ABSTRACT

A doctor device is used in a paper making machine for scraping a roll. The roll is scraped by a blade attached to one end of an elastic arm. The other end of the arm is attached to a body beam extending parallel to the roll. The portion of the beam between the attachment and the blade is convexly curved and extends away from the arm.

2 Claims, 1 Drawing Figure
DOCTOR DEVICE FOR PAPER MAKING MACHINE

This invention relates to a doctor device used in a paper making machine for scraping a roll. Many of the rolls in a paper making machine have to be provided with external doctor devices, which prevent the pulp or the completed paper from adhering to the surface of the rolls. Doctor devices are used, for instance, in the calenders and presses of the paper making machine. The blade pressure of the blade against the roll has to be made at least nearly constant over the entire length of the roll. In existing doctor devices the required blade pressure between the roll and the blade was produced by the weight of the doctor device. In such doctor devices the blade pressure could be made to be sufficiently constant over the entire length of the roll.

These known doctor devices have the drawback that achievement of sufficiently high blade pressures was difficult and in some cases even impossible. It has therefore become quite common practice to use doctor devices in which at the ends of their bodies there are hydraulically or pneumatically operating swivelling cylinders for producing required blade pressure. It is true that in doctor devices of this kind blade pressures of desired magnitude are achieved, but when conventional doctor devices are used, the blade pressure at the ends will be higher than at the center, and the device does not operate satisfactorily. In order to eliminate this drawback it has been necessary to install in the body of the doctor device, devices for the compensation of deflection. However, such devices render the construction of the doctor device complex and expensive.

It should also be noted that a part of the doctor devices in a paper making machine has to operate in contact with hot cylindrical surfaces, which cause different temperatures on different sides of the doctor device body and these in their turn, cause a deflection of the body. The result is non-uniform blade pressure. It is also impossible to eliminate the influence of the working position of the doctor device on blade pressure.

Attempts have been made to eliminate these drawbacks by attaching the blade elastically to the body of the doctor device. One such solution consists in that the blade holder has been attached to the body by means of elastic rods spaced at a certain distance. The rods pass through the front of the hollow body beam forming the body and are attached to the rear wall of the body beam. No deflection compensating devices are then needed in the body of the doctor device because, due to the elastic attachment of the blade, uniform blade pressure over the entire length of the roll is achieved. The uniformity of the blade pressure is then not influenced by changes of temperature either. However, in a structure of this kind the attachment of the supporting arm of the blade holder to the body is difficult to accomplish. The fixing of the supporting arm within the body requires high manufacturing precision as far as the straightness of the line of holes is concerned.

An object of the present invention is the provision of a doctor device of the described type which does not have the drawbacks of existing devices.

Other objects will become apparent in the course of the following specification.

In the accomplishment of the objectives of the present invention it was found desirable to attach the blade to a supporting arm consisting of an elastic plate and having a length equal to that of the blade. The arm is fixed to the rear end of the side of the body beam facing its swivelling direction and so that it is located outside this side; this side of the body beam is convexly curved, extending away from the supporting arm in the direction towards the blade. It is advantageous to provide the blade with a protection plate having the same length as the blade and resting elastically against the outer surface of the side of the body beam constituting its rear side with reference to the swivelling direction of the beam, thereby enclosing the space between said plate-like supporting arm and the body beam.

Thus in accordance with the present invention the blade is connected by an elastic, plate-like supporting arm to the rear end of the side of the body beam facing the direction in which this beam swivels, and since said side is convexe curved, the point of support of the supporting arm against the side of the body may change without steps, depending on the blade pressure. Thus, the flexural rigidity will be the same over the entire length of the blade. When the blade has been provided with a protective plate, which encloses the space between the supporting arm and the body beam, no pulp detached by the blade, or the like, can enter said space.

It is advantageous if the body beam, which most appropriately has a drop-shaped cross section, is pivotally supported at its ends, at the centroid of its cross section. In that case the influence of the operational position of the doctor device on the blade pressure is eliminated, because then the blade pressure is solely dependent on the load imposed by the swivelling cylinders. Machining of the outer surface of the body to have desired shape and straightness is made easier.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawing the sole FIGURE of which is a cross-section through a doctor device constructed in accordance with the present invention.

The drawing shows the body of the doctor device consisting of a body beam 1 having a drop-shaped cross section. It is made of two longitudinal halves, which have been joined with each other by welding at the points 2 and 3. At its ends, at the centroid 4, the body beam 1 has been journeled with the aid of journal pins in bearing bushings (not shown), to be swivellable.

These journal pins are connected to swivelling cylinders at the ends of the doctor device. The blade pressure is then solely dependent on the load imposed by the swivelling cylinders. The arrow a indicates the swivelling direction of the doctor device. The blade 5 of the doctor device is connected by the blade holder 6 to a supporting arm 7 consisting of elastic sheet material and having the same length as the blade 5. The end of the arm opposite to the end where the blade has been fitted, is attached to the rear end of that side 8 of the body beam 1 which faces the swivelling direction, by means of the screw 9 and the counterpiece 10. The side 8 is convexly curved. Thus the supporting arm 7 located outside the side 8 draws farther away from the side 8 in the direction towards the blade 5. The supporting arm 7 has a breadth such that the blade 5 will be positioned farther in frontal direction than the front end of the body beam 1. To the blade holder 6 an elas
tic protective plate 11 has been attached, the curved end of which presses against the upper side of the body beam 1. The protective plate 11 has the length of the blade 5, so that it encloses the space between the supporting arm 7 and the side 8 of the body beam 1, preventing entrance of pulp or other foreign matter into this space.

When the blade pressure at the ends of the blade increases, the supporting arm 7 bends to be closer to the side 8. As a result, the point of contact between the supporting arm 7 and the side 8 moves closer to the blade. Since the side 8 is curved, this point of contact may move steplessly. The result is that the flexural rigidity of the supporting arm will always be the same over the entire blade length. When the blade pressure is increased, the spacing of the supporting arm becomes shorter, so that the stress imposed on the supporting arm and its elastic yielding remain within reasonable limits.

Since in a doctor device according to the present invention the supporting arm of the blade 5 is located on the outside of the body beam, the attachment of the supporting arm in the course of manufacturing is far more easily accomplished than that of a supporting arm entering the body beam.

I claim:

1. A doctor device for scraping a roll in a paper making machine, said device comprising a swivelling body beam, a scraping blade, an elastic supporting arm having a front end carrying said blade, the length of said arm being equal to that of said blade, means connecting the rear end of said arm to a side of said beam facing in the swivelling direction of the beam, said side of the beam being convexly curved and extending away from said arm and said blade, and an elastic plate having a length equal to that of said blade and one end connected to said front end of said arm and the other end connected to a side of said beam opposite to the first-mentioned side.

2. A device in accordance with claim 1, wherein said beam has a drop-shaped cross-section, said beam being pivoted at the centroid of its cross-section, said arm and said plate extending on opposite sides of the narrow end of said drop-shaped beam.