to control the zonal inking of the inking units involved in the printing. To this end, measurement regions printed on the
20 printing material outside a subject, what are known as print control elements, are usually measured, in this case actual values of the zonal inking determined being transmitted to a control device of the press. In the control device, the actual values are compared with
25 predefined intended values in order to generate actuating signals for the inking zone actuating elements on the basis of the comparison between the actual values and the intended values and therefore on the basis of the control deviation between the measured
30 actual values and the predefined intended values. In this way, automatic control of the zonal inking is already possible. It is also possible to measure regions within a subject as measurement regions and to control the zonal inking on this basis. In addition,
35 print control elements printed outside a subject as measurement regions and regions within the subject can be measured.

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When controlling the zonal inking on the basis of the measurement of print control elements, for example printed outside the subject, it is possible that, although the measured actual values agree with the predefined intended values for all the measurement regions, a deviation between actual values and intended values can be detected in the actual subject for individual separations of the inking. Hitherto, no methods for controlling the inking have been known which take account of this phenomenon.

Summary of the Invention

On this basis, the present invention is based on the problem of providing a novel type of method for controlling the inking in an offset press.

This problem is solved by a method for controlling the inking in an offset press. According to the invention, the control deviations between the measured actual values and the predefined intended values are modified on the basis of a model of the respective inking unit and/or on the basis of data from the subject.

In the spirit of the present invention, it is proposed to modify the control deviations between the actual values determined by measuring measurement regions and the predefined intended values on the basis of data from the subject and/or on the basis of a model of the respective inking unit. The invention is therefore based on the idea that a deviation between the actual values of the subject and the predefined intended values, although the actual values of the measurement regions agree with the predefined intended values, can depend on the character of the subject to be printed and/or on the rolling behaviour and, if appropriate, oscillating behaviour of the inking unit. Depending on an analysis of the subject and/or an inking unit model, the control deviations between the actual values

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measured on the measurement regions and the predefined intended values are accordingly modified in order to achieve agreement between intended values and actual values in the subject.

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According to an advantageous development of the invention, for each inking zone of the subject, at least one measurement region is measured, a circumferential strip covered by the measurement region being smaller than a circumferential strip covered by the respective inking zone and when an area coverage value determined from the data from the subject in the circumferential strip covered by the measurement region is smaller than a predefined limiting value, the predefined intended value for the corresponding inking zone actuating element being increased or the measured actual value being reduced.

According to a further advantageous development of the invention, by using the data from the subject and from the model of the respective inking unit an area coverage value dependent on the ghosting behaviour of the respective inking unit is determined for the circumferential strip covered by the measurement region and when this area coverage value is greater than a predefined limiting value, the predefined intended value for the corresponding inking zone actuating element is reduced or the measured actual value is increased.

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According to a further advantageous development of the invention, depending on the model of the respective inking unit, an ink drop-off is determined and when there is a maximum of the ink drop-off in the circumferential strip covered by the measurement region, the predefined intended value for the corresponding inking zone actuating element is increased or the measured actual value is reduced and

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- 5 -

when there is a minimum of the ink drop-off in the circumferential strip covered by the measurement region, the predefined intended value for the corresponding inking zone actuating element being
5 reduced or the measured actual value being increased.

The above advantageous developments of the invention can be used either on their own, in partial combinations or in an overall combination in the
10 control of the inking according to the invention.

Brief Description of the Drawings

Further features and advantages of the present invention will become apparent from the following
15 detailed description, taken in combination with the appended drawings, in which:

Fig. 1 shows a schematic representation of an inking unit of an offset press in order to illustrate
20 the method according to the invention for controlling the inking;

Fig. 2 shows a cross section through the inking unit of Fig. 1 along the section line II-II; and
25

Fig. 3 shows a schematic representation of a printed sheet to be printed in order to illustrate
further the method according to the invention for controlling the inking.
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Detailed Description of the Preferred Embodiment

In the following text, the present invention will be described in greater detail with reference to Figs 1 to 3, specifically using the example of measurement
35 regions which are present outside a subject as print control elements. It should be pointed out that the invention can also be used in an analogous way in the case of measurement regions which lie within a subject.

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Figs 1 and 2 show an inking unit 10 constructed as a vibrator inking unit of an offset press, the inking unit 10 comprising a ductor roll 11 which picks up printing ink kept ready in an ink fountain 12. A vibrator roll 13 interacts with the ductor roll 11, the vibrator roll 13 picking up printing ink from the ductor roll 11 in the form of a vibrator strip, as it is known, and transferring it cyclically in the direction of the arrow 14 to an inking unit roll 15 arranged downstream of the vibrator roll 13. Arranged downstream of the inking unit roll 15 are further inking unit rolls 16, 17, 18, 19, 20, 21, 22, 23, 24, 25 and 26, the inking unit rolls 16 to 26 transporting the printing ink in the direction of a forme cylinder 27. The inking unit rolls 23, 24, 25 and 26 roll on the form cylinder 27 and are therefore also designated ink applicator rolls. Positioned on the forme cylinder is at least one printing forme, the ink applicator rolls 23 to 26 applying the printing ink to the printing forme. The quantity of ink which is transferred from the ink fountain 12 onto the ductor roll 11 depends on zonal inking of a subject to be printed. As can be gathered from Fig. 2, the ink fountain 12 is assigned inking zone actuating elements 28, as they are known, it being possible via the inking zone actuating elements 28 for the quantity of ink transferred to the ductor roll 11 for each inking zone to be adjusted. In the exemplary embodiment shown, in which the inking unit 10 is constructed as a vibrator inking unit, the inking zone actuating elements are implemented as ink slides. The ink slides and also the vibrator roll are a constituent part of what is known as an ink metering device of the inking unit.

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It should be pointed out that the inking unit 10 illustrated in Fig. 1 is preferably used in sheet-fed offset presses. In the case of web-fed offset presses,

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use is made of inking units which, instead of ink slides, comprise what are known as ink knives as inking zone actuating elements and, instead of the vibrator roll, comprise what is known as a film roll.

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Fig. 3 shows in schematic form a printing material 29 which is printed with a subject 30 and, outside the subject 30, with print control elements 31, the print control elements 31 being printed onto the printing material 29 outside the actual subject 30 in the form of a control strip 32. In the exemplary embodiment shown in Fig. 3, the subject 30 printed onto the printing material 29 is subdivided into a total of twelve inking zones 33, it being possible for the printing ink applied to the printing material 29 in each inking zone 33 to be adjusted by means of a corresponding number of inking zone actuating elements 28. In the example of Fig. 3, for each inking zone 33 a print control element 31 is printed onto the printing material 29 outside the subject 30, a circumferential strip 34 covered by the print control element 31 being smaller or narrower than the circumferential strip covered by the respective inking zone 33. The print control elements 31 printed outside the subject 30 are measured densitometrically and/or colorimetrically and/or spectrally and actual values determined in this case are compared in a control device with predefined intended values, in order to generate actuating signals for the inking zone actuating elements 28 for the automatic control of the zonal inking of the subject 30 on the basis of the comparison between the actual values obtained by measuring the print control elements 31 and the predefined intended values.

35 In the spirit of the present invention, it is now proposed to modify the control deviations between the actual values measured on the print control elements 31 outside the subject 30 and the predefined intended

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values on the basis of data from the subject 30 and/or on the basis of data from the inking unit 10.

In this way, it is possible to counteract the effect that, although the actual values registered in the region of the print control elements 31 agree with the corresponding intended values, deviations between actual values and intended values can be detected in the subject. The control deviations are preferably modified both on the basis of data from the subject and on the basis of a model of the respective inking unit.

In the case of modifying the control deviations on the basis of data from the subject, use is made of data from a digital prepress stage, which are available either as low-resolution data in PPF format or JDF format or as high-resolution image data. The high-resolution image data are preferably what are known as bitmaps of the individual colour separations, which are normally used for the production of printing formes.

The model of the inking unit which is used for the modification of control deviations depends on the rolling behaviour and, if appropriate, the oscillating behaviour of the rolls of the inking unit. Data about materials used in the inking unit and also about the dynamic behaviour of the inking unit can also be incorporated in the model of the inking unit.

As already mentioned, for each inking zone 33 of the subject 30, at least one print control element 31, which is printed onto the printing material 29 outside the subject 30, is measured, a circumferential strip 34 covered by the print control element 31 being smaller or narrower than a circumferential strip covered by the respective inking zone 33.

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Now, it is within the spirit of the present invention, by using the data from the subject, which are preferably provided from a digital prepress stage, to determine an area coverage value for the circumferential strip covered by the print control element 31. If this area coverage value determined from the data from the subject is smaller than a predefined limiting value then, in the spirit of the present invention, the predefined intended value for the corresponding inking zone actuating element is increased or the measured actual value is reduced.

For instance, when the area coverage value determined from the data from the subject for the circumferential strip covered by the print control element 31 is between 0% and 0.5%, the intended value for the corresponding inking zone actuating element can be increased by an amount X; if, on the other hand, the area coverage value determined from the data from the subject lies between 0.5% and 2%, then the intended value can be increased by an amount Y, the amount Y being smaller than the amount X. If, on the other hand, the area coverage value determined for the circumferential strip covered by the print control element is greater than 2%, no increase is made in the intended value.

It should be pointed out that this adjustment law for the intended value is merely purely exemplary and that, depending on the area coverage value determined, any desired complex modification of the control deviation between intended values and actual values can be carried out.

With the above described modification of the control deviation between intended values and actual values on the basis of an area coverage value which is determined from subject data from a circumferential strip covered

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by the print control element, it is possible to counteract the effect that, if no ink removal takes place in the circumferential strip of the subject in which the print control element lies, printing ink builds up in the inking unit and in this way the print control element contains a higher ink density than would be the case in the event of further ink removal. Accordingly, in the spirit of the present invention, when an area coverage value determined from data from the subject in the circumferential strip covered by the print control element is smaller than a predefined limiting value, the predefined intended value for the corresponding inking zone actuating element is increased or the measured actual value is reduced.

In a development of this idea according to the invention, the circumferential strip covered by the print control element can be subdivided into a plurality of part strips, an area coverage value being determined from the data from the subject for each of the part strips. Averaging of the area coverage values of these part strips can then be used to modify the control deviation between the intended value and actual value. Alternatively, only the area coverage value of that part strip within which a measurement field of the print control element lies can be used for the adaptation of the intended value and/or the actual value and therefore for the modification of the control deviation between the intended value and actual value.

If an oscillating behaviour of at least one roll of the inking unit is known from the inking unit model then, according to a further advantageous development of the invention, an area coverage value is not just determined from the subject data for the circumferential strip covered by the print control element; instead, such area coverage values are also determined for adjacent circumferential strips.

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Corresponding area coverage values are preferably determined from the data from the subject for a plurality of adjacent circumferential strips, circumferential strips lying further removed from the circumferential strip covered by the control element being weighted less highly than circumferential strips lying closer when changing the intended value and/or actual value.

10 According to a further aspect of the present invention, depending on the model of the respective inking unit, what is known as an ink drop-off is determined. An ink drop-off normally arises when the ink applicator rolls rolling on the forme cylinder cannot apply any printing ink to the printing forme because of a clamping channel for a printing plate. If it is determined from the inking unit model that a print control element is affected by such an ink drop-off, then a modification of the control deviation between the measured actual value and the predefined intended value is likewise carried out.

If, by using the ink drop-off determined from the inking unit model, it is determined that there is a maximum of the ink drop-off in the circumferential strip covered by a print control unit, then the predefined intended value for the corresponding inking zone actuating element is increased or the measured actual value is reduced. If, on the other hand, there is a minimum of the drop-off of ink in the circumferential strip covered by the print control element, then the predefined intended value for the corresponding inking zone actuating element is reduced or the measured actual value is increased.

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According to a further aspect of the present invention, by using the data from the subject and from the model of the inking unit, an area coverage value dependent on

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the ghosting behaviour of the inking unit is determined for a circumferential strip covered by the print control element. If this area coverage value dependent on the ghosting behaviour is greater than a predefined limiting value then, in the spirit of the present invention, the predefined intended value for the corresponding inking zone actuating element is reduced or the measured actual value is increased. In this case, the procedure is as follows, that an area coverage value is determined for the circumferential strip covered by the print control element that lies before the circumferential strip covered by the print control element by one developed length of an applicator roll. Preferably, for the two applicator rolls with the greatest ink flow, in each case a corresponding area coverage value is determined one developed length of these rolls before the circumferential strip covered by the print control element. If the area coverage determined in this case is greater than a predefined limiting value, then the predefined intended value for the corresponding inking zone actuating element is preferably reduced.

In this way, it is possible to take account of the effect that, when the circumferential strip covered by the print control element is removed by one circumferential length of an ink applicator roll from a circumferential strip with high area coverage, the print control element indicates a lower ink density, since it is not yet possible to compensate completely for such a sharp ink drop-off after the ink applicator roll has rolled over.

In a practical exemplary embodiment, the procedure can be such that when an area coverage value between 80% and 95% is determined from the data from the subject and the inking unit model for a circumferential strip which lies one developed length before the

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circumferential strip covered by the print control strip, the intended value for the corresponding inking zone element is reduced by an amount A whereas, if this area coverage value lies between 95% and 100%, the
5 intended value is reduced by an amount B, B being greater than A. In the face of area coverage values determined as less than 80%, no reduction is made in the intended value for the corresponding inking zone actuating element. Here, too, the adjustment law can
10 again be configured as complexly as desired, depending on the ghosting behaviour of the inking unit.

In the spirit of the present invention, accordingly, a method for controlling the inking is proposed in which
15 control deviations between actual values registered on print control elements printed outside the actual subject and predefined intended values are modified on the basis of data from the subject and on the basis of an inking unit model. In this way, effects such as
20 inking unit ghosting, ink drop-off and the fact that a circumferential strip covered by a print control element is smaller than a circumferential strip covered by the respective inking zone can be taken into account. In this way, inking during printing can be
25 optimized considerably.

Claims

1. A method for controlling the inking in at least one inking unit of an offset press, namely for controlling the zonal inking that can be adjusted by inking zone actuating elements of the respective inking unit, measurement regions being measured for this purpose and actual values determined in the process being compared with predefined intended values in order to generate actuating signals for the inking zone actuating elements on the basis of the comparison between the actual values and the intended values, characterized in that the control deviations between the measured actual values and the predefined intended values are modified on the basis of a model of the respective inking unit and/or on the basis of data from the subject.
2. A method according to Claim 1, characterized in that the control deviations between the measured actual values and the predefined intended values are modified on the basis of data from the subject.
3. A method according to Claim 2, characterized in that the control deviations between the measured actual values and the predefined intended values are modified on the basis of data from the subject and on the basis of a model of the respective inking unit.
4. A method according to at least one of Claims 1 to 3, characterized in that the model of the respective inking unit depends on the construction of the inking unit, in particular on a rolling behaviour and, if appropriate, on an oscillating behaviour of the rolls of the inking unit.

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5. A method according to at least one of Claims 1 to 4, characterized in that, for the data from the subject, use is made of data from a digital prepress stage.
6. A method according to Claim 5, characterized in that, for the data from the subject, use is made of low-resolution data in the PPF format or JDF format.
7. A method according to Claim 5, characterized in that, for the data from the subject, use is made of high-resolution image data, preferably bitmaps of the individual colour separations, which are also used to produce printing plates.
8. A method according to at least one of Claims 1 to 7, characterized in that the measurement regions measured outside a subject are print control elements.
9. A method according to Claim 8, characterized in that print control elements which are positioned in a control strip outside the subject are measured.
10. A method according to at least one of Claims 1 to 7, characterized in that regions within a subject are measured as measurement regions.
11. A method according to at least one of Claims 1 to 7, characterized in that print control elements printed outside a subject and regions within the subject are measured as measurement regions.
12. A method according to at least one of Claims 1 to 11, characterized in that the measurement regions

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are measured densitometrically and/or colorimetrically and/or spectrally.

13. A method according to at least one of Claims 1 to 12, characterized in that, for each inking zone of the subject, at least one measurement region is measured, a circumferential strip covered by the measurement region being smaller than a circumferential strip covered by the respective inking zone.
14. A method according to Claim 13, characterized in that, when an area coverage value determined from the data from the subject in the circumferential strip covered by the measurement region is smaller than a predefined limiting value, the predefined intended value for the corresponding inking zone actuating element is increased or the measured actual value is reduced.
15. A method according to Claim 14, characterized in that, depending on the model of the respective inking unit, in addition to the area coverage value of the circumferential strip covered by the measurement region, an area coverage value of at least one adjacent circumferential strip is used to change the intended value and/or actual value.
16. A method according to Claim 15, characterized in that the change of the intended value and/or actual value is made on the basis of area coverage values of a plurality of adjacent circumferential strips, circumferential strips lying further removed being less highly weighted than circumferential strips lying closer when changing the intended value and/or actual value.

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17. A method according to at least one of Claims 13 to 16, characterized in that the circumferential strip covered by the measurement region is subdivided into a plurality of part strips, an area coverage value being determined from the data from the subject for each of the part strips.
18. A method according to Claim 17, characterized in that averaging of the area coverage values of the part strips is used to adapt the intended value and/or actual value.
19. A method according to Claim 17, characterized in that only the area coverage value of that part strip within which a measurement field of the measurement region lies is used for the adaptation of the intended value and/or the actual value.
20. A method according to at least one of Claims 13 to 19, characterized in that, depending on the model of the respective inking unit, an ink drop-off is determined and when there is a maximum of the ink drop-off in the circumferential strip covered by the measurement region, the predefined intended value for the corresponding inking zone actuating element is increased or the measured actual value is reduced.
21. A method according to Claim 20, characterized in that when there is a minimum of the ink drop-off in the circumferential strip covered by the measurement region, the predefined intended value for the corresponding inking zone actuating element is reduced or the measured actual value is increased.
22. A method according to at least one of Claims 13 to 21, characterized in that, by using the data from

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the subject and from the model of the respective inking unit, an area coverage value dependent on the ghosting behaviour of the respective inking unit is determined for the circumferential strip covered by the measurement region and when this area coverage value is greater than a predefined limiting value, the predefined intended value for the corresponding inking zone actuating element is reduced or the measured actual value is increased.

23. A method according to Claim 22, characterized in that an area coverage value is determined for the circumferential strip covered by the measurement region that lies one developed length of at least one ink applicator roll before the circumferential strip covered by the measurement region.
24. A method according to Claim 23, characterized in that, for the two ink applicator rolls with the greatest ink flow, in each case a corresponding area coverage value is determined one developed length of these ink applicator rolls before the circumferential strip covered by the measurement region, the intended value and/or the actual value being changed on the basis of these area coverage values.

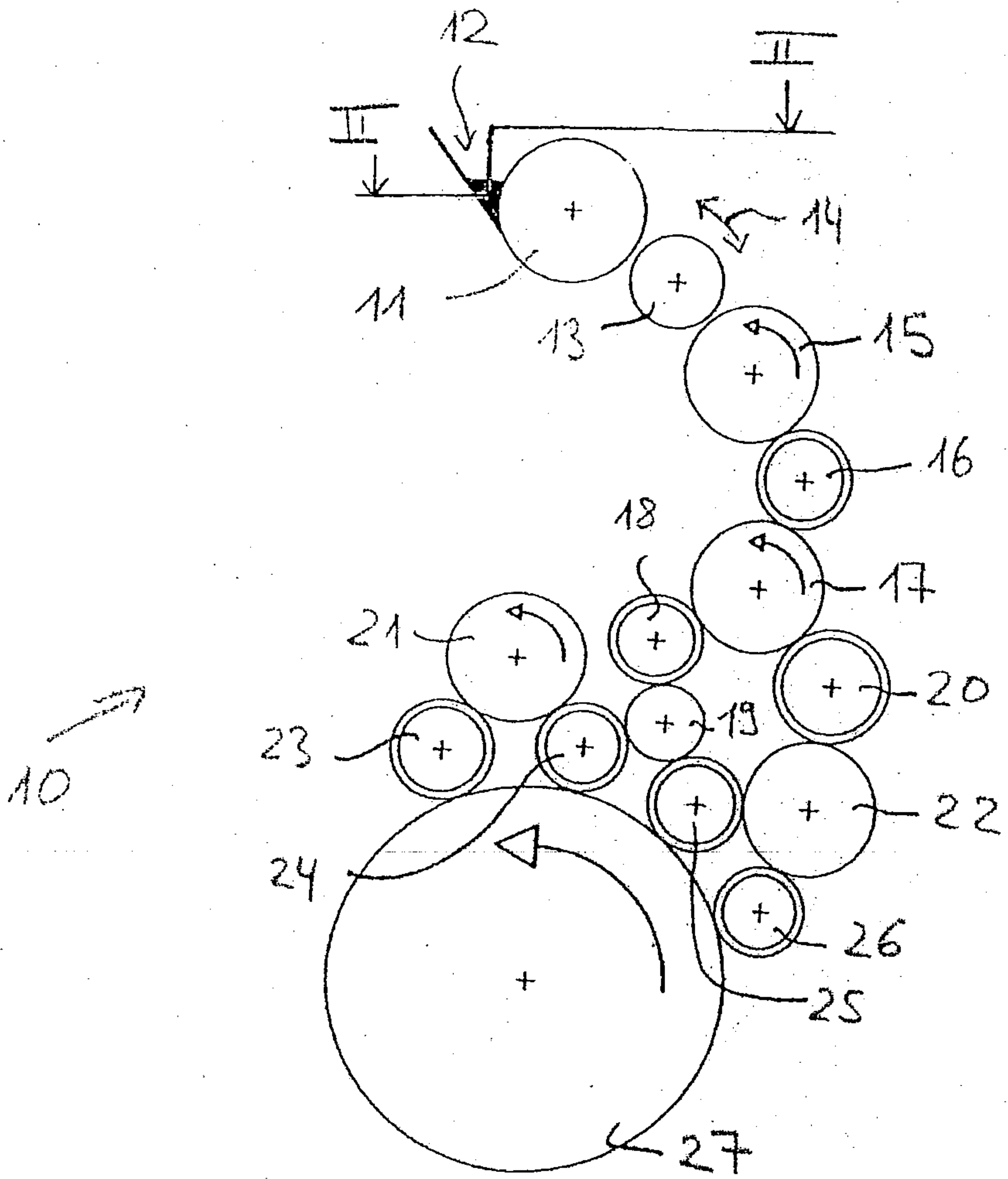


Fig. 1

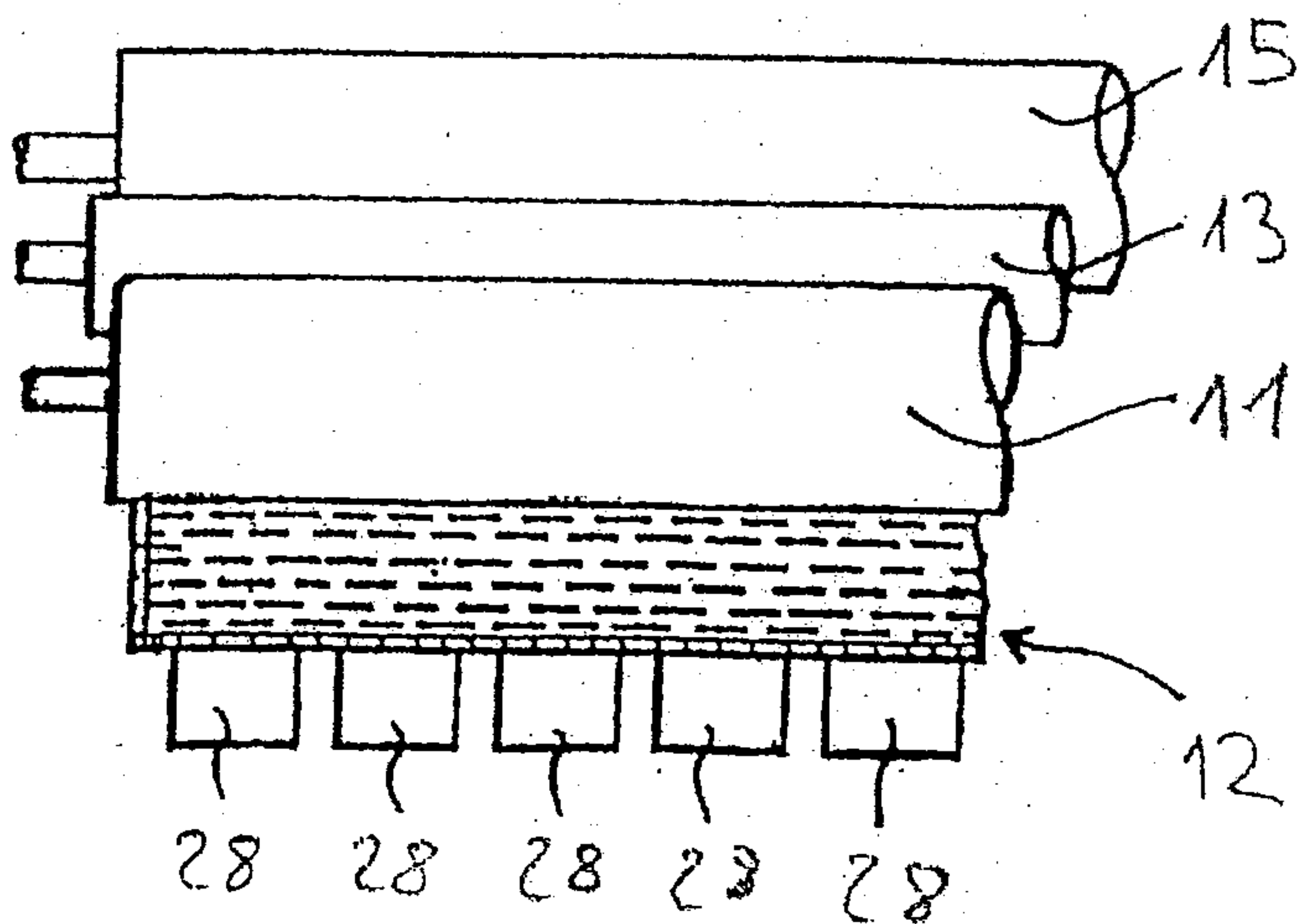


Fig. 2

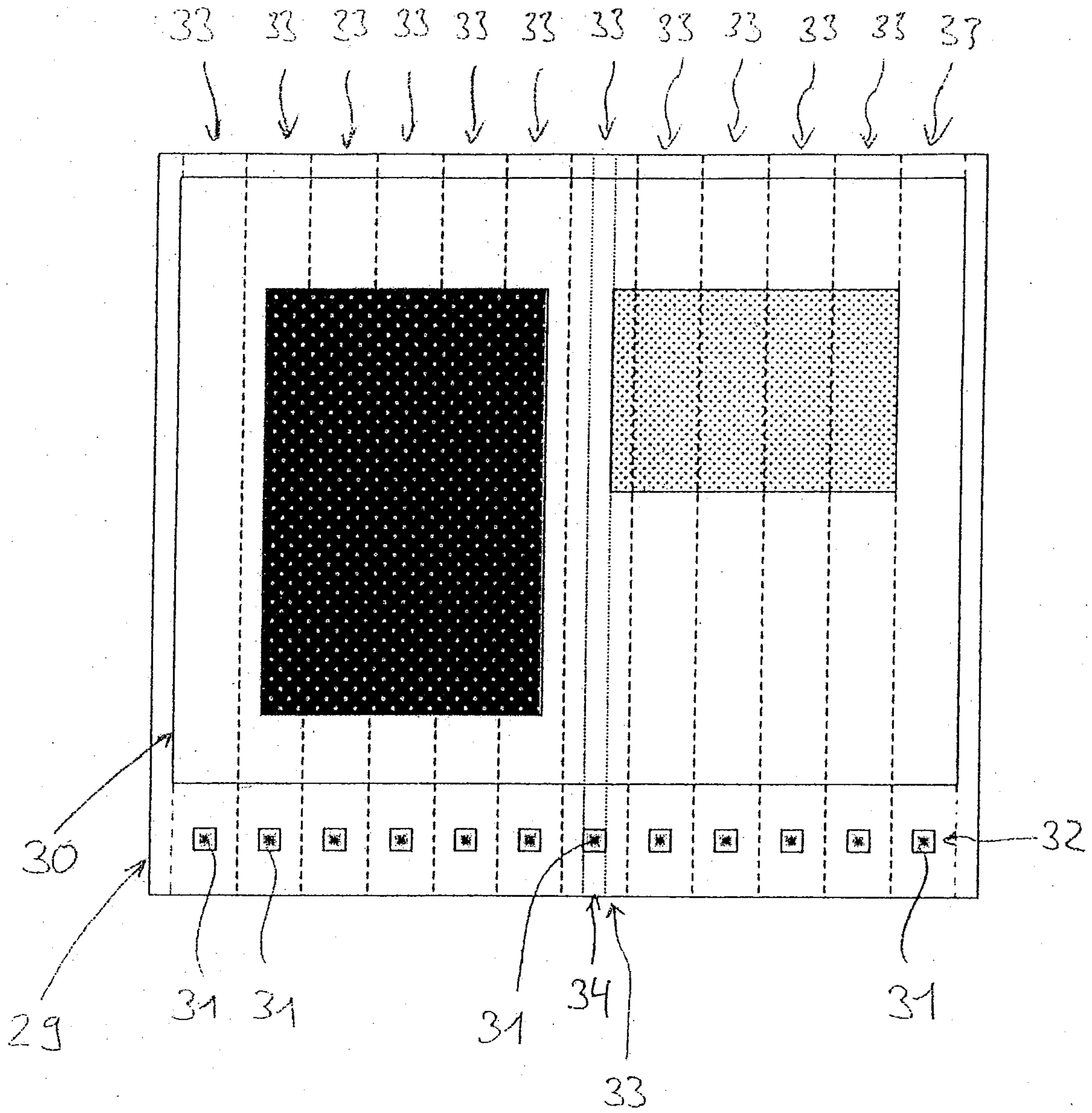
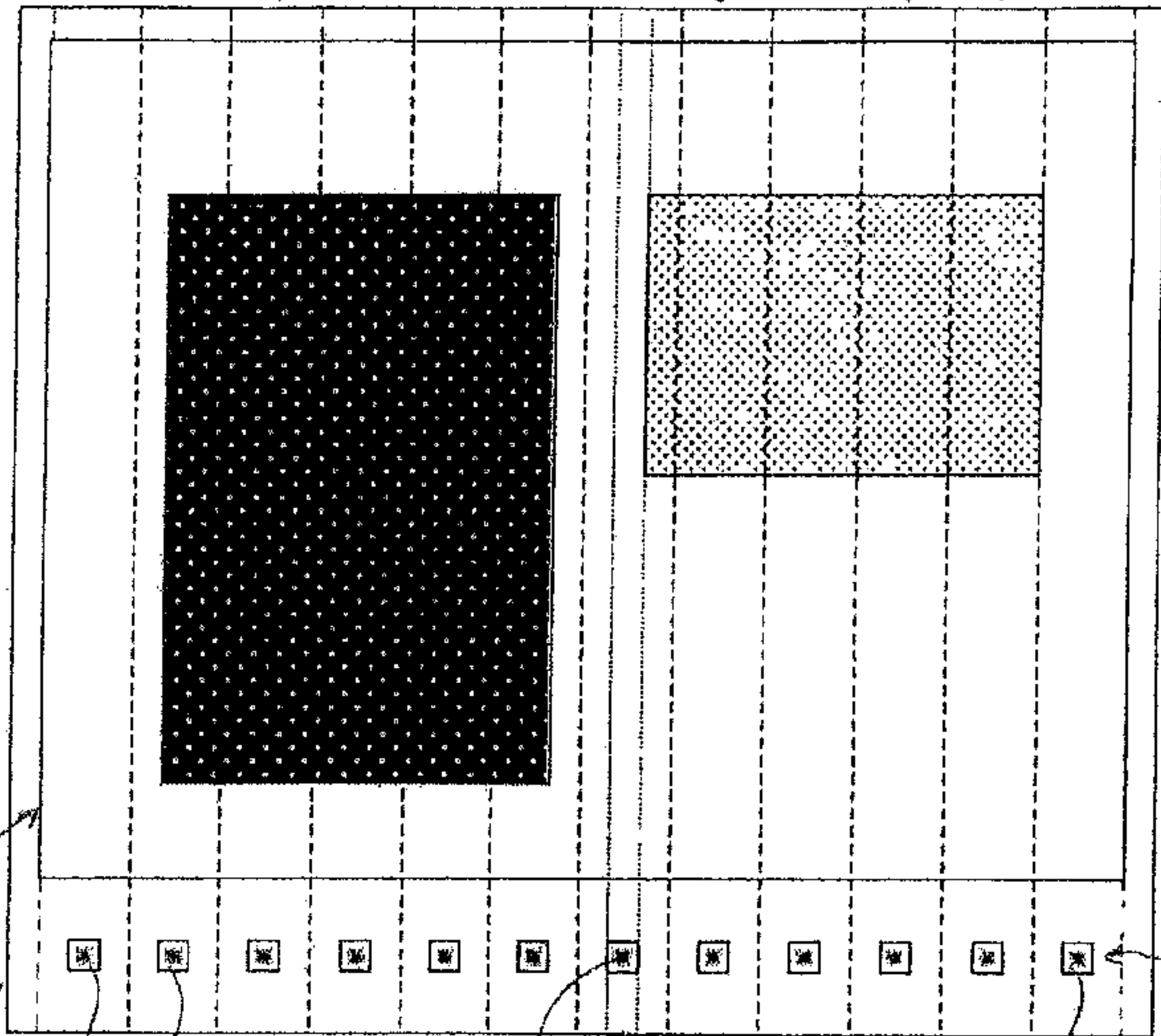


Fig 3

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