Aug. 20, 1946. W. BARRETT 2,406,056

MEANS FOR COATING PAPERS

Filed Nov. 24, 1943 3 Sheets-Sheet 1

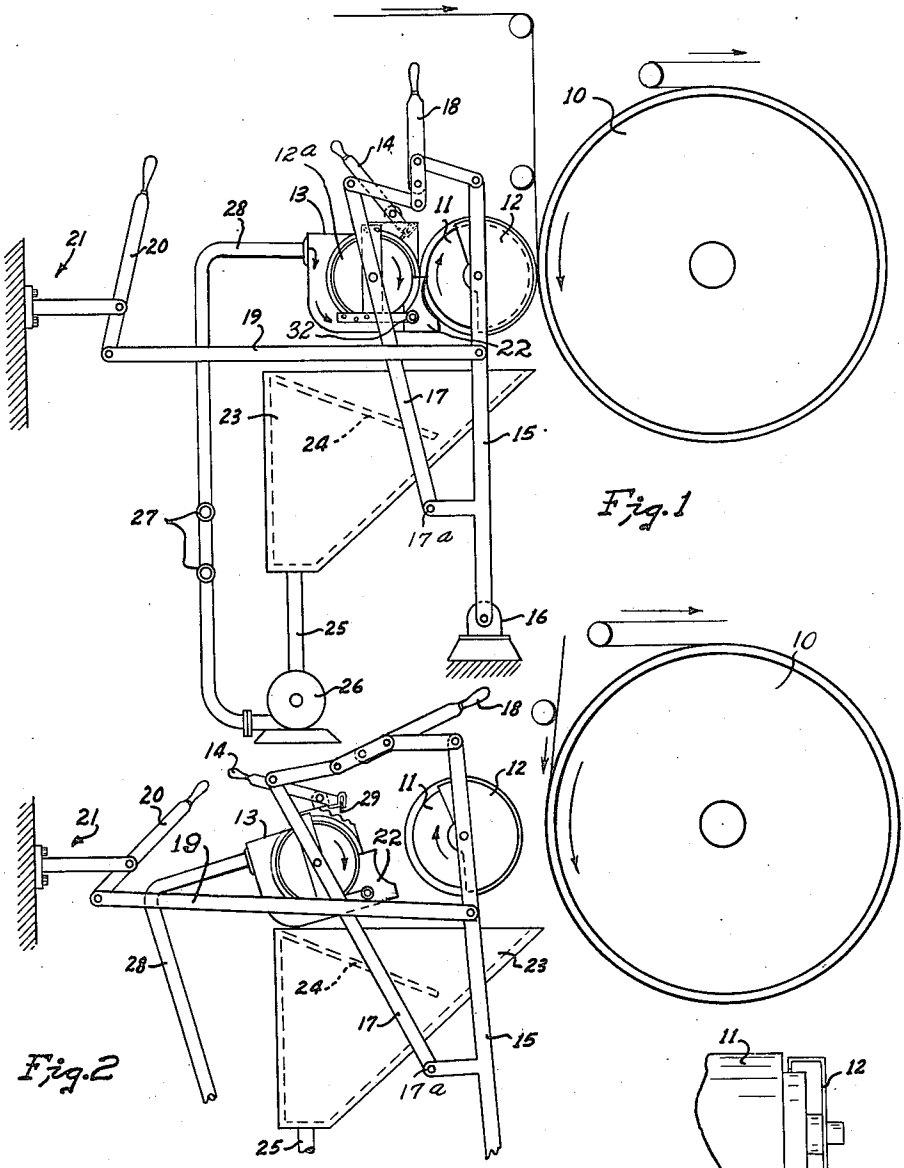


Fig. 1

Fig. 2

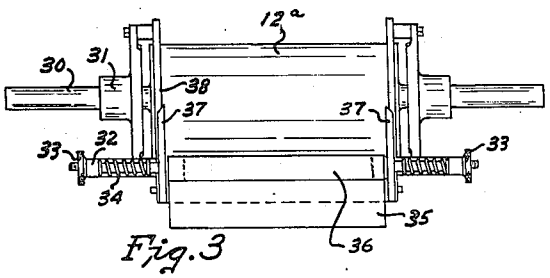


Fig. 3

Fig. 4

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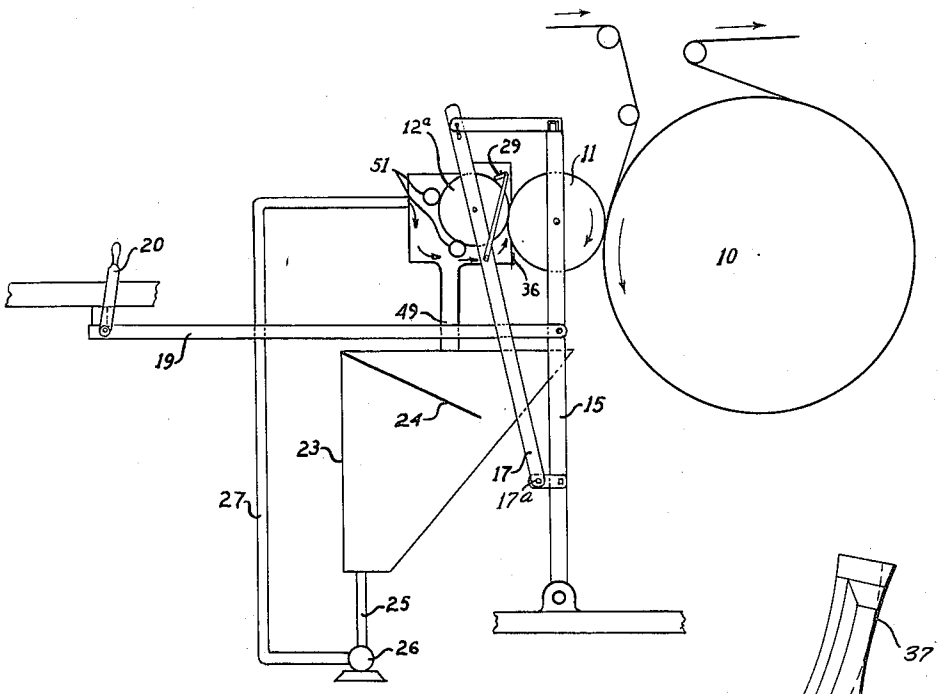


Fig. 5

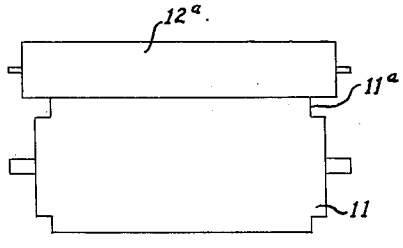


Fig. 6

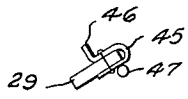


Fig. 7

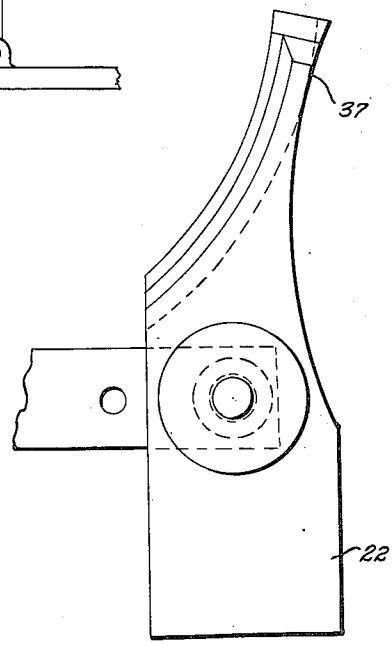


Fig. 10.

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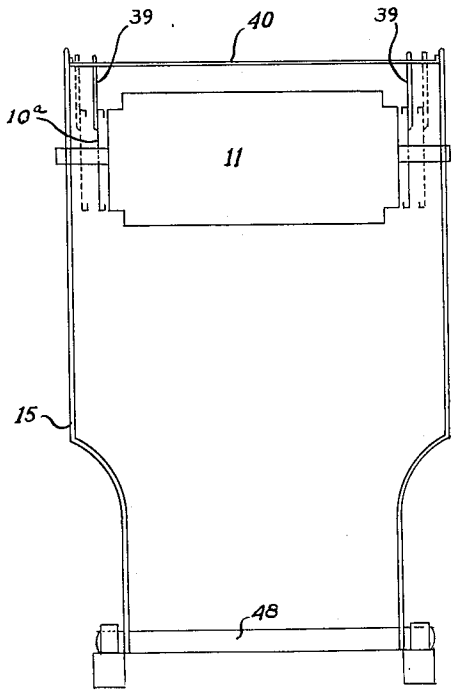


Fig. 8

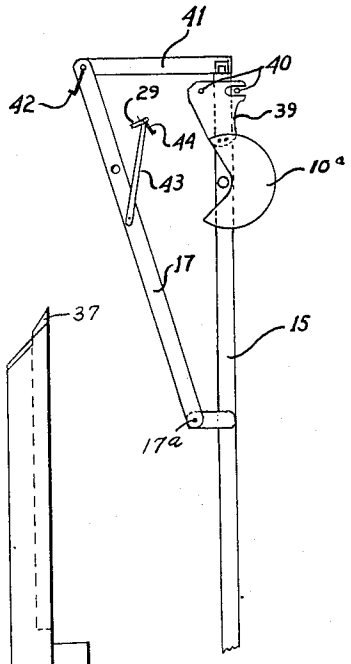


Fig. 9

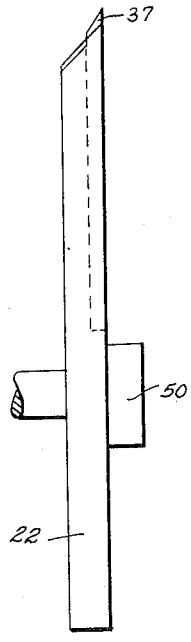


Fig. 11.

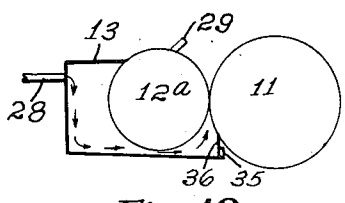


Fig. 12

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UNITED STATES PATENT OFFICE

2,406,056

MEANS FOR COATING PAPERS

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Application November 24, 1943, Serial No. 511,753

12 Claims. (Cl. 91—49)

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This invention relates to the art of coating and generally to coating web material, and has reference more particularly to webs of paper which can be processed in a continuous manner while moving at high rates of speed.

There are many methods of coating web material such as paper having the desired object of applying a coating that will be smooth, uniform in appearance, and of the desired weight or thickness. A method of applying color is shown in my co-pending application Serial No. 511,754, filed November 24, 1943, in which is used a combination of rolls to smooth and lay the color on the material to be coated. In such combination a doctor roll may be utilized to remove the excess color and to form the color evenly on the applicator roll. Both the surface of the applicator roll and the doctor roll are of great importance. It has been found highly desirable to remove all color remaining on the doctor roll by suitable means such as a doctor blade. Such removal prevents the transfer of the coating from the doctor roll to the applicator roll with a streaking or ribbing effect upon the surface of the applicator roll and thus eliminating an uneven coated surface.

It is an object of this invention to form a smooth and even coating upon a fast traveling web of paper. By the term paper as used herein, it is intended to include any and all materials in web form whereon a coating may be applied and treated in accordance with this invention.

Another object of the invention is to predetermine and control the amount of coating material to be applied to the moving web of paper.

Another important object of this invention is the provision of a coating unit so arranged that coating material having wide variations in solid contents may be applied to a fast moving web of paper in predetermined weights per unit of paper.

Another feature of the invention resides in the coating fountain, the applicator roll, the provisions whereby pressure applied to the applicator roll and the doctor roll can be determined and controlled. The invention has numerous other features of novelty which will be hereinafter described in detail, and particularly pointed out in the appended claims.

In the drawings forming part of this application similar characters of reference indicate corresponding parts in all the drawings in which:

Figure 1 is a side elevational view of the coating apparatus;

Figure 2 is a view of the coating apparatus with parts broken away showing the rolls and fountain in non-coating position;

Figure 3 is a view of the coating fountain showing the seal members;

Figure 4 is a view with parts broken away showing position of the one shield member;

Figure 5 is a side elevational view of a modified form of coating apparatus;

Figure 6 is a view of the preferred form of doctor roll and applicator roll;

Figure 7 is a sectional view through the doctor blade and doctor blade holder;

Figure 8 is a front view of the applicator roll frame;

Figure 9 is a side view of the doctor roll, doctor blade and applicator roll supporting frame;

Figure 10 is a side view of one of the fountain end seal members;

Figure 11 is a view with parts broken away of the fountain end seal members, and

Figure 12 is a view showing the fountain and the path of the coating material therein from the inlet to the lower nip between the doctor roll and the applicator roll.

Referring to the drawings in detail: 10 indicates a heated drier backing drum but it is to be understood that the coating unit may be utilized in connection with other types of backing means. The coating unit consists of a resilient surfaced applicator roll 11 and to prevent coating material from being thrown from the applicator roll onto the coated surface, guard members 12 are positioned at the ends of roll 11. The coating material collected by the shield guard members 12 is returned to the coating container 23. The shield 12 may take various forms than that shown in Figures 1 and 2 such as that shown at 10a in Fig. 9.

The coating fountain 13 may be of the open type or closed type depending in part upon the kind of coating material is employed. Rotatably mounted in the fountain 13 is hard surfaced doctor roll 12a, a suitably supported doctor blade 29 cooperates with the doctor roll 12a to clean the doctor roll of all coating material prior to the doctor roll's contact with the surface of the applicator roll. Means 14 are provided for varying the pressure between the doctor blade and the doctor roll. The coating material enters the fountain by pipe 28 and follows the path indicated by the arrows to the lower nip formed by the rolls 11 and 12a.

Hingedly connected in bearing 16 to the machine frame or to member 48 carried by machine frame is applicator roll supporting frame 15. For

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varying and controlling the pressure between the applicator roll 11 and the backing means 10, there is connected to frame 15 member 19. This member 19 has connected at one end thereof a handle member 20, which in turn is suitably connected to coating machine frame indicated at 21. Hingedly connected to the frame 15 and frame 17 there is operatively connected means 18 for controlling and varying the pressure applied by the doctor roll to the applicator roll. It is to be understood that other means such as hydraulic means may be employed for varying the pressure applied by the doctor roll against the applicator roll and the applicator roll against the backing means.

The coating material is furnished from a suitable source of supply (not shown) to coating container 23. The coating material is withdrawn from the coating container through pipe 25 by means of a pump 26 and the pump forces the material into the fountain 13 by means of pipe 28.

It is generally considered essential that the coating material be discharged into the fountain at a point between above the middle of the doctor roll and the top of the fountain. A surplus of coating material is maintained at the nip between the doctor roll 12*a* and the applicator roll 11. In other words, a sufficient head of coating material is maintained in the fountain to maintain a surplus of coating material between the rolls. The excess if any of coating material from the fountain may flow over the top of the back of the fountain and into the coating container 23 if an open fountain is employed. If a closed fountain is employed, the coating material may be returned to container 23 by a suitable pipe. The coating material returned to the container 23 flows over a sloping member 24. The purpose of feeding the coating material to the fountain at the points above indicated and the flowing of coating material over the sloping member 24 is to lessen if not entirely eliminate the passage of air in the coating material to the nip between the doctor roll and the applicator roll.

The ends of the fountain 13 are provided with seal members 22 which are adjustable and the fountain seals 22 are held in place by means of arm 32 which is suitably connected to the fountain 13, adjustable screw 33 and spring 34. The roll 12*a* is mounted on a suitable shaft 30 and this shaft is furnished with suitable bearings 31. The seal members are so faced that the upper portion 37 lies against the edge of the applicator roll 11 and the inner face of the seal member rides against the doctor roll 12*a*. Attached to the bottom of the fountain is member 35 which supports seal or doctor blade member 36. It is preferred that seal 36 be of flexible material such as thin steel. Attached to the seal members 22 are short seal members 50 which cooperate with seal member 36 in preventing leakage of the coating material at the front end of the fountain.

In Figure 5 is disclosed a fountain of the closed type in which the coating is returned to the container 23 by means of pipe 49. The doctor roll 12*a* has cooperating therewith rolls 51 which are rotatably mounted in contact with the surface of doctor roll 12*a*.

The doctor 29 for cleaning the surface of roll 12*a* is preferably made of resilient material. The doctor 29 is supported in holder 45 which has upturned lip 46. The holder is mounted on rod 47 which is supported by member 43 carried by member 17. To control the pressure between the doctor 29 and the doctor roll 12*a*, a handle 44 is connected to the doctor blade 29.

In Figure 9 the shield or guard members 12 are shown slidably mounted on rods 40 and the members 39 are secured shield sides. When the coating operation is carried out the shields 12 are in the position shown in solid lines in Figure 8 and the inactive position is shown in dotted lines. In this figure the upper end of member 17 is hingedly secured member 41 one end of which is removably secured to upper end of member 15. A handle 42 is mounted at the point where member 17 and member 41 are connected.

Figure 6 of the drawings shows the doctor roll 12*a* of greater width than the applicator roll 11 and the upper end 37 of seal members 22 operates against notched edge 11*a* of roll 11. The use of a doctor roll of greater width than the applicator roll is of considerable importance for various reasons, one of which is the eliminating of throwing of coating color onto the web carried by the backing means 10.

Figure 10 shows the form in which it is preferred to make the seal members 22, while in Figure 11 is disclosed short seal member carried by seal members 22 which are adapted to cooperate with seal member 36.

Various changes from the detailed description and specific form shown will occur to those skilled in the art, without departing from the spirit of the invention or the scope of the appended claims.

What I claim:

1. An apparatus for coating a continuous web of paper or analogous material, a web carrying roll; a resilient surfaced applicator, a fountain having an open side directed toward the applicator roll so that the said applicator roll and fountain form a coating material compartment, a doctor roll mounted in the fountain for cooperating with the applicator roll in controlling the amount of coating material applied to applicator roll, and means for supplying coating material to the fountain at a point in a plane between the middle of the doctor roll and the top of the fountain.

2. In a coating unit including a backing means, a resilient surfaced applicator roll for transferring coating material to material to be coated carried by the backing means, a fountain having an open side directed toward the applicator roll, so that the fountain and the applicator roll form a coating container, a hard surfaced doctor roll mounted in the fountain at a selected distance from the applicator roll, means for separating the applicator roll and the backing means, and means for separating the doctor roll and the applicator roll.

3. An apparatus for coating comprising a backing means, an applicator roll for applying coating material to a material supported by the backing means; a fountain, said fountain and applicator roll forming a coating material container, a doctor roll rotatably mounted in the fountain for controlling the amount of coating on the applicator roll; a doctor blade for cleaning the surface of the doctor roll; a frame for supporting the applicator roll, said frame hingedly supported at one end whereby the applicator roll can move toward and away from the backing means, a frame hingedly connected to the applicator roll frame for supporting the doctor roll whereby the doctor roll can be moved toward and away from the applicator roll; and means for controlling the pressure between the applicator roll and the backing means.

4. An apparatus for coating, including an applicator roll having a shoulder around each end of the roll surface, a fountain with an open side directed toward the applicator roll so that the fountain and the applicator roll form a coating container, a doctor roll mounted in the fountain for controlling the amount of coating carried by the applicator roll, and longitudinally adjustable seal members forming part of the sides of the fountain, said seal members contacting the surface of the doctor roll and the shoulder on the applicator roll.

5. In a coating apparatus the combination of a backing means; an applicator roll for the transferring of coating material to material to be coated, carried by the backing means; a fountain having an open side directed toward the applicator roll so that the fountain and the applicator roll form a coating container; a doctor roll mounted at a selected distance from the applicator roll, and means for supplying coating to the fountain.

6. In a coating apparatus in combination with a backing means of a coating unit including a fountain having an open side, an applicator roll directed toward the open side so that the applicator roll and fountain form a coating container, a doctor roll mounted at a selected distance from the applicator roll, said doctor roll of greater width than the applicator roll, and means for supplying coating to the fountain.

7. In a coating apparatus, a fountain having an open side, a resilient means positioned along one edge of the open side of the fountain, a resilient surfaced applicator roll directed toward the open side of the fountain so that the fountain and the applicator roll form a coating container, movable shield members positioned at the ends of the applicator roll, and a doctor roll mounted in the fountain at a selected distance from the applicator roll for controlling the amount of coating material on the applicator roll.

8. A coating apparatus comprising, supporting means for supporting the material being coated, means defining the walls of a fountain having an open side, seal members forming a part of the walls of the fountain, members secured to the side seal members, a flexible member positioned along the open side of the fountain, an applicator roll directed toward the open side of the fountain so that the applicator roll and the fountain form a coating container, a doctor roll rotatably mounted in the fountain at a selected distance from the applicator roll, and means for separating applicator roll and the backing means.

9. In a coating unit including a backing means, an applicator roll for transferring coating material to material to be coated supported by the backing means, a fountain having an open side directed toward the applicator roll so that the fountain and the applicator roll form a coating container, a doctor roll mounted at a selected distance from the applicator roll, means for cleaning the doctor roll surface, means for separating the doctor roll and the applicator roll, and means for separating the applicator roll and the backing means.

10. In a coating unit including a backing roll, applicator roll, and a doctor roll, said three rolls mounted in a horizontal plane, a fountain having an open side, the applicator roll directed toward the open side of the fountain so that the applicator roll and the fountain form a coating container, the said doctor roll positioned in the fountain at a selected distance from the applicator roll, means for separating the doctor roll and the applicator roll, and means for separating the applicator roll and the backing roll.

11. In a coating unit including a backing roll, a resilient surfaced applicator roll, and a doctor roll, said three rolls mounted in substantially the same horizontal plane, a fountain having an open side directed toward the applicator roll so that the applicator roll and the fountain form a coating container; a doctor blade for cleaning the doctor roll surface; the said doctor roll positioned at a selected distance from the applicator roll for controlling the amount of coating carried by the applicator roll, means for separating the doctor roll from the applicator roll and means for separating the applicator roll from the backing roll; and means for supplying coating material to the fountain.

12. A coating apparatus for coating a moving material, comprising a supporting means for supporting the material being coated, means defining the walls of a fountain having an open side, side seal members forming part of the walls of the fountain, a member secured to each side seal member, an applicator roll in juxtaposition to the fountain, and members whereby the fountain, applicator roll and said members form a coating container; a doctor roll rotatably mounted at a selected distance from the applicator roll for controlling the amount of coating material carried by the applicator roll, and means for supplying coating material to the fountain so that the lower nip formed by the doctor roll and the applicator roll has an excess of coating therein.

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