Nov. 5, 1935. C. C. COLBERT ET AL 2,019,845

PROCESS AND APPARATUS FOR MAKING BRANDED PAPER BOARD AND PRODUCT THEREOF

Filed Feb. 26, 1934 4 Sheets-Sheet 1

Fig. 1.

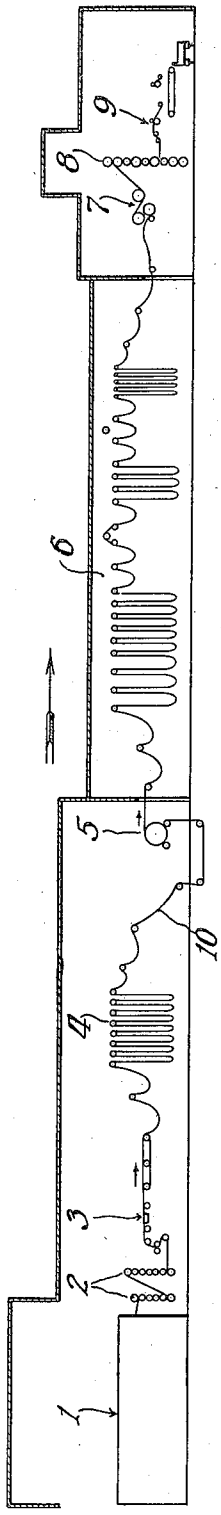
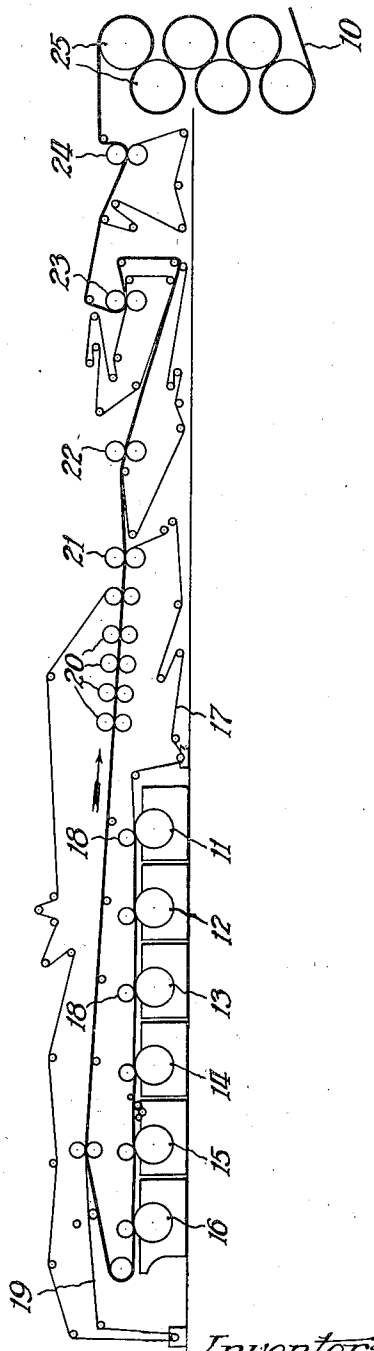



Fig. 2.




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PROCESS AND APPARATUS FOR MAKING BRANDED PAPER BOARD AND PRODUCT THEREOF

Filed Feb. 26, 1934 4 Sheets-Sheet 2

Fig. 3.

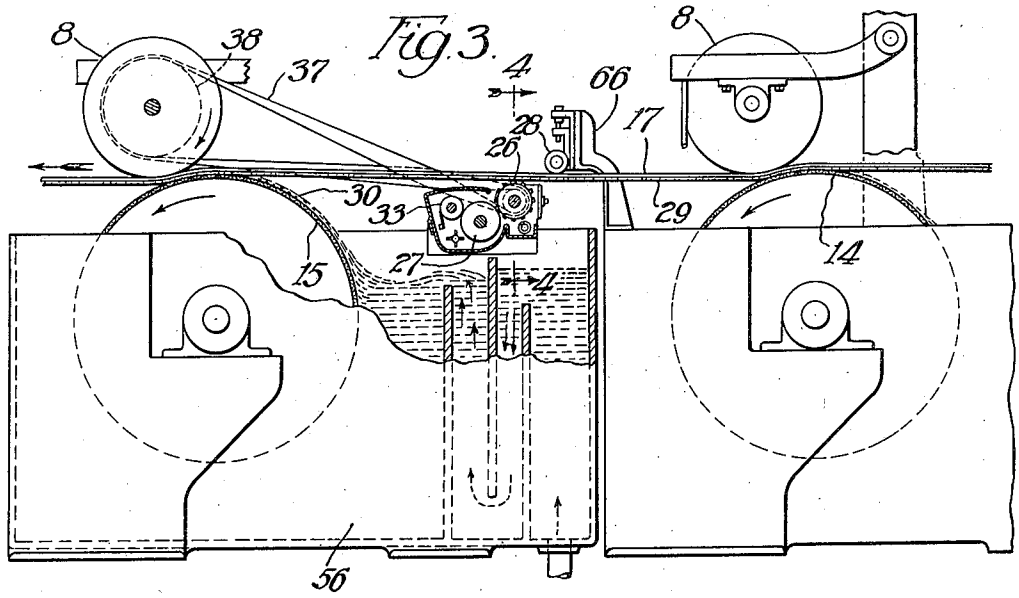
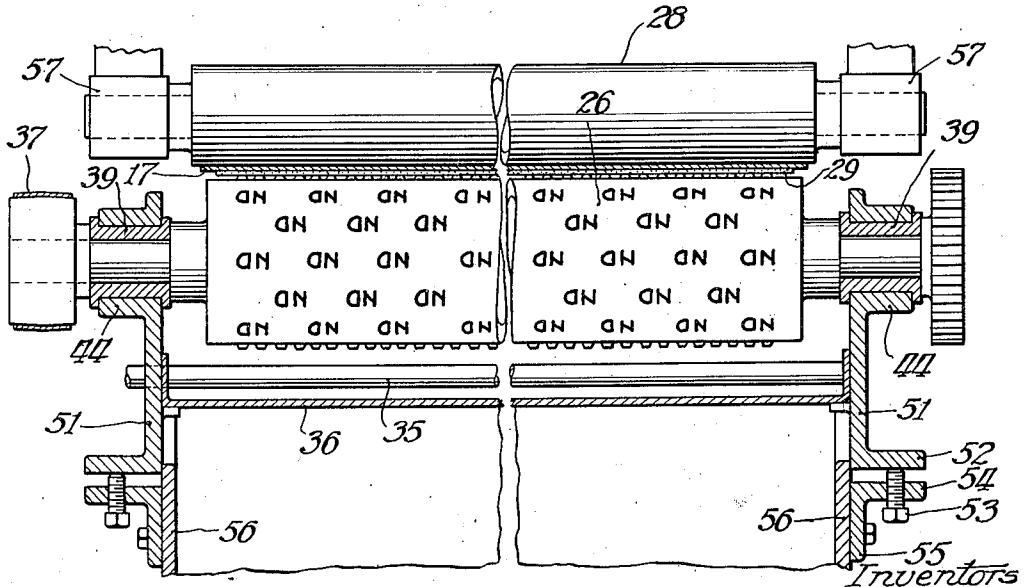



Fig. 4.




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PROCESS AND APPARATUS FOR MAKING BRANDED PAPER BOARD AND PRODUCT THEREOF

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Fig. 5.

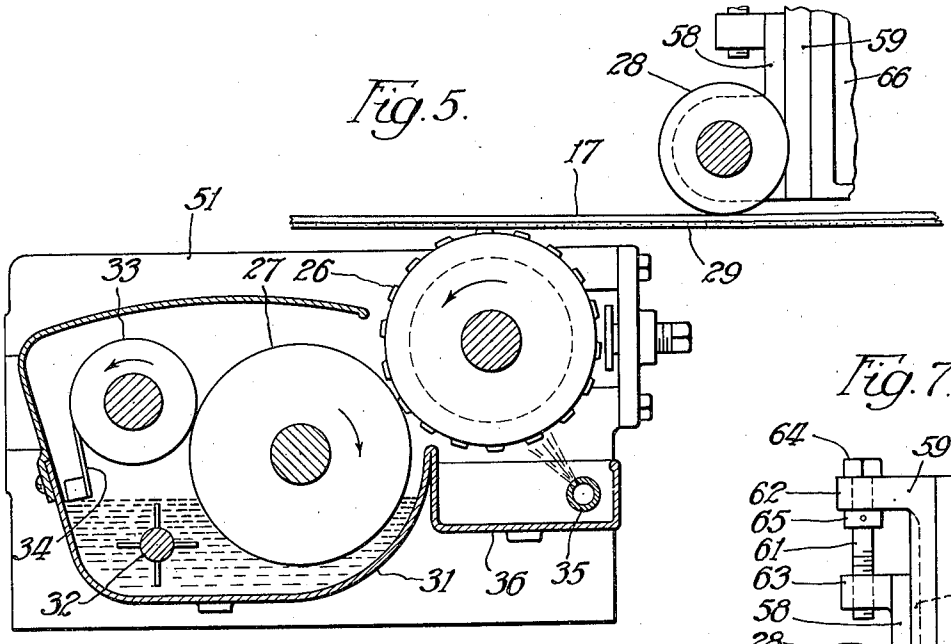



Fig. 7.

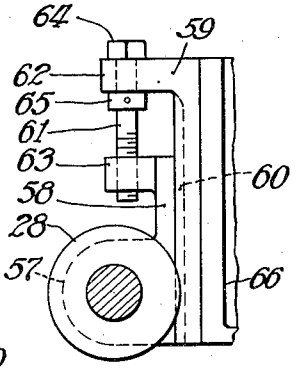
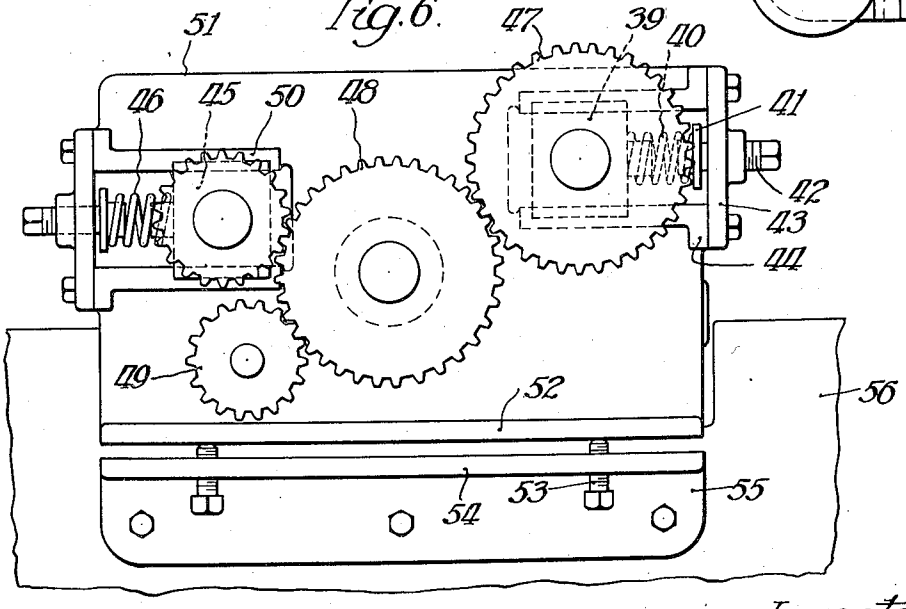



Fig. 6.




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Fig. 8.

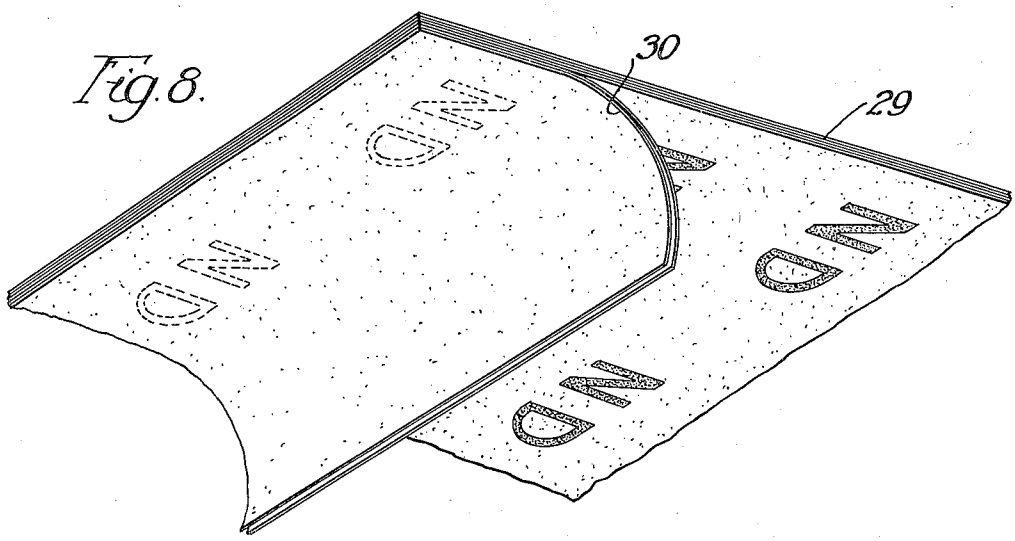
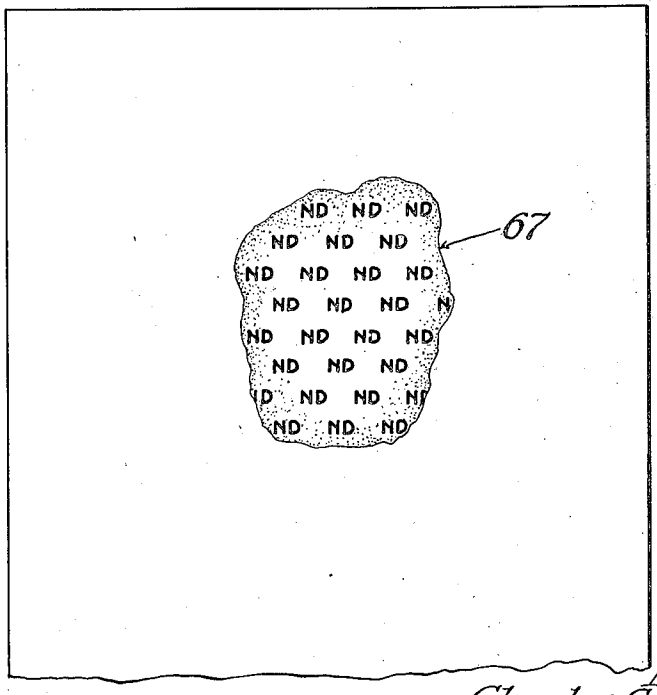



Fig. 9.




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Patented Nov. 5, 1935 2,019,845

# UNITED STATES PATENT OFFICE

2,019,845

## PROCESS AND APPARATUS FOR MAKING BRANDED PAPER BOARD AND PRODUCT THEREOF

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Application February 26, 1934, Serial No. 712,946

18 Claims. (Cl. 92—39)

This invention relates to a process and apparatus for producing paper board and particularly coated paper board with identifying brands, design or other identification marks incorporated in the board between the surfaces thereof; the product being produced in such manner that it cannot be duplicated except by a complete process of manufacture from the wet stock. The product so produced is a novel product which is also claimed as a part of the invention.

In practicing the invention, the board is made specially for any individual carton user with facsimiles of such user's private brand, trade mark, initials or other indicia distributed or scattered throughout the area of the board; the object being to provide for any carton user paper board of such individual and inimitable character that the cartons made therefrom can be readily identified independently of the label or printed matter on the exterior faces of the cartons, wherefore attempted counterfeits of such cartons can be readily detected.

The manufacture of the board involves a wet printing operation in connection with the process of forming the board from the wet stock, the identification marks being printed on one of the laminations of the board in such manner as to be under a surface layer or layers.

The process of making the board, including such wet printing operation, is employed in conjunction with a coating step in such manner that the identification marks are arranged to be read obversely from the front or coated side of the board and to be rendered apparent by wetting the board on said coated side; although if preferred the identification marks could be printed so as to be obverse from the back side.

Reference will now be made to an illustrative practice of the invention in connection with the manufacture of coated paper board under United States patents to Colbert and Preston No. 1,514,439 of November 4, 1924 and 1,903,325 of April 4, 1933. As disclosed in said first mentioned patent, coated paper board is manufactured by making the board from wet stock on a board making machine and performing a succession of operations on the board sheet delivered from the machine for production of the finished coated product without reeling the board between successive stages of manufacture, whereby the product is produced with a great saving of time, labor and expense and with minimum opportunity for damaging the board. The process of said patent includes calendering the surface of the board to be coated, and finishing the coated surface of the board by super-calendering, thereby producing a fine finished coated product suitable for printing or lithographing on the coated surface. By the process disclosed in said second mentioned patent, the board is coated with a clay solution which may be white enamel, china clay or the like, with or without coloring pigments, the coating being performed in two operations by first applying to the calendered surface of the board a thin or light coat of the solution, drying the same, and then applying and brushing a second coat of the solution on the pre-coated surface, the solution for the two operations being the same in composition and color except that the solution for the first operation is thinner or more dilute than that employed for the second operation. This method of coating has marked advantages contributing improvement in the quality and uniformity of the coated surface of the board, as well as to increase speed and economy in the manufacture of coated paper board on a large commercial scale.

In the accompanying drawings:

Fig. 1 is a diagrammatic representation of a plant for the manufacture of coated paper board under the aforesaid Colbert and Preston patents, reference to which patents may be made for a detailed disclosure of the construction and operation of the several units of said plant.

Fig. 2 is a diagrammatic representation of the board making machine employed as the first unit in said plant.

Fig. 3 is a view partly in section of a portion of the board making machine embodying means for performing the wet printing operation in conjunction with the making of the wet board web.

Fig. 4 is a sectional elevation taken on the section line 4—4 of Fig. 3, looking in the direction of the arrow, showing a portion of the wet printing mechanism.

Fig. 5 is a sectional elevation of the wet printing unit, this section being taken longitudinally of the board machine or crosswise of the printing roller.

Fig. 6 is an end elevation of the printing unit as it appears at one side of the board making machine.

Fig. 7 is a view of the adjustable pressure roll which presses the press felt and board material thereon against the printing roller.

Fig. 8 is a bottom view of a portion of the wet board web as it is being made, showing printed identification marks on a layer of the web and another layer of the web being applied to the printed layer.

Fig. 9 is a view of a cut sheet of paper board made in accordance with the present invention, the surface of the board having a splotch of water applied thereon whereby the concealed identification characters in the wet area of the board become visible or apparent.

Referring to Fig. 1, the unit 1 represents the entire machinery for making the paper board in condition for calendering, namely the board making machine which is diagrammatically shown in Fig. 2, comprising wet end section, press section and drying section. The paper board is drawn from the drying end of the board making machine through the calenders 2. The calendered board runs through a coating appliance 3 which applies the preliminary light or thin coat of coating solution to the calendered surface of the board. The board is conveyed from the coating appliance to a suitable hang-up apparatus in which the board is hung up in festoons or folds for drying as indicated at 4. From the delivery end of the hang-up apparatus the board is drawn through a second coating machine 5 which applies and brushes the second coat of coating solution on the preliminarily coated surface of the board. From the second coating machine the board runs into a drying room 6 in which the board is hung in festoons or folds for drying, the cross sticks or supports from which the board hangs being slowly conveyed along the drying room. From the delivery end of the drying room, the dry coated board is drawn past aligning, tensioning and smoothing means 7 to and through the super-calendering machine 8 for finishing the coated surface of the board. The super-calendered board may run through a coating machine 9 which delivers the finished coated board in cut sheets of appropriate size for use in the manufacture of cartons.

The continuous sheet of paper board delivered from the board making machine and undergoing the succession of operations described, is indicated by the numeral 10 in Fig. 1.

Referring to Fig. 2, the board making machine shown in this instance is of the type which makes the wet board by collecting layers of wet pulp on cylinder molds and couching the pulp layers from the cylinder molds onto an endless felt. In this instance the machine has six forming cylinders or cylinder molds, respectively designated by the numerals 11, 12, 13, 14, 15, 16. Each cylinder mold revolves in a vat to which a properly prepared pulp solution, i. e. water containing a suitable percentage of properly prepared pulp fibers in suspension, is supplied by any suitable arrangement for feeding the liquid stock. As well understood in the art, the pulp in each vat is strained by the cylinder mold, the water flowing off through the cylindrical screening surface of the mold and the pulp fibers gathering thereon, so that each cylinder mold as it revolves accumulates a layer, film or sheet of pulp fibers. The cyllinder molds are driven by the endless press felt 17, the lower run of the press felt being in coactive engagement with the top surfaces of the cylinders, and each cylinder mold having associated therewith a top couch roll 18 which bears with appropriate pressure against the cylinder mold, the felt being clamped between the couch rolls and the cylinder molds. By virtue of the pressure exerted by the couch rolls, the pulp layers formed on the cylinder molds are couched or transferred to the felt, the first layer formed on the first cylinder 11 being applied directly to the underside of the felt, the next layer formed on the second cylinder 12 being deposited on the first layer, and so on. Thus the pulp layers collected by the respective cylinder molds are successively deposited one upon another upon the endless press felt, thereby forming the wet laminated board web. Ordinarily the first and last cylinder molds 11 and 16 are supplied with superior stock, such for instance as white or manila stock, while the intermediate cylinder molds 12, 13, 14 and 15 are supplied with inferior stock, such for instance as ordinary newsprint or newspaper stock, so as to form the board as a laminated web of cheap or relatively cheap stock surfaced or lined with superior stock which will calender with as fine a finish as is desired for the subsequent application of the liquid coating.

The wet board web forming continuously on the press felt 17 is carried by said felt and a coacting top felt 19 between a series of presses or squeeze rolls 20 which squeeze out the surplus water from the web and reduce it to a more compacted and thoroughly bonded state; and the web is then passed through a succession of ordinary presses 21, 22, 23, 24 which substantially eliminate the expressible moisture and further compact and consolidate the web. The several presses are associated with suitable felts as shown to assist in conveying the wet web and absorbing the water and moisture expressed from the web as it passes through the presses. From the presses, the damp board is passed to the dryers 25, comprising ordinary steam heated cylinders or drums in contact with which the board sheet is carried for heating and evaporating its moisture. For compactness the drying cylinders 25 may be arranged in a number of vertical stacks, only the first of which stacks are shown, it being understood that there would ordinarily be a considerable number of stacks of drying rolls to provide the capacity of drying equipment which is necessary for properly drying the board material under treatment. From the dryers the board is drawn through the calenders 2 (Fig. 1) and passed through the successive operations for producing the finished coated board, as already described, and in the manner more fully set forth in the aforesaid Colbert and Preston patents.

Reference will now be made to the wet printing operation in connection with the process of forming the wet board web, whereby the board is printed with identification marks beneath its coated surface.

At any suitable point in the wet board making process, e. g. between the cylinders 14 and 15, the wet web on the press felt is passed in contact with a printing roller 26, as shown in Figs. 3, 4 and 5. The surface of the printing roller is formed with large raised type for printing the emblems, initials or other identification marks desired. The printing roller may be constructed with a removable shell either of rubber or metal composition having the type molded thereon. Ordinarily the several type would be identical or arranged in groups of identical type, for printing the same mark over and over again throughout the area of the board. For instance in the illustrative apparatus the board is printed with identification marks consisting of the initials N. D., and the type on the printing roller are accordingly in pairs for printing said initials. As shown in Fig. 4 the printing type may be conveniently arranged on the printing roller in longitudinal rows, the type of the alternate rows being staggered. Suitable liquid for the printing operation is supplied to the surface of the type

on the printing roller by the contacting rubber roller 27 which for convenience may be termed the inking roll. A vertically adjustable presser roll 28 offset from the printing roller holds down the felt so that it bears with sufficient pressure against the printing roller to insure the making of the proper impressions on the board web. In Figs. 3, 4, 5 and 8 the portion of the board web which is being printed is indicated by the numeral 29, while in Figs. 3 and 8 the layer of pulp which is superimposed on the printed layer is indicated at 30.

The wet printing operation is a coarse printing operation as compared with that of ordinary book printing. It requires the use of large block type, e. g. type of about three quarters of an inch or more in height and of thick outline for making the desired impressions with sufficient clear cut characteristics for the purposes of the invention. The type may of course be as much larger as desired. The wet printing operation also requires a printing liquid which will print the wet board with the indelible and non-running impressions. A suitable printing liquid is provided by a watery solution of clay colored with black or dark aniline dye or with lamp black, the consistency of the printing liquid being about that of cream. With such a solution, impressions of letters or figures may be made with relatively large block type which will be sufficiently permanent and clear cut for the purposes of the invention. There may be some blurring or running of the impressions at the margins, but not to an objectionable extent. Although the wet board web on which the characters are printed is wet, nevertheless the pulp after having been run from the forming cylinders on to the press felt has a strong affinity for water, so that the water in the printing liquid would be readily absorbed by the layer of the wet pulp on which the characters are printed, leaving the insoluble matter of the printing liquid on the surface of said pulp layer, as substantially fixed or non-running impressions.

In the specific construction shown in Figs. 3 to 6, the inking roll 27 revolves with its under side in a bath of the printing liquid contained in the receptacle 31. Rotating in the liquid is an agitator 32 to keep the printing liquid at a uniform consistency. The printing liquid is supplied to the receptacle by any suitable feed pipe (not shown). Above the printing liquid is a rubber squeeze roll 33 which bears on the inking roll to insure uniform distribution of the liquid thereon and to remove surplus liquid therefrom. A scraper 34 contacts with the rubber rolls which will remove the liquid from its surface. The printing roller is kept in a cleansed condition by showering it with water discharged against the underside of said roller from the shower pipe 35, there being a trough 36 to catch and conduct off the water. As shown in Fig. 3 the printing roller may be driven by the belt 37 from a pulley 38 on the shaft of the couch roll which coacts with the cylinder mold 15. The printing roller should be driven to rotate with the same surface speed as the speed of the felt and material carried thereby. The shaft of the printing roller is mounted in horizontally slidable bearings 39, and the printing roller is forced against the inking roll by means of springs 40 interposed between said slidable bearings and adjustable abutments 41 which are provided on the inner ends of adjusting screws 42 tapped in cap members 43 which are bolted to the outer ends of the brackets 44 providing the slideways for the bearing blocks 39. The rubber squeeze roll 33 is similarly mounted in horizontally slidable bearings 45 and said squeeze roll is forced against the inking roll by the springs 46, the construction for mounting the squeeze roll and adjusting its springs being the same as that described with reference to the mounting of the printing roller. The shaft of the inking roll and the shaft of the agitator are mounted in fixed bearings. The inking roll, the agitator and the rubber squeeze roll are driven from the printing roller by the intermeshing gears 47, 48, 49, 50.

The entire mechanism comprising the printing roller, inking roll, squeeze roll and associated receptacles is preferably organized as a removable unit and adjustably supported in the board machine. For this purpose receptacles 31 and 35 are constructed as integral parts of a supporting frame having the side plates 51 in which the bearings for the inking roll and agitator shaft are mounted and which are formed with the brackets 44 providing the slideways for the adjustable bearing blocks for the printing roller and squeeze roll. As shown more clearly in Figs. 4 and 6 the side plates of the supporting structure are formed with bottom angle flanges 52 and are supported on the adjusting screws 53 passing through the flanges 54 of angled supports 55 which are bolted to the sides of the vat walls 56 of the vat containing the cylinder mold 15 with which the printing equipment is associated. The adjusting screws 53 permit vertical adjustment of the entire unit, and such adjustment in conjunction with the vertical adjustment of the presser roll 28 permits the printing roll to set at the proper elevation for the printing operation with extreme nicety.

As shown in Figs. 3, 4, 5 and 7, the shaft of the presser roll 28 is mounted in vertically adjustable bearings 57. As shown in Fig. 7 the shaft bearings are formed on vertically slidable members 58 having dovetailed slidable connection with the supporting brackets 59. The presser roll is adapted to be raised and lowered by operating the adjusting screws 61 which are swivelled in the lugs 62 projecting from the supporting brackets and the threaded portions of which engage threaded holes in the ears or lugs 63 of the members carrying the shaft bearings. As indicated in Fig. 7, each adjusting screw, the head of which is indicated at 64, has a collar 65 secured thereon below the lug 62, thus providing the swivel connection with the supporting brackets. The supporting brackets are attached to standards 66 which may be attached in any suitable manner to the vat side walls.

For the purpose of the present invention, the paper material which overlies the lamination of the board on which the identification marks or printed matter should be of such texture and color as to be rendered sufficiently transparent or translucent by wetting to render the identification marks visible. Thus in the illustrative arrangement, in which the identification marks are printed on the board layer which is supplied from the fourth cylinder mold 14, and covered by the layers supplied by the two following cylinder molds 15 and 16, the last cylinder mold 16 should preferably be supplied with white stock to form a thin white surface liner, and the cylinder 16 should be supplied with newsprint stock of practically a white or nearly white color. If desired the identification marks could be printed on the board lamination furnished by the cylinder 15, so that the marks would be covered

only by the film of white paper supplied by the last cylinder mold 16. However as the surface liner of the paper is usually quite thin, the printing of the identification marks immediately next to the liner might render the marks more or less apparent, whereas it is generally desired to have the marks invisible or non-apparent until the surface portion of the board is rendered transparent or translucent by wetting. It is therefore considered preferable to print the identification marks so as to underly both the surface liner of the board and the immediately subjacent lamination. It will be understood that the characters could be printed on any of the laminations insofar as may be suitable for accomplishing the objects of the invention.

In the illustrative practice, with the apparatus shown in the drawings, the board is calendered, coated and super-calendered on the same side as that for which the surface is supplied by the liner of white stock furnished to the last cylinder mold 16, this being the top surface of the board. As explained in the aforesaid Colbert and Preston patents, the board is maintained in its successive operations so that the top surface is presented to the coating appliances, and the top surface of the board is maintained out of contact with conveying apparatus during the travel of the board through the machine until after the board leaves the drying room when it is passed through the super-calendering apparatus for finiishing the coated surface. With this arrangement a very fine product is obtained, having a super-calendered coated surface for the printing or lithographing of the matter desired to appear on the exterior of the contents. In Fig. 9 a piece of the board is represented. It has a blank appearance when dry. By splotching water thereon as indicated at 67, the subjacent identification marks within the wetted area become visible or apparent.

The board may be coated with a solution of clay or clay and casein, with or without aniline coloring matter, and the coating solution may contain suitable percentages of sizing or other materials; in short the coating solution is that which is commonly understood as a clay solution for the making of clay coated paper board. For the purpose of the present invention, the clay coating should be white or else of a light color. The coating contributes to conceal the identification marks, while on the other hand the clay coated side of the board can absorb moisture for rendering the material sufficiently transparent or translucent to reveal the identification marks, without impairing the surface.

It will be understood that the specific practice herein described is illustrative, and that the invention may be practiced with various modifications as required to suit different conditions and requirements. The wet printing operation herein involved may be employed in conjunction with any practicable mode of operation for making the wet board. It is within the purview of the invention to make a wet paper web on a Fourdrinier machine, transfer the web to a felt, print the web while on the felt, and impose on the printed web another web which may be formed on a Fourdrinier wire simultaneously with the forming of the first mentioned web, using arrangements for transferring the web such as are known to the art. It is also within the purview of the invention to print the identification marks otherwise than by the use of printing type, as for example by stencilling means. It is contemplated for instance that the identification marks may be applied or printed by running the web in contact with a hollow cylinder having stencil openings in its surface corresponding to the characters or designs to be printed, and spraying the printing liquid against the interior of the cylinder so that the printed characters will be applied by stencilling. The term "paper board" is to be understood as including any paper product made by collecting, superimposing and bonding a plurality of wet paper plies, films, or layers to form a unitary sheet suitable for the making of cartons or the like.

What we claim as our invention, and desire to secure by Letters Patent, is:

1. The product comprising paper board having printed identification marks under a surface thereof and a clay coating on said surface, said identification marks adapted to be rendered apparent by wetting the clay coated side of the board.

2. The product comprising a sheet of paper material composed mainly of coarse stock and having a surface layer of fine white or light colored stock and printed identification marks under said layer, the surface of the board provided by said layer having a clay coating of white or light color.

3. Paper board comprising a sheet of paper material composed of laminations bonded by interfelted fibers and having printed identification marks on a layer thereof under a surface thereof, said identification marks being printed with colored clay solution.

4. The process of producing branded or identifiable paper board characterized by forming the board from the wet stock while printing identification marks with a colored clay solution on a layer thereof during the forming of the wet board web.

5. The process of producing branded paper board characterized by forming the board from wet stock, providing the board with internal identification marks in the process of formation, pressing, drying and calendering the board, coating the board on the calendered surface thereof, and finishing the coated surface of the board by super-calendering.

6. The process of making branded paper board characterized by forming the wet board from wet stock while printing identification marks from a colored clay solution on a layer thereof during the forming of the wet web, pressing and drying the web and calendering the same in a manner to provide a smooth calendered surface to be coated, and applying a clay coating to said surface.

7. The process of making branded paper board characterized by forming the wet board from wet stock while printing identification marks on a layer thereof during the forming of the wet web, pressing and drying the web and calendering the same in a manner to provide a calendered surface on a side of the board from which the identification marks are to be viewed, and applying to said surface a coating of a nature to permit the wetting of the surface portion of the board material without damaging said surface.

8. The process of making branded paper board characterized by forming the wet board from wet stock while printing identification marks on a layer thereof during the forming of the wet web, pressing and drying the web and calendering the same in a manner to provide a calendered surface on a side of the board from which the

identification marks are to be viewed, and coating said calendered surface with clay coating material of white or light color.

9. The process of making branded paper board characterized by forming the wet board from wet stock while printing identification marks on a layer thereof during the forming of the wet web, pressing and drying the web and calendering the same in a manner to provide a calendered surface on a side of the board from which the identification marks are to be viewed, coating said calendered surface with clay coating material of white or light color, and finishing the clay coated surface by super-calendering.

10. The process of producing branded paper board characterized by simultaneously forming a plurality of wet pulp layers, superimposing them one upon another, and applying identification marks by printing the same with colored clay solution in a layer on which another layer is imposed before so imposing said other layer.

11. The process of producing branded paper board characterized by simultaneously forming a plurality of wet pulp layers, superimposing them one upon another, and applying identification marks to a layer by printing said marks thereon with a liquid to produce indelible and non-running marks, said marks being so printed on a layer on which another layer is imposed before so imposing said other layer.

12. The process of producing branded paper board characterized by simultaneously forming a plurality of wet pulp layers, superimposing them one upon another, and applying identification marks by a wet printing operation to a wet layer on which another layer is imposed before so imposing said other layer.

13. An apparatus for making branded paper board comprising a plurality of cylinder molds for simultaneously collecting a plurality of wet pulp layers, a carrying medium on which said layers are successively deposited to form a wet board web, wet printing means arranged between cylinder molds for applying printed identification marks to a layer of the wet web, means arranged for pressing the web, drying means through which the web is carried after pressing, and calendering means through which the web is drawn from the drying section of the apparatus.

14. An apparatus for making branded paper board comprising a plurality of cylinder molds for simultaneously collecting a plurality of wet pulp layers, a carrying medium on which said layers are successively deposited to form a wet board web, wet printing means arranged between cylinder molds for applying printed identification marks to a layer of the wet web, means for drying the board, means for calendering the same, means through which the board is drawn from the calendering means for coating the calendered surface of the board, means for drying the coated board, and means for finishing the coated surface of the board by super-calendering.

15. In an apparatus for making branded paper board, a board making machine comprising means for collecting a plurality of wet pulp layers, means for imposing said layers one upon another, and means operable on a layer on which another is imposed before the latter is so imposed for applying identification marks thereto.

16. An apparatus according to claim 15 in which the wet board web is formed by imposing the wet pulp layers one upon another on a carrying medium and the identification marks are printed on a layer of the web carried by said medium between operations of imposing said layer and next layer on the medium.

17. An apparatus according to claim 15 in which the wet board web is formed by imposing the wet pulp layers one upon another on a carrying medium and the identification marks are printed on a layer of the web carried by said medium between operations of imposing said layer and next layer on the medium, the printing means comprising a revolving cylinder in contact with which the web on the medium is carried, and a vertically adjustable presser roll holding said medium against the cylinder.

18. In an apparatus for making branded paper board, a board making machine comprising means for collecting a plurality of wet pulp layers, means for imposing said layers one upon another, and means operable on a layer on which another is imposed before the latter is so imposed for applying identification marks thereto, said last named means comprising a printing roller in contact with which the web to be printed travels, an inking roll in contact with the type surfaces on said printing roll, and means for supplying said inking roll with printing liquid.

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