

[54] **DOCTOR BLADE FOR PHOTOGRAVURE PRINTING MACHINE**

[75] Inventor: **Max Dätwyler**, Bleienbach, Switzerland

[73] Assignee: **Max Datwyler & Co.**, Bleienbach, Switzerland

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[58] **Field of Search**..... 101/425, 169, 157; 15/256.51; 118/261

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Primary Examiner—Stephen C. Pellegrino
Attorney, Agent, or Firm—Diller, Brown, Ramik & Wight

[57] **ABSTRACT**

A doctor blade assembly for photogravure printing machines for the removal of excess printing ink from a printing surface comprising an elongated doctor blade having opposite longitudinal edge portions one of which has a contact surface adapted to contact a printing surface, a strengthening element secured to said doctor blade therealong and having a longitudinal edge terminating short of the contact surface, a plurality of individually connected though sequentially removable means between the longitudinal edge and the contact surface for supportive back-up of said one edge portion and for sequentially reducing the length of the removable means in a direction away from the contact surface whereby the distance between the last of the removable means and the contact surface is maintained essentially constant during the progressive wear of the doctor blade one edge portion.

14 Claims, 5 Drawing Figures

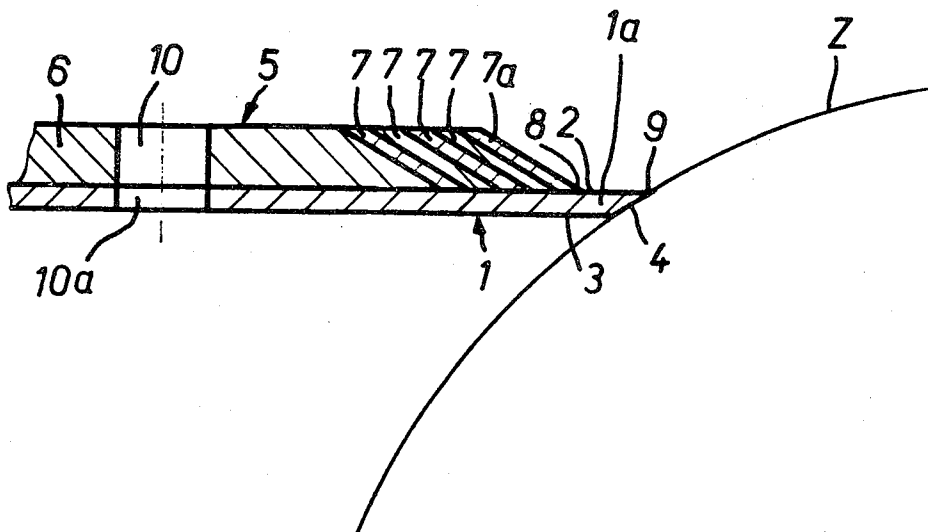


Fig.1

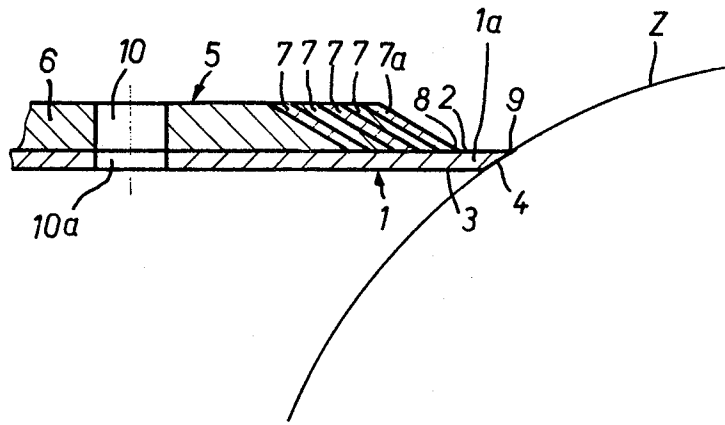
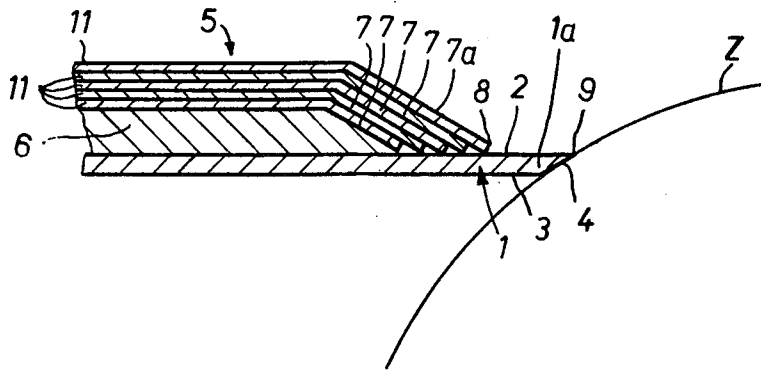
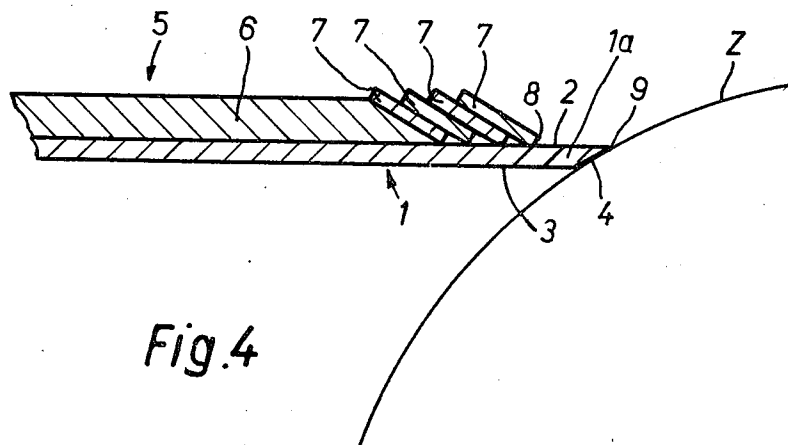
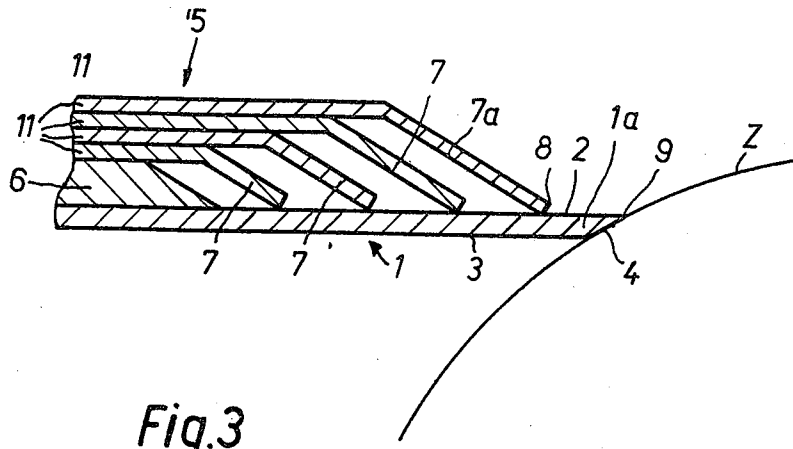


Fig.2





DOCTOR BLADE FOR PHOTOGRAVURE PRINTING MACHINE

BACKGROUND OF THE INVENTION

The present invention relates to a new and improved construction of a doctor blade assembly for photogravure printing machines for the removal of printing ink or the like from a printing surface, in particular from a printing cylinder.

It is well known in this particular field that the surface of the doctor blade contacting the printing cylinder of the photogravure printing machine is subject to material wear. Due to this material wear phenomenon this contact surface of the prior art doctor blades which bear against the printing cylinder, and wherein the end confronting the printing cylinder is constructed to possess a substantially wedge-shaped cross-section, always becomes wider. This in turn impairs the wiping action of the doctor blade and leads to undesired fluctuations in the color tone of the printed product. The contact surface of the doctor blade is also referred to as the doctor blade bevel.

In order to prevent the above-discussed undesirable effects the doctor blade must be frequently replaced and reground, each time requiring standstill of the printing machine.

SUMMARY OF THE INVENTION

Hence, it is a primary object of the present invention to provide an improved construction of a doctor blade assembly for photogravure printing machines or the like which is not associated with the aforementioned drawbacks and limitations of the prior art proposals.

Another and more specific object of the present invention relates to a new and improved construction of a doctor blade assembly which overcomes the aforementioned drawbacks and wherein wear of the doctor blade bevel contacting the printing surface does not produce any impairment in the ink wiping action of the doctor blade.

Now in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the doctor blade assembly of the previously mentioned type is manifested by the features that there is provided a doctor blade which has a contact surface which contacts the printing surface and this doctor blade is connected with a strengthening element. The strengthening element terminates at a spacing from the contact surface of the doctor blade, and at the end of such support element which confronts the contact surface is provided a number of individual sections. These individual sections are connected with one another and are individually removable so that by removing individual sections the spacing or distance between the contact surface of the doctor blade and the last of the individual sections is maintained essentially constant during the progressive wear of the contact surface.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIG. 1 is a schematic sectional view of a first exemplary embodiment of a doctor blade assembly for pho-

togravure printing machines and designed according to the teachings of the present invention;

FIG. 2 is a second embodiment of a doctor blade assembly;

FIG. 3 is a third embodiment of a doctor blade assembly;

FIG. 4 is a fourth embodiment of a doctor blade assembly; and

FIG. 5 is a fifth embodiment of a doctor blade assembly designed according to the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Describing now the drawings it is to be understood that in each of the exemplary illustrated embodiments of doctor blade assemblies constructed according to the teachings of the invention there have only been conveniently shown in the drawings those portions of the doctor blade assemblies which are significant for understanding the basic concepts of the invention and which generally confront the schematically portrayed printing cylinder Z of a rotary photogravure printing machine. To simplify the drawing illustration the end of the doctor blade assembly which is clamped in standard fashion at a doctor blade holder has been omitted.

Now each of the constructions of doctor blade assemblies depicted in FIGS. 1 to 5 will be understood to incorporate a substantially plate-shaped doctor blade 1. This doctor blade 1 extends over the entire width of the doctor blade assembly and is delimited or bounded by two boundary surfaces 2 and 3 which are essentially parallel to one another. The doctor blade 1 possesses a contact surface 4 which extends at an inclination with respect to the surfaces 2 and 3, as shown, and also bears against the printing cylinder Z. As mentioned heretofore, this contact surface 4 of the doctor blade is also sometimes referred to in the art as the doctor blade bevel. Since the spacing between both surfaces 2 and 3 remains constant the width of the doctor blade bevel 4 essentially remains constant during wear of the scraper element 1.

Since the width of the doctor blade bevel 4 should not exceed a certain or predetermined value, which for instance is in the order of magnitude of about 50 μm , in order to obtain at any time a sufficiently satisfactory wiping of the ink from the surface of the printing cylinder, the doctor blade 1 must be constructed correspondingly thin. In order to impart to such thin doctor blade 1 a sufficient bending strength it is connected with a strengthening element 5.

With the exemplary embodiment of doctor blade assembly depicted in FIG. 1 this strengthening element 5 embodies a strengthening member 6 secured at the surface 2 of the doctor blade 1, and at one end 6a of such strengthening member 6 there are means in the form of a number of individual abutting sections 7. These sections 7 are connected at their joint surfaces with one another, as will be explained more fully hereinafter, for instance by adhesively bonding the same, and with the doctor blade 1 in such a way that in each instance individual sections can be detached from the neighboring sections. The end 8 of the last section 7a which bears against the doctor blade 1 extends at a spacing from a longitudinal edge 9 of the contact surface 4 of the doctor blade 1 and which edge 9 bears against the printing cylinder Z. The section 7 thereby collectively define a plurality of individually connected though sequentially

removable means 7 between a longitudinal edge or end (unnumbered) of the strengthening element 6 and the contact surface 4 or edge 9 of the doctor blade 1 for supportive back-up thereof and for sequentially reducing the length of the removable means 7 in a direction away from the contact surface 4 whereby the distance between the last of the removable means 7 and the contact surface 4 is maintained essentially constant during the progressive wear of the doctor blade 1.

The doctor blade 1 and the strengthening element 5 prior to attachment are adjusted with regard to their mutual position by means of a centering tool inserted into the bores 10 and 10a of such components.

Now if the doctor blade 1 is worn down during use, then in each case by removing the forwardmost section 7a it is possible to essentially maintain constant the spacing between the edges 8 and 9. In this way there is achieved the result that the portion 1a of the doctor blade 1 which protrudes past the strengthening element 5 always remains approximately the same size, which apart from the constant width of the doctor blade bevel 4 leads to a constant wiping action of the doctor blade, so that there can be effectively avoided fluctuations in the color at the printed products.

Since the sections 7 can be detached or removed during rotation of the printing cylinder Z, there is not required any downtime or standstill of the printing machine for compensating the wear of the doctor blade.

The exemplary embodiments of doctor blades depicted in FIGS. 2 to 5 respectively, essentially correspond to the exemplary embodiment of doctor blade assembly above in connection with FIG. 1 and only deviate therefrom in the construction of the sections 7.

Now with the exemplary embodiments depicted in FIGS. 2 and 3 the sections 7 possess extended portions or extensions 11 which bear in superimposed fashion upon the strengthening member 6. These extensions or extended portions 11 are detachably connected with one another and the lowermost extension or extended portion 11 is additionally connected with the strengthening member 6.

In the exemplary embodiment of FIG. 2 the mutually abutting sections 7 are connected with one another at their abutting or joint surfaces, whereas with the exemplary embodiment of FIG. 3 the sections 7 are arranged at a spacing from one another in the direction of the doctor blade bevel 4. In this case the connection of these sections 7 occurs solely via the abutting and detachable interconnected extension or extended portions 11 of such sections 7. Apart from the possibility of removing or detaching the individual sections 7 manually in each instance, there are also other detachment techniques which can be conceivably employed, for instance based upon mechanical, chemical or electrical principles. Such techniques also can be combined with a suitable measuring device which measures the length of the portion 1a of the doctor blade 1 which protrudes past the support element 5 and as a function of the wear of the doctor blade end automatically brings about removal or detachment of a section 7.

For the doctor blade 1, the strengthening member 6, the sections 7 and the extensions or extended portions 11 there are employed suitable materials for the relevant doctor blade constructions.

Thus, for instance for the doctor blade there is preferably used a metallic material, whereas the remaining

components 6, 7 and 11 for instance are formed of plastic or a metallic material.

For the connection of the sections 7 and the extensions 11 with one another and with the strengthening member 6 and the doctor blade 1 there are to be chosen connection means which, on the one hand, ensure for a permanent connection in order to avoid any undesired detachment of the individual sections 7 and the connection or extended portions 11, and on the other hand, when required, still permit of an effortless detachment of such components. All of these requirements can be fulfilled by connection means for instance in the form of suitable commercially available adhesives; furthermore, connections of the desired type also can be obtained by means of suitable welding- and soldering procedures, as schematically indicated by reference character 20 for instance in FIG. 1.

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto, but may be otherwise variously embodied and practiced within the scope of the following claims. Accordingly,

What is claimed is:

1. A doctor blade assembly for photogravure printing machines for the removal of excess printing ink from a printing surface comprising an elongated doctor blade having opposite longitudinal edge portions one of which has a contact surface adapted to contact a printing surface, a strengthening element secured to said doctor blade therealong and having a longitudinal edge terminating short of said contact surface, a plurality of individually connected though sequentially removable means between said longitudinal edge and said contact surface for supportive back-up of said one edge portion and for sequentially reducing the length of said removable means in a direction away from said contact surface whereby the distance between the last of said removable means and said contact surface is maintained essentially constant during the progressive wear of said doctor blade one edge portion.

2. The doctor blade assembly as defined in claim 1 wherein said removable means extend longitudinally along the length of said doctor blade.

3. The doctor blade assembly as defined in claim 1 wherein said removable means are a plurality of elongated sections extending longitudinally along the length of said doctor blade.

4. The doctor blade assembly as defined in claim 3 wherein said sections are connected with one another by an adhesive.

5. The doctor blade assembly as defined in claim 3 wherein said sections are connected with one another by welding.

6. The doctor blade assembly as defined in claim 3 wherein said sections are connected with one another by soldering.

7. The doctor blade assembly as defined in claim 3 wherein said elongated sections are disposed in shingle-like fashion upon said doctor blade.

8. The doctor blade assembly as defined in claim 3 wherein each elongated section has a first longitudinal edge generally parallel to said doctor blade and a second longitudinal edge directed at a downwardly directed incline in a direction toward said contact surface.

9. The doctor blade assembly as defined in claim 3 wherein each elongated section has a first longitudinal

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edge generally parallel to said doctor blade, a second longitudinal edge directed at a downwardly directed incline in a direction toward said contact surface, and said second longitudinal edges are in spaced relationship to each other.

10. The doctor blade assembly as defined in claim 3 wherein each elongated section has a first longitudinal edge generally parallel to said doctor blade, a second longitudinal edge directed at a downwardly directed incline in a direction toward said contact surface, and said second longitudinal edges are in spaced parallel relationship to each other.

11. The doctor blade assembly as defined in claim 7 wherein each elongated section has an edge resting

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upon said doctor blade.

12. The doctor blade assembly as defined in claim 8 wherein each second longitudinal edge of each elongated section has an edge resting upon said doctor blade.

13. The doctor blade assembly as defined in claim 9 wherein each second longitudinal edge of each elongated section has an edge resting upon said doctor blade.

14. The doctor blade assembly as defined in claim 10 wherein each second longitudinal edge of each elongated section has an edge resting upon said doctor blade.

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