June 15, 1943. R. G. QUINN 2,321,938

COATING PROCESS

Filed June 19, 1940

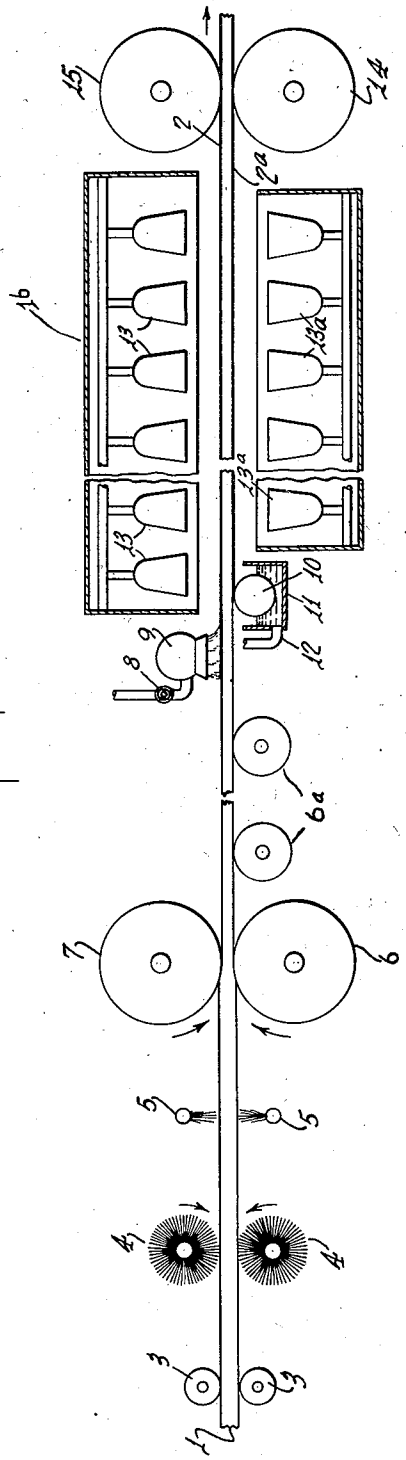

Fig. I.

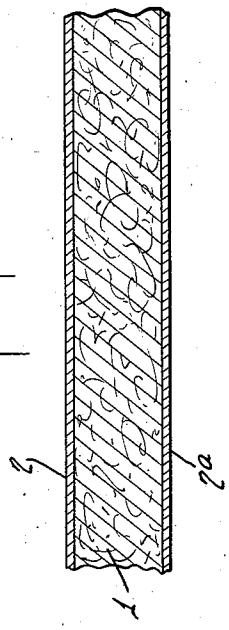

Fig. II.

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COATING PROCESS

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2 Claims. (Cl. 117—65)

The invention relates to a process for coating a sheet product either in web or board form.

In the manufacture of board or sheet products, and especially such products as fibre board, it is desirable to coat the product on both surfaces simultaneously to more uniformly dry the surfaces and to minimize any tendency of the board to warp. When such products are coated either in the web stage of manufacture or in board form, it is difficult to support the sheet in the conventional drier for the length of space required to dry a coating on the under surface of the web or board.

The invention now provides a method of coating a board product on both surfaces simultaneously through the use of an improved drier whereby the coating of the under surface of the web or board is dried in such a short length of space that no supports for the sheet are required. The improved drier is one which dries the coating primarily by radiation, as by the use of infra-red or near infra-red rays.

An object of the invention is to provide an improved method of coating a board product on the under surface.

A more specific object of the invention is to provide a method of coating a board product on both surfaces simultaneously through the use of an improved drier.

Other objects and advantages will appear from the following description and drawing appended thereto.

In the drawing, which illustrates an embodiment of the invention and wherein like reference characters designate like parts:

Fig. I is a diagrammatic side elevation view of an apparatus for carrying out the process of the invention; and

Fig. II is an enlarged fragmentary sectional view of a product embodying the invention.

The process, in detail, is carried out by forming a fibrous web 1 in any conventional manner, as by felting on a board making machine from the usual pulp slurry. Any agents that are desired to be incorporated into the board may be added to the pulp mixture, or may be added later to the board itself. Such agents may be for the purpose of rendering the finished board waterproof, insect-proof, fungus-proof, fireproof or combinations of these and other purposes. Furthermore, other agents, as synthetic resins may be added at this time to render the finished board harder and denser.

The fibres are preferably wood fibres, although any vegetable fibre, such as bagasse, corn, and the like, may be used. Where wood is used, it is disintegrated into fibres in any one of several usual ways: by being broken down by means of a slasher-grinder; by being saturated with steam and water under pressure and then exploded by releasing the pressure; or by use of ordinary chemical processes of separation.

After the fibres are felted into a web of usual thickness, the web is pressed, rolled, and dried into finished uncoated fibre board. Referring now to Fig. I, in the preferred embodiment of this invention the uncoated fibre board is conveyed from the forming operations by conveyor rolls 3. The board 1 may be passed between one or more pairs of revolving brushes 4, which are preferably turning in a direction opposite to the movement of the board 1, and the dust and loose fibres removed from the board.

The board may then be passed between moisteners 5 which apply a small amount of water to both surfaces of the board. Preferably, the moisteners 5 are sprays, although any conventional means may be used. The board, slightly moistened, passes between one or more pairs of hot ironing rolls 6 and 7 which smooth and densify the surfaces as they are dried.

The board is now ready for the coating which is applied by any of the usual means, such as sprays, applicator rolls, brushes and the like. Preferably, the coating is applied to the upper surface of the board by coating sprayer 9, which is fed by pipe 8. The coating is deposited on the board 1 evenly so as to form the coating layer 2 (see Fig. II). The smooth and somewhat densified upper surface of the board 1 absorbs the coating slowly and to a sufficient extent to bond the coating 2 to the fibre board 1.

The under surface is preferably coated by means of an applicator roll 10 which rotates in reservoir 11. The applicator roll 10 not only applies the coating to the under surface but also serves as a support to the board immediately prior to the entry of the board into the drier. Reservoir 11 is kept to the proper level by conventional controlling devices, the coating material being supplied to the reservoir by feed pipe 12.

The coating material may be any type paint suitable for a fibrous product coated in the above manner, and which would be dried in the conventional drier. However, certain coatings have been found to be advantageous for fibre board and the like. Preferably, the coating is a water vehicle paint comprising a binder, filler, extender, pigment, plasticizer and water. The binder is preferably urea formaldehyde used either alone

or with an alpha protein. The pigment is any one or more of the usual types, such as cadmium sulphide, iron oxides, and the like. The extender may comprise lithopone, talc or diatomaceous earth. The filler is preferably clay. The plasticizer may be China-wood oil, urea or the like. A coating that has been used effectively is as follows:

	Pounds
Alpha protein	200
Paraformaldehyde	12
Urea	5
China-wood oil	12
Whiting	450
Clay	450
Water	2000
Caustic soda	10

Due to the peculiar action of infra-red rays in setting up and hardening certain resins, it is advantageous to include such resins in the coating. When, for example, urea and paraformaldehyde are present in the coating they will be set up by the infra-red rays. Thus, the infra-red rays will have the added function of setting up resins in the coating sensitive to such rays while, at the same time, drying the coating in the conventional sense.

It should be understood that the coatings contemplated in this process are those which are most economical and effective for use on fibrous products.

The board 1 with the upper surface coating 2 and under surface coating 2*a* is conveyed into infra-red ray drier 16. The drier comprises two banks of infra-red ray lamps 13 and 13*a*, located respectively above and beneath board 1, and adjacent thereto. By way of example, there may be used 24 banks of lamps, 6 lamps to the bank, with approximately 75% of them in use when the board 1 is moving at the rate of 30 lineal feet per minute.

As the infra-red drier solidifies the coating in a length of space in which the sheet is self-sustaining, the coating may be applied to the sheet and solidified without contact with conveyor rolls.

While it is preferred that the coating be only partially dried or solidified by the infra-red or near infra-red rays, yet the process may be modified so that the coating is substantially dried or solidified when it leaves the drier. Substantial solidification is used to denote the degree of dryness or solidification of the coating which permits handling of the sheet without injury to the coating.

In the preferred operation of the process the coating is dried or solidified by the drier only to a plastic state and the coated sheet then passed between ironing rolls 14 and 15, which are heated in any conventional manner.

Roll 14 further dries the coating and, at the same time, smooths and hardens it. The degree of plasticity to which the coating is dried or solidified in the drier 16 is that which will permit the coating to be smoothed and densified without being doctored off by the heated press rolls 14 and 15. Such a plasticity is attained by drying the above-mentioned coating to approximately 60% dryness.

It will be understood that certain changes may be made with respect to one or more of such factors as the speed of the board, the amount of heat applied to the board prior to the coating, the type and amount of coating applied, the number and intensity of the infra-red ray lamps, the distance of the lamps from the board, the length of the drier, and the like, if corresponding changes are made with respect to the remaining factors.

The drying of both coated surfaces of the board at the same time is believed to be assisted by the penetrating characteristics of the infra-red rays, thus making the drying operation more efficient than if the surfaces were dried in separate operations. To facilitate the drying of the coating of the under surface of the board, heated rolls may be placed on either or both sides of rolls 6 and 7 so as to contact the lower surface of the board. In this way, the coating of the under surface dries more quickly and permits the length of the lower infra-red ray drier to be shortened so that the board need not be unsupported for the distance otherwise necessary. As shown in Fig. I, one or more heated rolls 6*a* may be placed between roll 6 and applicator 10.

The invention may be used for coating and drying various fibrous sheets, the sheet being preferably in the form of a continuous web, although obviously a succession of separate sheets could be treated. However, best results are obtained when using a fibrous sheet of the nature of fibre board where the thickness of the sheet aids the sheet to sustain itself when passing over the lower drier.

While the preferred embodiment of the invention specifically states the use of infra-red rays, it should be understood that heat rays having a position on the spectrum adjacent to that of infra-red rays may be used.

The details herein set forth are only for purposes of illustration and the invention is to be limited only by the scope of the appended claims.

I claim:

1. A process for producing coated fiber board comprising, supporting said board at horizontally spaced points while continuously advancing the board; while the board is advancing between supporting points applying to the under surface thereof an aqueous paint dispersion coating containing a heat hardenable binder comprising a heat-polymerizable resin and a protein, and a plasticizer, and rapidly drying, setting and hardening the coating to approximately 60% dryness by exposing the coated surface to infra red radiation before contacting the coating with any sol d supporting surface; and completing the drying, setting, hardening and smoothing of the coating by hot ironing.

2. A process for producing coated fiber board comprising, supporting said board at horizontally spaced points while continuously advancing the board; while the board is advancing between supporting points applying to the under surface thereof an aqueous paint dispersion coating containing a plasticized heat hardenable binder comprising approximately 200 parts alpha protein, 12 parts paraformaldehyde, 5 parts urea and 12 parts China-wood oil, and rapidly drying, setting and hardening the coating to approximately 60% dryness while the wet board is out of contact with any solid supporting surface by exposing the coated surface to infra-red radiation; and completing the drying and hardening operation by hot ironing to smooth said coating.

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