Aug. 18, 1942. J. R. FANSELOW 2,293,125

METHOD AND APPARATUS FOR COATING SHEET MATERIAL

Filed April 12, 1941 2 Sheets-Sheet 1

Fig. 1

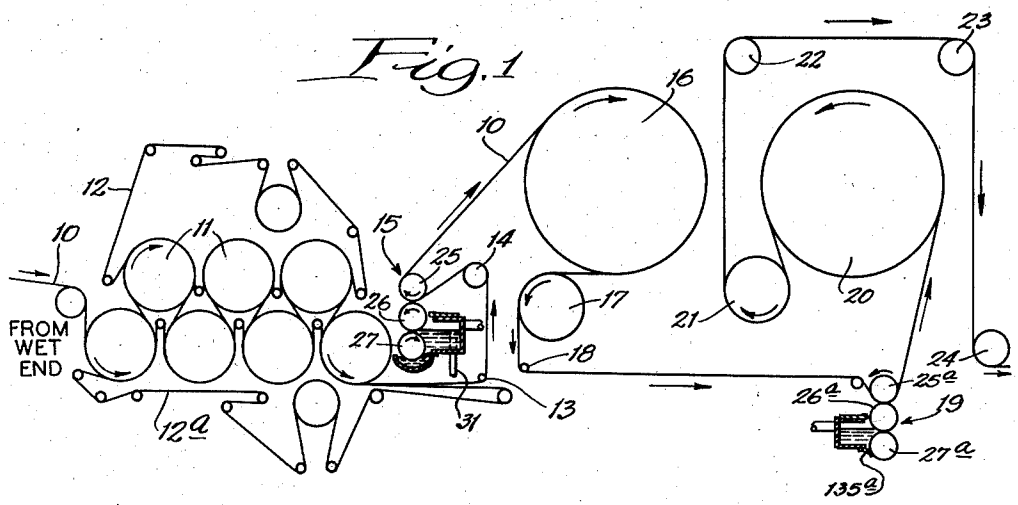
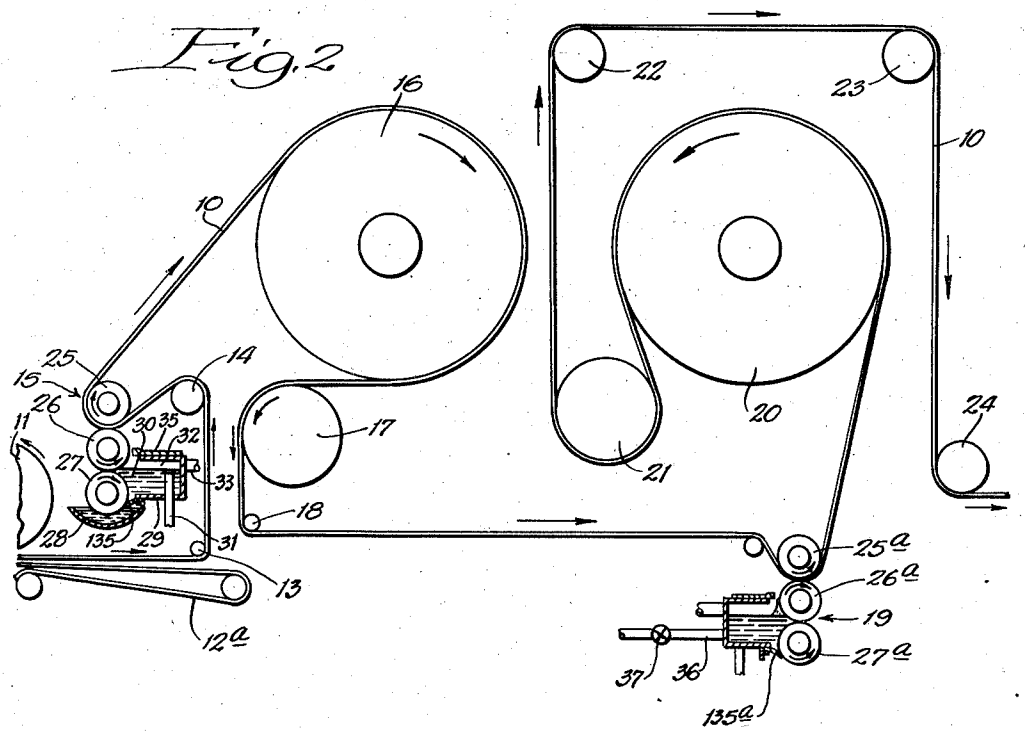



Fig. 2




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Fig. 3

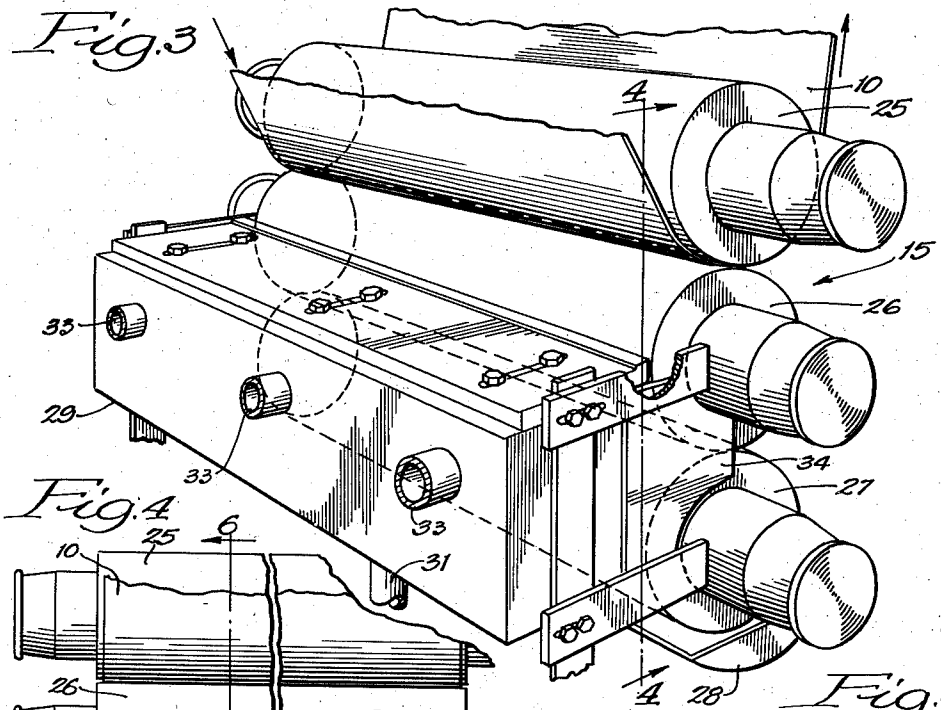



Fig. 4

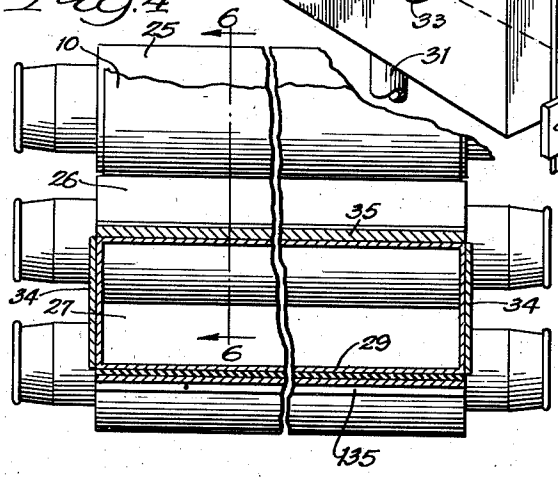



Fig. 6

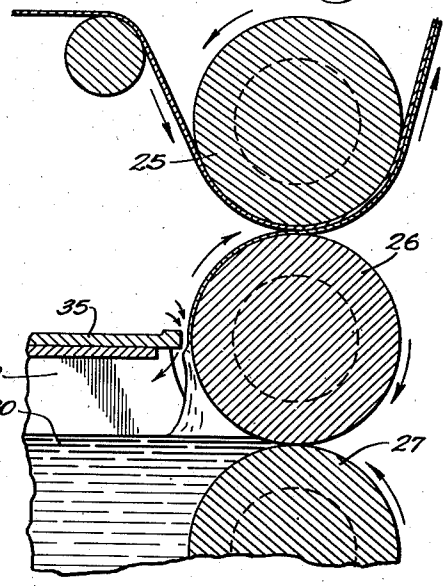
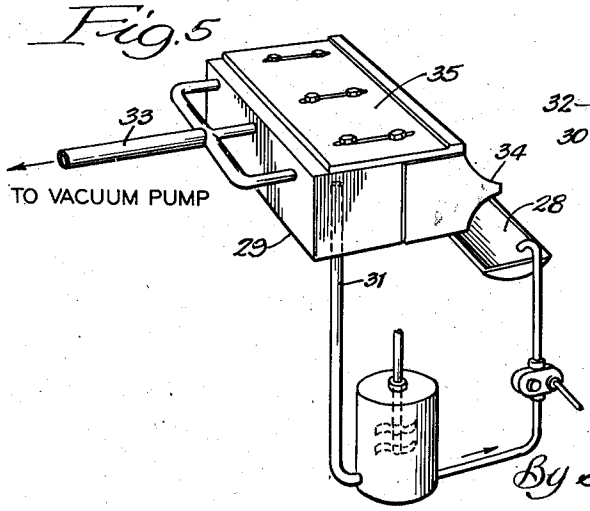



Fig. 5




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# UNITED STATES PATENT OFFICE

2,293,125

## METHOD AND APPARATUS FOR COATING SHEET MATERIAL

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Application April 12, 1941, Serial No. 388,201

3 Claims. (Cl. 91—48)

This invention relates to improvements in the art of coating sheet materials and has particular relation to the art of coating sheet material such as paper. The invention is a modification or improvement in the so-called vacuum coating method and apparatus set forth in my co-pending application Ser. No. 188,369, filed February 2, 1938, and which has matured to Patent No. 2,257,373, issued September 30, 1941.

In said pending application, the web is conducted into and through a zone of relatively lower pressure, usually styled the "vacuum chamber" and carries the liquid coating through a slot leading from the vacuum chamber into the zone of higher pressure, for example the atmosphere. The current of air drawn through the slot effects the required levelling of the coating carried by the sheet or web.

As compared with the method and apparatus disclosed in said pending application, the present invention contemplates the use of a vacuum chamber to produce a coating of proper thickness and characteristics on a movable carrier or transfer member, which coating, outside of the vacuum chamber, is contacted with the web. The web itself does not enter or pass through the vacuum chamber, but merely picks up the coating from the carrier member, which does carry the coating through the vacuum slot out of the chamber. Preferably, said carrier member consists of a roll which, as in the case of said pending application, forms part of the chamber or wall thereof. There are certain advantages in applying the liquid coating to the travelling web in the open as compared with making the application of the coating within the vacuum chamber. Some of these advantages will be apparent to those skilled in the art.

In the drawings which disclose one of the embodiments of my invention as applied to the coating of paper on the paper machine,

Fig. 1 is a diagrammatic view, in elevation, of that portion of the paper machine to which my improved coating method and apparatus have been adapted;

Fig. 2 is an enlargement of a portion of Fig. 1;

Fig. 3 is a perspective view of one of the sets of coating rolls;

Fig. 4 is a vertical elevation, partly in section, taken on the line 4—4 of Fig. 3;

Fig. 5 is a perspective view of the liquid coating supply equipment; and

Fig. 6 is a section taken on the line 6—6 of Fig. 4.

In the drawings, the formed paper web, as it comes from the wet end of the paper making machine, is indicated at 10. This web, in accordance with the usual practice, will be carried over a plurality of heated drying cylinders 11, the web being held in place and placed into contact with the cylinders by suitable felts 12 and 12a. Although a relatively small number of drying cylinders are illustrated, it will be understood that any number may be used.

The paper web, after passing over the last drying cylinder 11, is conducted around a lower roll 13 and an upper roll 14 whence it passes into the field of the coating apparatus designated as a whole 15. From the coating apparatus, it is conducted to a large drying cylinder 16 around rolls 17 and 18 to a second coating apparatus designated as a whole 19. From the coating apparatus 19, the web, which has now been coated on both sides, passes around the large drying cylinder 20 and the rolls 21, 22, 23 and 24 to the delivery end of the paper machine and usually around another set of dryers similar to the dryers 11, in the event that the paper has not yet reached its proper degree of dryness.

Describing now the coating apparatus represented by the symbol 15, it will be seen that the equipment in general comprises three rolls on horizontal axes, located in the same vertical plane, the paper travelling around only the upper roll 25. The two lower rolls 26 and 27 are held together with the proper pressure to permit a supply of liquid coating material to pass between them. This liquid coating is carried in a trough 28 into which the lower roll 27 dips and is carried up by said roll 27 into the nip between the rolls 26 and 27. Preferably, there is carried through the nip an excess of coating, i. e. more than sufficient to supply the requirements of the web.

The two rolls 26 and 27 form parts of the walls of the vacuum chamber which is designated as a whole 29. Said vacuum chamber may, and usually does, carry a fairly substantial supply of coating material, as indicated at 30, which has been carried through the nip between the rolls 26 and 27. The excess of coating material is carried away by a pipe 31, as shown best in Fig. 5, and is re-circulated back into the trough 28. A sufficient amount of additional liquid coating material is supplied to the trough 32, by means not shown, in order to take care of the requirements of the coating operation.

The chamber 32 is partially evacuated through a suction pipe 33 connected to a suitable vacuum pump arrangement, not shown. The ends of the

vacuum chamber are closed by suitable end seals, as indicated at 34 in Fig. 3, and the top of the chamber is closed by an adjustable horizontal plate 35, which is positioned close enough to the periphery of the roll 26 to form in cooperation with said roll a slot of the proper width to permit the coating on roll 26 to pass therethrough with some clearance, while at the same time the slot does not have such width as to impose too severe a load upon the vacuum pump. The bottom seal between the lower wall of the chamber and the roll 27 is effected by means of a flexible rubber wiper or doctor 135.

Slot dimensions and other conditions may be substantially the same as those disclosed in the said co-pending application Ser. No. 188,369, it being understood, however, that, in view of the fact that a small fraction of the coating which is applied to the transfer roll 26 remains on the roll 26 after the web has passed through the contact or transferring nip between rolls 25 and 26, the conditions necessarily will have to be changed somewhat, for example the consistency increased or the slot width increased, in order to permit the paper web to pick up the same weight of coating as in the case of the method and apparatus disclosed in the said co-pending application Ser. No. 188,369.

The coating apparatus disclosed at 19 in Fig. 1, and which serves to coat the wire side of the web, is slightly different from that shown at 15 in Fig. 1 and Fig. 2 in that, in the coating apparatus indicated at 19, the coating, instead of being picked up by roll $27^a$, is conducted directly into the coating chamber through a supply pipe 36 controlled by a suitable valve 37.

I claim:

1. The method of coating a travelling web of paper or the like, which consists in applying a liquid to the peripheral surface of a roll which forms part of the wall of a chamber, maintaining the interior of said chamber at a less pressure than that of the surrounding atmosphere, rotating said roll so as to propel said roll surface bearing said liquid out of the chamber through a slot one edge of which is defined by the roll, whereby the liquid borne by said surface is caused to form a level coating and any excess liquid present is returned to the chamber by the air sucked through said slot, and then contacting said coating with said travelling web.

2. In combination, a roll, a chamber having a slot constituting a passageway from the interior to the exterior of the chamber, said roll being arranged to form one side of said slot and to rotate in such direction that its periphery moves outwardly through said slot, means for applying liquid coating to the periphery of said roll before said periphery leaves the chamber, means for evacuating said chamber to suck air inwardly through said slot so as to level said coating on said roll, and means for propelling a web of paper in contact with said coated roll outside of the chamber.

3. In combination, a roll, a chamber having a slot constituting a passageway from the interior to the exterior of the chamber, said roll being arranged to form one side of said slot and to rotate in such direction that its periphery moves outwardly through said slot, means for applying liquid coating to the periphery of said roll before said periphery leaves the chamber, means for evacuating said chamber to suck air inwardly through said slot so as to level said coating on said roll, a second roll outside of the chamber and cooperating with said first roll to form a nip through which a web of paper may be propelled in contact with said coated roll so as to transfer a part of said liquid coating from said first roll to said paper web.

JOHN R. FANSELOW.