June 16, 1959 H. E. B. SCOTT 2,890,473

DOCTORS FOR PAPER AND LIKE MACHINES

Filed Dec. 14, 1954 2 Sheets-Sheet 1

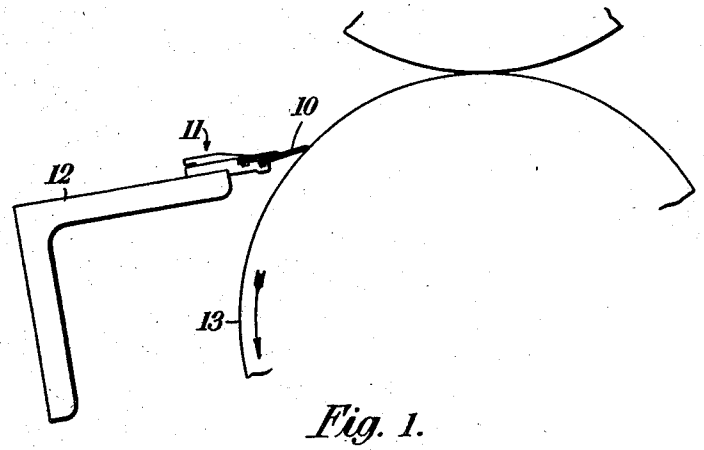


Fig. 1.

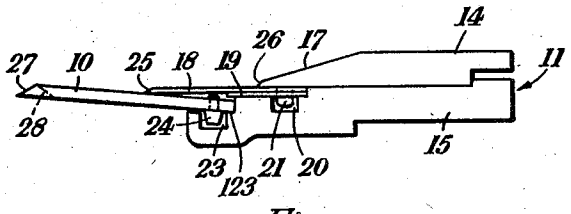


Fig. 2.

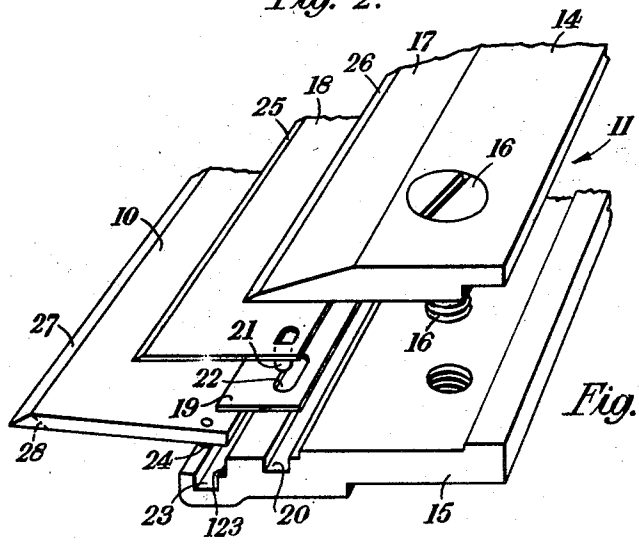


Fig. 3.

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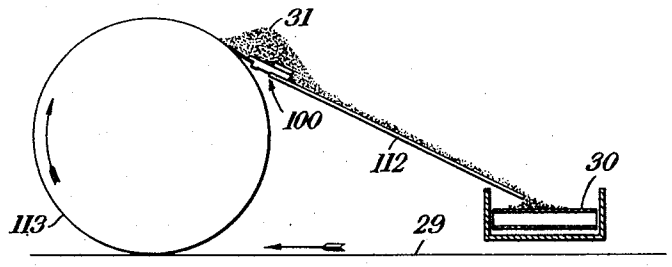


Fig. 4.

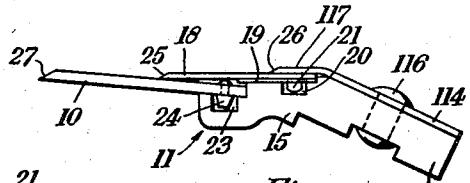


Fig. 5.

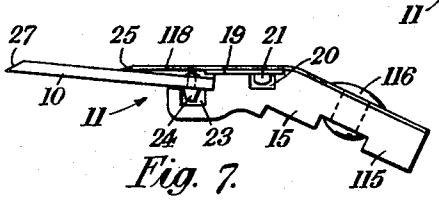


Fig. 7.

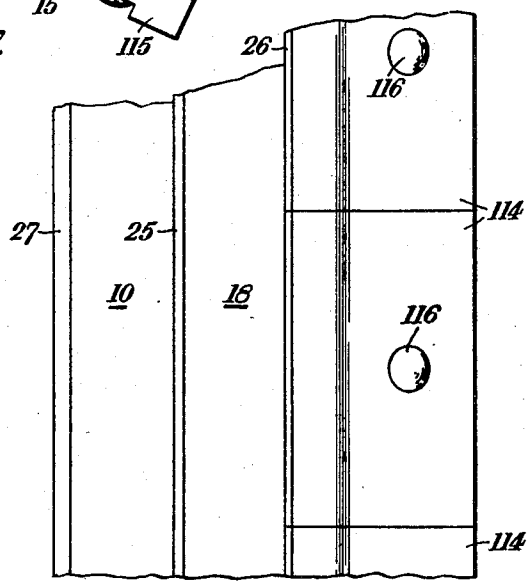


Fig. 6.

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DOCTORS FOR PAPER AND LIKE MACHINES

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Application December 14, 1954, Serial No. 475,083

9 Claims. (Cl. 15—256.5)

This invention relates to doctors for paper making and other machines, including rolls or cylinders which have to be kept clean, e.g. board making machines, pulp making machines, milk driers, metal foil rolling mills and gluing, crimping or combining machines.

More specifically, the invention relates to that type of doctor which comprises a holder, a doctor blade having its rear edge retained in the holder and a pressure plate, disposed above the blade and bearing against the upper surface of the blade throughout the whole, or substantially the whole, of the length of the blade.

A doctor in a paper making machine normally serves merely to clean the roll to which it is fitted by removing pulp and other impurities deposited on the roll by the web of paper. From time to time, however, the web of paper breaks and the doctor then performs the further function of stripping the web from the roll and preventing the web from winding itself around the roll.

The holder is normally extruded from brass or manganese bronze with a lip to retain the rear edge of the blade. Due to the fact that the holder is extruded, the upper lip of said retaining groove must be of substantial depth, with the result that the pressure plate is inclined at a substantial angle to the blade. This renders more difficult the rearward escape of the pulp.

Moreover, the rear edge of the pressure plate is normally also accommodated in a groove in the holder with a nose at the top of the holder bearing against the upper surface of the pressure plate near its rear end and it has hitherto been necessary to make this nose of substantial depth. This tendency has been accentuated by the fact that it is the usual practice to retain the pressure plate in the holder by rivets projecting from its undersurface and engaging in a longitudinal groove in the holder, the heads of the rivets projecting above the upper surface of the pressure plate, and thereby necessitating a clearance between said upper surface and the top of the retaining groove. The nose of the holder therefore necessarily slants upwardly and rearwardly from the upper surface of the pressure plate at a fairly steep angle of 30 degrees or more. Consequently, pulp scraped from the roll and travelling rearwardly along the upper surfaces of the blade and pressure plate is checked by the ramp formed by the sloping surface of the nose and accumulates in front of the ramp necessitating frequent cleaning of the doctor.

The present invention provides a doctor of the above type of streamlined form and such that the pulp or web of paper can travel freely along the upper surface of the pressure plate along and over the holder. The smooth streamlined shape of the upper surface of the whole construction is of particular importance on modern fast and wide paper making machines, which run often at 2,000 feet per minute or over and where the slightest obstruction to the web, should the paper break, would cause a bunch-up. At this high speed the broken paper is liable to accumulate on the doctor at such a fast rate

as to cause a bunch-up thus making the feeding up of the broken web very difficult and causing added loss of paper. This tendency is reduced with the doctor according to the invention.

According to the invention, the rear or trailing edge of the blade, instead of being retained in a groove in the holder which is open at the front or leading side only, is accommodated in an open-topped slot in the holder and is retained in said slot by a keep plate, the upper surface of which is in contact with the undersurface of the pressure plate. This keep plate can be considerably thinner than the above-mentioned extruded lip and consequently the angle between the pressure plate and the blade may be considerably reduced, e.g. to the order of 5 degrees or less. This has the advantage of facilitating the rearward travel of the pulp on the upper surface of the blade. Owing to the pressure plate and the blade being nearly parallel, the pressure plate can be of thicker material to resist the impact of the web at high speed and at the same time allow flexibility of movement of the blade. Also, the flexibility of the unsupported portion of the blade is increased. Moreover, since a groove closed at the top is no longer required in the holder, the latter can be made by machining from the solid bar stock, which enables the holder to be made of harder or stronger material, e.g. high tensile or stainless steel, which cannot be extruded.

Preferably the blade-retaining slot in the holder comprises a seating for the rear edge of the blade, and a portion accommodating lugs projecting from the blade near its rear edge. The keep plate is conveniently retained in position by lugs extending downwardly from the pressure plate, through holes in the keep plate, into a longitudinal slot in the holder.

The pressure plate may be bevelled at its forward edge, to provide a gradual rise from the upper surface of the blade, and abut with just sliding clearance at its rear end against the undersurface of a nose on the holder, the angle between the upper surface of the nose and the upper surface of the pressure plate being 15 degrees or less. Due to the bevel of the front of the pressure plate, and the small angle of the ramp afforded by the forward end of the nose, pulp or paper can travel with minimum obstruction from the upper surface of the blade onto and over the nose. The pressure plate may be retained in the holder by lugs welded onto its undersurface or by punched out downwardly extending projections.

As an alternative, the pressure plate may extend rearwardly over the holder and be secured thereto near its rear edge. In this case the nose on the holder normally present above the pressure plate is eliminated entirely, thus reducing still further the obstruction afforded rearward travel of the pulp.

Three embodiments of the doctor according to the invention will now be described in detail, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a side elevation, on a greatly reduced scale, showing the first form of doctor in position on the roll of a paper making machine;

Fig. 2 is a side elevation of this form of doctor on a larger scale;

Fig. 3 is an exploded view of the doctor shown in Fig. 2;

Fig. 4 is a diagram showing a typical known doctor installation fitted to a press roll of a paper making machine with broke conveyor;

Fig. 5 is a side elevation of the second form of doctor according to the invention, which is primarily intended for use in the installation shown in Fig. 4;

Fig. 6 is a corresponding plan view, and

Fig. 7 is a side elevation of the third form of doctor according to the invention, which is also primarily intended for use in the installation shown in Fig. 4.

Like numerals designate like parts throughout the figures.

The doctor shown in Fig. 1 comprises a blade **10**, supported in a metal holder **11**, carried by a bracket **12** which is biased by a spring or by gravity so that the blade **10** bears on the surface of a roll **13**.

Turning now to Figs. 2 and 3, the holder **11** is made of separately machined upper and lower sections **14**, **15** joined together by screws **16** or in my other suitable fashion. The upper section **14** has a flat undersurface, to which the forward end of the nose **17** is inclined at about 15 degrees. A pressure plate **18**, extending the full length of the blade **10**, bears against the upper surface of the blade, and a keep plate **19**, also extending the full length of the blade, retains the blade in the holder. The rear part of the upper surface of the lower section **15** is flat, the front portion being stepped down by the amount of the combined thickness of the pressure plate **18** and keep plate **19**. The thickness of each of these plates is conveniently .030". The pressure plate **18** can be made of thicker material for heavier duties. At the rear of the stepped down portion is an open topped longitudinal slot **20** to accommodate retaining projections **21** pressed out from the undersurface of the pressure plate near its rear edge, these projections passing with clearance through holes **22** in the keep plate. A further step down is provided near the front of the lower section **15** of the holder to accommodate the rear edge of the blade, and in front of this is an open topped longitudinal slot **23** to accommodate retaining lugs **24** on the undersurface of the blade near its rear edge. At the rear of the portion of the slot **23** accommodating the lugs is a seating **123** for the rear edge of the blade. The blade may be of metal .050" thick, or of synthetic plastic material ⅛" thick. The upper surface of the pressure plate is bevelled at its front edge **25** and bears against the blade slightly in rear of its longitudinal center line. The pressure plate is inclined to the blade at about 5 degrees. A bevel **26** is provided at the forward end of the nose **17** on the holder.

The forward edge of the blade **10** is bevelled at **27**, but after a short period of use the leading edge of the blade is worn away by contact with the roll to form a heel **28**.

The surfaces of the blade and pressure plate remote from the roll have, for convenience, been referred to as their upper surfaces. It will be appreciated that in cases where the doctor blade is mounted beneath the roll its "upper" surface will be located, in the space below its lower surface.

Fig. 4 shows a doctor installation at present in common use on the press rolls of paper making machines. The doctor **100** is shown applied to the press roll **113**, which operates on the pulp travelling forwards on the felt **29**. The doctor **100** is mounted on a downwardly inclined support **112** and pulp removed from the press roll **113** travels over the doctor and down the support onto a conveyor **30** running transversely to the felt.

Normally the doctor only serves to remove impurities from the press roll **113** but sometimes the web of partially consolidated pulp on the felt breaks and the doctor then has to strip this web from the roll **113**. Existing doctors at present in use on high speed paper making machines offer so much obstruction to rearward travel of the pulp over the blade and its holder and onto the support **112** that, when the web breaks, the pulp tends to accumulate as indicated at **31** in Fig. 4.

The forms of doctor shown in Figs. 6–7 are intended for use on press rolls and are designed to offer minimum obstruction to rearward travel of the pulp over the doctor blade and its holder.

The doctor shown in Fig. 5 and Fig. 6 is generally similar to that shown in Figs. 2 and 3, but the rear part **115** of

the lower section **15** of the holder **11** is bent downwardly, as indicated, to facilitate the travel of the pulp onto the support **112** (Fig. 4). The upper section of the holder is constituted by a number of thin, narrow, closely abutting sections **114**, which may conveniently be 3" in width, each attached to the lower section by a rivet **116**. The upper section of the holder thus has an extremely shallow nose **117**, formed with a bevel **26** at its forward end, and consequently offers very little obstruction to rearward travel of the pulp. Due to the fact that the rear part of the holder is bent downwardly, the pulp is already travelling in a downward direction by the time it encounters the heads of the rivets **116**. It cannot therefore accumulate in front of the rivet heads even when the doctor is installed on a fast running machine. The top section of the holder is divided into individual closely abutting sections **114** because of the difficulty in bending a long sheet of material to form throughout its length a nose **117** extending at the correct angle to the remainder of the sheet.

In the case of the doctor shown in Fig. 7, the pressure plate is extended rearwardly to constitute the top section of the holder **11**. The pressure plate is formed of individual narrow, closely abutting sections **118**, which may conveniently be 3" in width and which are united to the downwardly bent rear portion **115** of the lower section of the holder by the rivets **116**. In this case therefore the holder has no nose situated above the pressure plate and obstruction to rearward travel of the pulp is reduced to a minimum.

I claim:

1. A doctor assembly adapted to engage a roll and comprising: a lower elongated rigid holder member having a leading edge adjacent said roll and having formed therein two longitudinal grooves extending parallel to the axis of the roll, the leading groove nearer the roll being at a lower level than the trailing groove farther from the roll; an elongated doctor blade having a forward portion extending beyond the leading edge of the lower holder provided with an edge adapted to engage the roll and a rear portion having a trailing edge, said blade having spaced projections adjacent its trailing edge, said blade extending rearwardly to a point between said grooves, said projections being received in said leading groove and said trailing edge being backed by a wall of the lower holder located between the grooves; a keep plate having leading and trailing edges bearing on said lower holder member, the leading edge of said keep plate overlying the trailing edge of said doctor blade to the rear of said projections, the trailing edge of said keep plate overlying said trailing groove, being backed by a wall of said trailing groove and having spaced perforations overlying the trailing groove; a pressure plate in face contact with said keep plate, said pressure plate having leading and trailing edges and being inclined at a low angle to said doctor blade with its leading edge contacting a medial widthwise line on said doctor blade; projections formed on said pressure plate and entering the trailing groove through the perforations in said keep plate; an upper holder member having its leading edge beveled at a low angle, said upper holder member bearing on the trailing side of said lower holder member and overlying a portion only of the width of said pressure plate, and means for fastening the upper holder member to the lower holder member for securing said blade, keep plate and pressure plate to said upper and lower holder members.

2. A doctor assembly as set forth in claim 1 in which the pressure plate has a beveled leading edge.

3. A doctor assembly as set forth in claim 1 in which the holder members are bent downwardly at the rear of the pressure plate.

4. A doctor assembly as set forth in claim 1 in which the upper holder member is made up of a plurality of thin, narrow, closely abutting sections.

5. A doctor assembly as set forth in claim 1 in which

the pressure plate is inclined at an angle of not more than five degrees to the doctor blade.

6. A doctor assembly adapted to engage a roll comprising a rigid elongated holder member having one edge adjacent said roll and having parallel longitudinal grooves near said edge; an elongated doctor blade extending from a point beyond said edge to a point between said grooves and backed by a wall of the groove nearer said edge and having projections engaging said last mentioned groove; a keep plate overlying the other groove and the space between said grooves, said keep plate having perforations overlying said other groove, a flexible elongated pressure plate inclined at a low angle to the doctor blade and having one edge bearing on a medial portion of said doctor blade, said pressure plate lying on said keep plate and having projections penetrating the perforations in the keep plate and engaging said other groove, and means for securing said pressure plate to said holder member.

7. A doctor assembly as set forth in claim 6 in which the pressure plate has a beveled leading edge.

8. A doctor assembly as set forth in claim 6 in which the holder member is bent downwardly at the rear of the other groove.

9. A doctor assembly as set forth in claim 6 in which the pressure plate is made up of a plurality of narrow, closely abutting sections.

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