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ROLLER COATING MACHINE FOR RIGID SHEET MATERIAL

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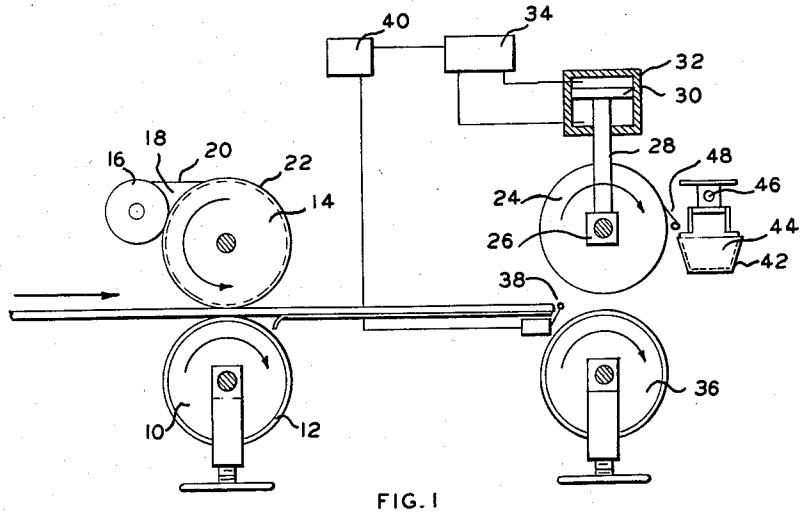


FIG. 1

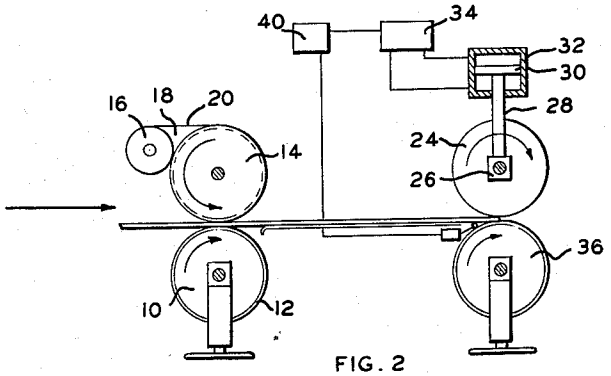


FIG. 2

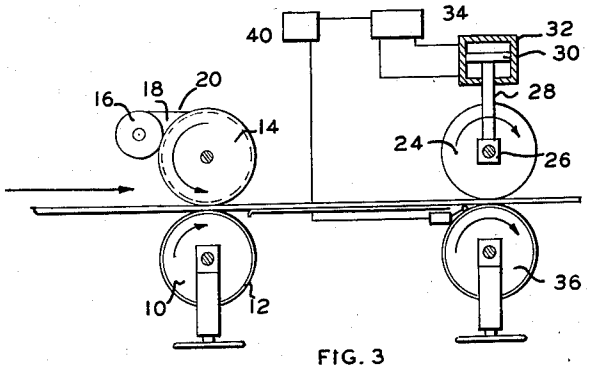


FIG. 3

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ROLLER COATING MACHINE FOR RIGID SHEET MATERIAL

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3 Claims. (Cl. 118—1)

This invention relates to roll coating machines and relates more particularly to an improved roll coating machine which permits application of a smooth coating over the entire surface of a rigid sheet material such as hardboard, wallboard, plywood, and the like material.

Previous types of roll coating machines, such as, for example, the apparatus described in U.S. Patent No. 2,642,030 to E. H. Brink, were uniformly characterized by a series operating fauls. In their operation, rigid sheets were fed between rolls whereby a layer or film of coating material was applied to the top surface of the sheets. Thereafter, the coated sheets were fed between a pair of rolls adapted to wipe off the excess of coating material. As the leading edge of each sheet entered the nip of the wiping rolls, the initial pressure applied wiped from the sheet edge substantially all of the coating material. Thus, the surface of the sheet was uncoated, or only poorly coated, for a distance of nearly an inch from its leading edge. This necessitated cutting off, as waste material, the uncoated portion of the sheet. An alternative salvaging procedure was to apply a second coat by reversing the position of the sheet and feeding it through the apparatus with the uncoated portion in the trailing edge position.

A primary object of the present invention resides in the provision of an improved roll coating machine which permits the application of a smooth coating over the entire surface of a rigid sheet material.

Another object of the invention resides in the provision of a roll coating machine which automatically eliminates from the rigid sheet material the uncoated portion produced by prior art means.

Still another object of the invention resides in the novel method of roll coating a rigid sheet material to obtain a uniformly smooth coating over the entire surface of the sheet.

Other objects will be apparent from the description of the invention given hereinafter. A preferred embodiment will now be described with reference to the accompanying drawing in which:

Fig. 1 is a sectional side elevation of the roll coating machine showing a sheet approaching the wiping roll,

Fig. 2 is a sectional side elevation of the machine showing a sheet entering the nip of the wiping roll, and

Fig. 3 is a sectional side elevation of the machine showing the sheet passing through the wiping roll assembly.

The apparatus comprises a first pair of rolls **10** and **14**, the axes of which are substantially parallel and in a plane perpendicular to the surface of the sheet to be coated, comprising a drive roll **10** including an outer portion **12** of resilient material such as a rubber sleeve mounted around a rigid core, and a coating applicator roll **14**; a metering roll **16**; a coating agent supply trough **18** formed by the surfaces of applicator roll **14** and metering roll **16** respectively; members **20** for closing the ends of trough **18**; the periphery of applicator roll **14** containing a series of parallel grooves **22**; a second pair of rolls **24** and **36** the axes of which are substantially parallel

and in a plane perpendicular to the surface of the sheet to be coated, comprising a smooth hard polished-surface wiping roll **24** adjustably journaled by the bearing assembly **26** which cooperates with the piston rod **28**, piston **30**, and cylinder **32** to raise and lower the wiping roll **24** when motivated by the solenoid actuated valve **34**, and a work supporting roll **36** opposed to and cooperating with the drive roll **10**; the drive roll **10** and supporting roll **36** being journaled so as to be adjustable vertically; switch **38** connected through a relay **40** to the valve **34**; coating material return trough **42** equipped with a scraper **44** mounted on the double-spiral grooved shaft **46**; and doctor blade **48**. Means (not shown) are provided for driving the drive roll **10**, applicator roll **14**, and the supporting roll **36** in the direction of the sheet travel as shown by the arrows; similar independent drive means (not shown) are provided to drive the wiping roll **24** in a direction reverse to the sheet travel.

In operation, a sheet such as a hardboard, wallboard, plywood, or the like sheet is travelled between the first pair of rolls **10** and **14** whereby there is deposited on the upper sheet surface a layer of coating material disposed in substantially parallel ridges. Experimentation has shown that this type of coating material application is more desirable than is obtainable by means of other coating rolls as, for example, by a smooth coating roll or by one which contains spiral grooves around its periphery. This discovery, which was entirely unexpected, is an integral part of the present invention and presents a decided advance in the art.

Subsequent to being coated, the sheet is advanced to the second pair of rolls **24** and **36**. As the leading edge of the sheet approaches these rolls it contacts and depresses the switch **38**. This energizes the relay **40** which, in turn, motivates the solenoid actuated valve **34**. The wiping roll **24** which idles in elevated position is thereby lowered by means of the piston **30**, piston rod **28**, and journal assembly **26**. The roll lowering action is controlled so that the face of the roll contacts the sheet surface immediately adjacent to the leading edge thereof. Thus the wiping action of the roll, due to its rotation in a direction reverse to the direction of sheet travel, commences and is maintained at a constant controlled pressure. This is in contradistinction to prior art single position rolls wherein the initial nip of the wiping roll removed substantially all of the coating agent from the sheet surface for a distance of about an inch or more from the leading sheet edge. In the operation of the novel apparatus of this invention, the initial nip of the wiping roll is eliminated. As a result, a uniform layer of coating material is obtained over the entire sheet surface. As the sheet advances through the rolls **24** and **36**, the reverse wiping roll smooths out the ridges of coating material and removes the excess. The resulting film fills the pits in the sheet surface and imparts an extremely desirable smooth finish to the sheet. The excess of coating material is removed from the wiping roll **24** by the doctor blade **48**. The so removed material flows into the return trough **42** and is continuously removed therefrom by the scraper **44** which travels back and forth along the double-spiral grooved shaft **46**. The scraper **44** is so hinged that it does not move any coating material during its return travel. The removed coating material is then recycled to the supply trough **18** by conventional pumping means.

As shown in the drawing of a preferred embodiment of the novel apparatus, the means which actuates the wiping roll **24** comprises the switch **38** which is depressed by the leading edge of a sheet travelling through the roll coating machine. Obviously, other mechanical and/or electronic means may be employed to accomplish the same result. One particularly desirable alter-

native means comprises a light source and a photoelectric cell positioned at opposite sides of the machine with the light beam passing between the wiping roll **24** and supporting roll **36** immediately ahead of the nip. As a sheet travels through the machine, the leading edge thereof breaks the light beam and energizes the relay **40** and thereby actuates the wiping roll lowering means. When the trailing edge of the travelling sheet passes between the wiping roll assembly, the beam of light is again received by the photoelectric cell, and the wiping roll is raised to its idling position.

It will be apparent that the vertical travel of the wiping roll need only be slight as, for example, a matter of a few thousandths of an inch. The amount of roll travel vertically is not critical except that it must be sufficient to eliminate the initial nip of the wiping roll assembly when coating sheet material of any particular thickness. The pressure applied to either set of rolls may be regulated by adjustment of the drive roll **10** and the supporting roll **36**. Similarly, the degree of wiping effected by the wiping roll **24** may be controlled by increasing or decreasing the speed of the roll rotation.

From the foregoing description, it will be appreciated that the novel method and roll coating apparatus of the invention present a decided advance in the art of coating rigid sheet material. First, a relatively heavy layer of coating material is deposited on the surface of a traveling sheet and disposed thereon as a series of parallel ridges. Thereafter, the ridges of coating material are smoothed into a substantially uniform layer and the excess thereof removed by a reverse rotating wiping roll. At this point of the coating operation, the initial nip of the wiping roll assembly is eliminated by the novel combination of elements of the apparatus and the operation thereof results in obtaining a coated sheet whereon the coating material is disposed as a smooth film uniformly dispersed over the entire sheet surface. The invention therefore provides to the art a novel roll coating machine and coating method not heretofore available in any previously known apparatus.

As many apparently widely different embodiments of the invention may be made without departing from the spirit and scope thereof, it is to be understood that the invention is not to be limited except as defined in the appended claims.

I claim:

1. Apparatus for coating comprising roll means for applying an excess of coating material to the surface of a rigid sheet material, said roll means characterized by a series of parallel grooves extending around its periphery in planes perpendicular to the axis of the roll, a smooth hard polished-surface wiping roll adjustably journaled for vertical travel of predetermined distance, a work supporting pressure roll opposed to and cooperating with the wiping roll, the axes of the two rolls being substantially parallel and in a plane substantially perpendicular to that surface of the sheet being coated, means for removing the excess of coating material from the wiping roll, and means for automatically raising the wiping roll a slight distance during idling and lowering the roll for wiping the coated sheet material.

2. Apparatus for coating the surface of a substantially rigid sheet material comprising an applicator roll characterized by a peripheral portion having a series of parallel grooves extending therearound in planes perpendicular to the axis of the roll, a smooth hard polished-surface wiping roll adapted to be driven in a reverse direction relative to that of the sheet, said wiping roll adjustably journaled for vertical travel of predetermined distance, a work supporting pressure roll opposed to and cooperating with the wiping rolls, the axes of the two rolls being substantially parallel and in a plane substantially perpendicular to that surface of the sheet being coated, means for removing the excess of coating material from the wiping roll, and means for automatically raising the wiping roll a slight distance during idling and lowering the roll for wiping the coated sheet material.

3. In an apparatus for coating the surface of a substantially rigid sheet material and wherein the apparatus comprises an applicator roll and a wiping roll in combination with work supporting pressure rolls, said wiping roll adapted to be driven in a reverse direction relative to that of the sheet, the improvement which comprises adjustable journaling of said wiping roll for vertical travel of predetermined distance, automatic means for moving the wiping roll vertically, said means actuated by the leading edge of the sheet to lower said wiping roll into working position, and said means actuated by the trailing edge of the sheet to raise said wiping roll into idling position.

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