Oct. 13, 1959 J. P. NORRIS 2,908,590

METHOD OF FINISHING WOOD SURFACES

Filed Dec. 31, 1957 3 Sheets-Sheet 1

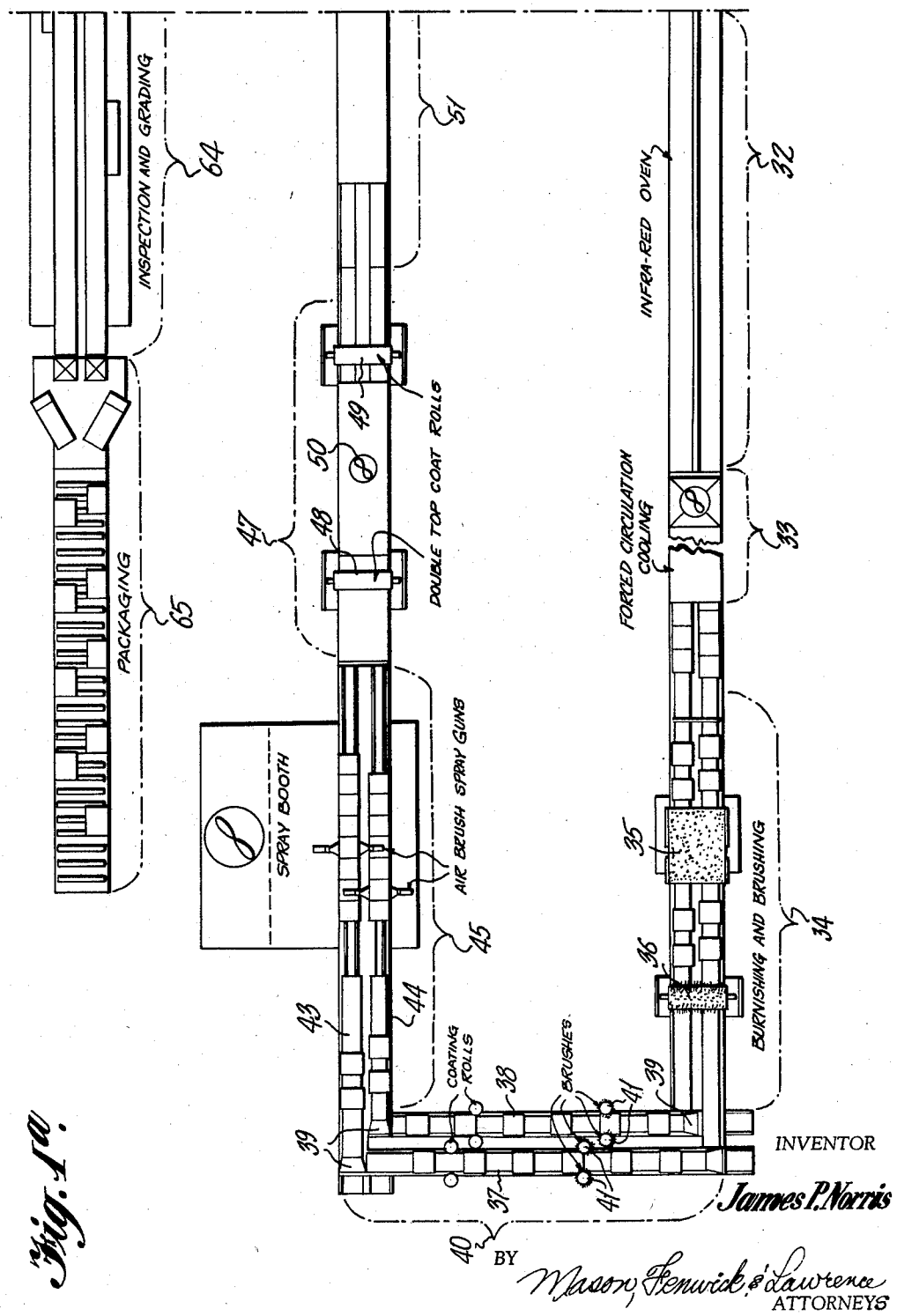


Fig. 1a.

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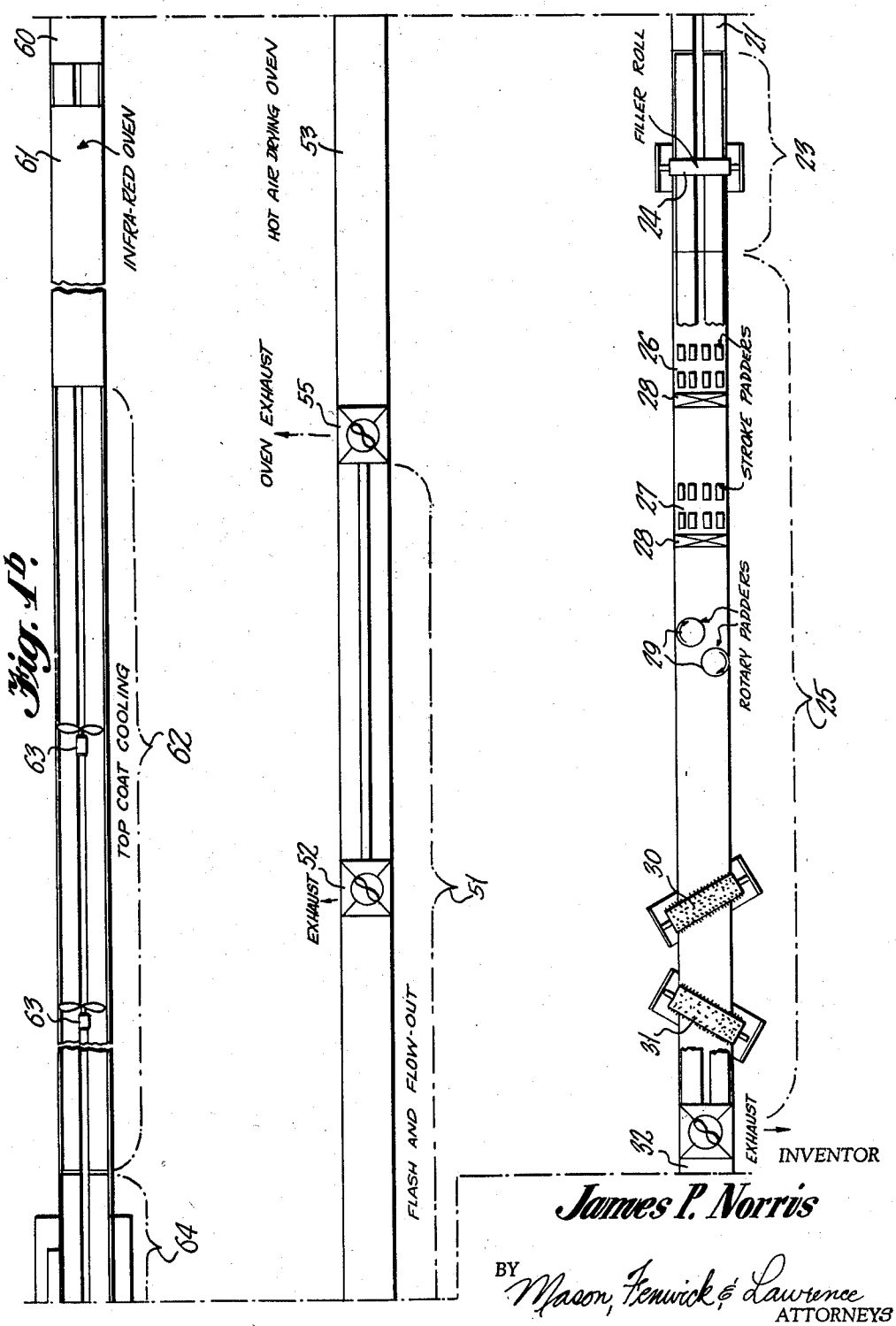


Fig. 1b.

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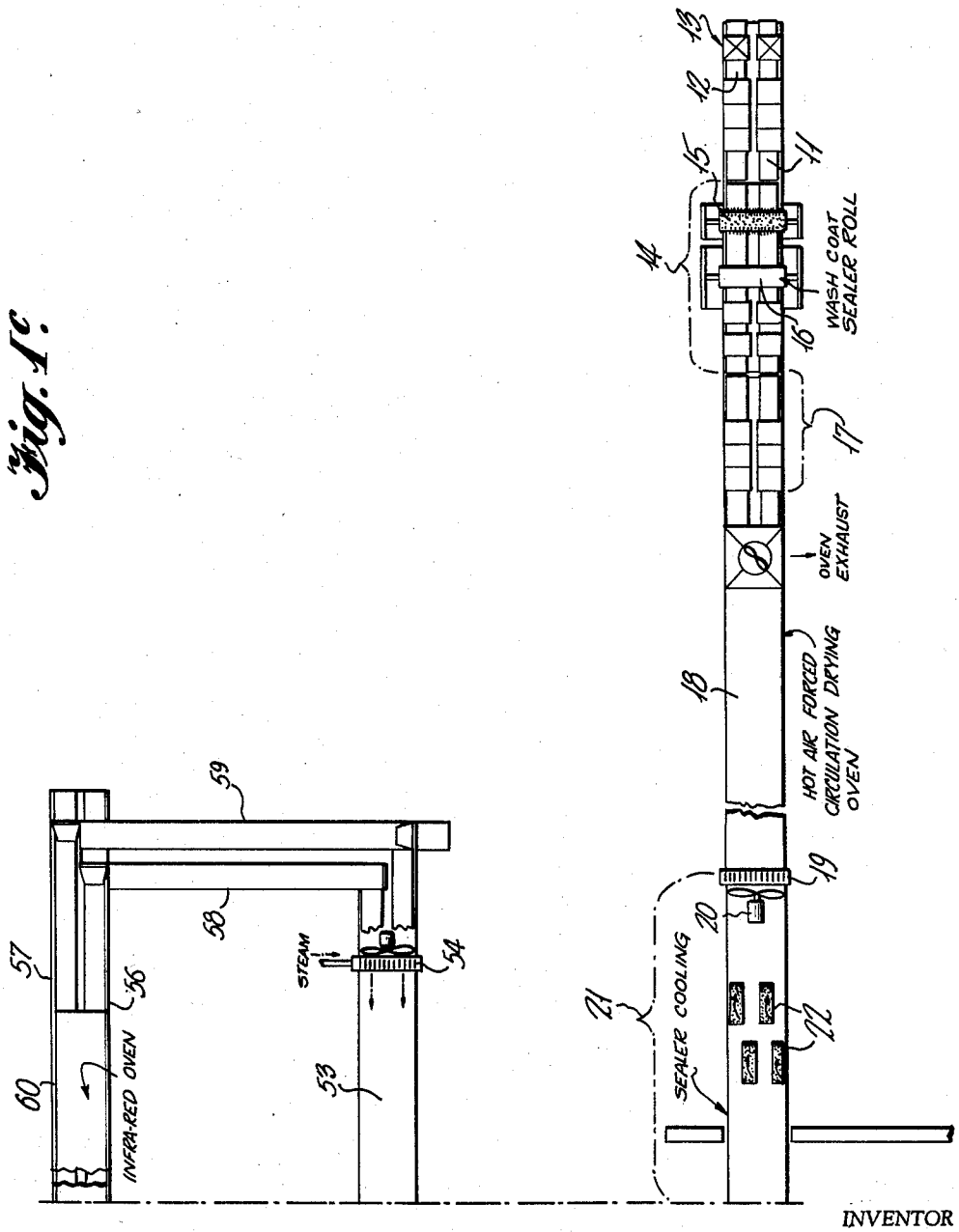
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METHOD OF FINISHING WOOD SURFACES

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Fig. 1c



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2,908,590

METHOD OF FINISHING WOOD SURFACES

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Application December 31, 1957, Serial No. 706,465

8 Claims. (Cl. 117—64)

The present invention relates in general to factory finishing of wood flooring, and more particularly to the manufacture of factory finished wood flooring blocks.

Heretofore, processes have been developed for finishing wood flooring, either in block or strip form, or parquetry type pattern flooring in the factory so that no additional finishing operation is required when the flooring is laid. One of such finishing processes involved the application to the wood of a finishing composition that rapidly penetrates the wood, as distinguished from a finish that merely coats the surface, then rubbing or wiping the composition, and subjecting the treated wood to curing or air drying for a period of time. A filler composition was then applied and rubbed or brushed, and the flooring was stacked to dry for several hours. After drying, a wax or polishing composition was applied and the composition was polished to a high gloss. The necessity for extended curing or air drying in this process presented serious problems, in that extensive storage space and excessive handling was required for the flooring during the drying period and the substantial drying periods lengthened considerably the production time.

Much effort has been devoted to development of processes for drastically reducing the time required to produce an improved factory finish on flooring. Many of these require extensive machinery installations and result in finishes having something less than the desired durability or other properties.

An object of the present invention is the provision of a novel continuous process of finishing block flooring and the like which eliminates interruption in the finishing line and conditions the blocks for immediate inspection and packaging at the end of the finishing line.

Another object of the present invention is the provision of a novel continuous process of providing a hard and lasting factory finish on block wood flooring, wherein the wood is coated with a deeply penetrating sealer composition and a filler composition which are rapidly dried in a manner permitting completion of the entire finishing operation in a period of minutes with high utilization of finishing materials.

Another object of the present invention is the provision of a novel improved continuous process of providing a composite factory finish on wood block flooring, wherein the wood is coated with a deeply penetrating vinyl-base sealer composition to provide a good adhesive platform for further finishing and to improve moisture and cold check resistance, heating to dry and cure sealer, then a filler composition being worked into the pores and open grain surface to impart color and produce a smooth uniform finish, drying the filler and polishing to produce a final finish with more lustre and depth, and finally superimposing over the cured insoluble filler coat a reactive resin mixture formulated to produce a top-coat film of high solid content and extremely tough and wear resistant

properties, and heating to dry and cure this surface coat; all of which is rapidly processed in a novel manner permitting completion of the entire finishing operation, including inspection and packaging, in the heretofore unrealistic time of eleven (11) minutes.

Other objects, advantages and capabilities of the present invention will become apparent from the following detail description, taken in conjunction with the accompanying drawings showing one preferred form of the invention.

In the drawings:

Figures 1*a*, 1*b* and 1*c* together represent a diagrammatic plan view of a finishing line for finishing wood block flooring in accordance with the process of the present invention.

Referring to the drawings, substantially square wood flooring blocks, indicated by the reference character **10**, which in the preferred example are of a commercially marketed type formed of a plurality of plys having tongues on two edges and mating grooves on the other edges, are transferred to or deposited on the feed end of a pair of side by side endless conveyor belts **11**, **12** from a hopper, feed conveyor, or other conventional supply facility for delivery through the finishing line. The conveyor belts **11**, **12** are of the normal commercial construction of multiple plys of rubberized fabric with rough rubber surface for maximum traction, and are preferably of slightly smaller width than the blocks **10**. For convenience in understanding certain details of the hereinafter described process, representative values of speed, temperatures and the like will be given for one preferred example. In the preferred example, the belts **11**, **12** are driven at a speed to advance the blocks at a rate of 106 per minute.

The blocks are advanced by the conveyor belts **11**, **12** from the feed station, indicated generally by the reference character **13**, through a sealer application station **14** where the upwardly facing surfaces of the blocks **10** are first brushed by a driven cylinder brush **15** to clean the upwardly facing surfaces and are then advanced into contact with a sealer applying roll **16** which applies a wash coat sealer composition to the adjacent surfaces of the blocks **10**. The object of the wash coat sealer is to provide a good adhesive platform for further finishing through penetration of the wood substratum, to improve moisture and cold check resistance of the blocks and to harden the nibs and raised wood fibres so they may be sanded off to assure a smooth, even surface for the filler application.

The wash coat sealer is a lacquer type material which drys by evaporation of its solvent. Examples of this type of film formers are: vinyl-butyral resins, vinyl acetate resins, and vinyl chloride acetate co-polymers, and the like; dissolved in organic solvents such as ketones, esters, chlorinated hydrocarbons, alcohols, petroleum and coal-tar diluents.

A satisfactory compound to provide rapid drying, superior bond, and moisture resistance is as follows:

	Percent solids by weight
Vinyl chloride-acetate resin	10–12
Methyl-iso-butyl-ketone	22.5
Toluol	67.5

Pigments and dye-stuffs may be added if desired to obtain various colors.

In the example herein shown, the distance along the conveyor belts allocated to the wash coat sealer station may be six feet so that the blocks will occupy this station for a period of about seven seconds. Thereafter, the blocks are delivered through a flash station **17**, which

may be about five feet long and require a travel time of five seconds, wherein the volatile wash coat sealer composition applied by the roll **16** will undergo rapid evaporation at approximately ambient temperature under the influence of forced air circulation by providing a hood and vent fan over the flash station **17**.

After traversing the flash station **17**, the block flooring enters a sealer coat drying oven **18** of the hot air forced circulation type which may be approximately forty-nine and one-half feet long so that the flooring requires about sixty-five seconds to traverse the length of the oven **18**. In the preferred example, the oven **18** has a temperature gradient of approximately 75° F. to 150° F. to provide a gradual temperature exposure, so that the coated surface of the wood blocks, assuming they enter the oven **18** at a temperature of about 70° F., would have a temperature of about 110° F. at the exit end of the oven **18**. The heat for the oven **18** to provide the desired temperature gradient may be derived from steam coils **19** located at the exit end of the oven, over which air is forced to be heated and circulated through the oven by the fan **20**.

After passage through the sealer coat drying oven **18**, the blocks **10** traverse a cooling section **21** which may be about thirty-four feet long and have a traverse time of about fifty seconds. A series of sanders **22** are located in the cooling section **21** near the exit end of the oven **18** for scuff sanding the coated surfaces of the blocks **10** to remove the nibs after the wash coat sealer application and before application of the filler. The sanders **22** may take the form of Minnesota Mining and Manufacturing Co. type "P–G" abrasive wheels which are arranged in pairs spaced longitudinally of the finishing line axis, wherein the wheels are staggered transversely of this axis so that the first pair of wheels effect scuff sanding of one-half of each of the blocks arranged to one side of the longitudinal medial axis of the block and the other pair of sander wheels sand the other half of each block. If special applications require spraying of some composition on to the wood blocks, a spray booth may conveniently be incorporated in the cooling section **21**, in which case the blocks will be transferred from the rubber conveyor belts **11**, **12** to chain belts for the duration of their travel through the spray booth and then transferred back to rubber belts **11**, **12**. The surface temperature of the blocks will have been reduced to about 85° F. at the exit end of the cooling section **21**.

The blocks **10** then pass through a filler application station **23** which may be about six feet long and have a traverse time of about seven seconds, wherein a filler composition, having a heavy base and little solvent so that it is a highly viscous composition, is applied to the upper surface of the blocks **10** by an applicator roll **24** to roll an even coating of the filler on to the block surfaces. The roll **24** may, if desired, receive the coating composition from a transfer roll which transfers the composition from a trough roll to the roll **24**, the transfer roll having spaced annular grooves in the surface thereof lying in plane normal to the roll axis to control the amount of composition applied to the blocks.

The function of the filler is to fill the open grain of the wood surface to produce a smooth uniform finish and to impart color to the finish. The filling material used in this process is made up of inert filling pigments, organic and inorganic pigments, organic dye-stuffs, vehicles and solvents formulated to provide proper consistency for wiping and padding into the open pores.

After rapid evaporation of solvents by forced air supply, padding, and brushing, the remaining filler solids are dried by solvent evaporation, oxidation, or chemical conversion to an insoluble film accelerated by catalysts and/or heat. This insoluble surface thus prevents the formation of bubbles or blistering through subsequent top coats.

A satisfactory filling composition to produce after drying, a filled surface insoluble in subsequent coats is as follows:

	Percent by weight
Silica	77
Earth colors and synthetic pigments	2
Short to medium soya-alkyd (solids)	4
Urea formaldehyde resin (solids)	4
Butyl alcohol	5
Xylol	8

Catalyst—5 to 10% toluene sulfonic acid based on urea formaldehyde solids. Reduced with VMP naptha as required.

The filler coated blocks **10** then pass into a filler padding and brushing section **25** wherein the blocks first encounter two longitudinally spaced groups **26** and **27** of motor driven stroke padders, a temperature controlled forced air supply, schematically indicated at **28**, being located immediately after each group of stroke padders **26** and **27** to maintain the filler at proper consistency for optimum padding. A pair of air-motor driven rotary padders **29** are also located within the section **25** immediately after the second group of stroke padders **27** to further pad the filler coated blocks **10** and removal of surplus filler and final cleaning of the filler coated blocks is achieved by a pair of rotary cylindrical brushes **30**, **31** which rotate on a horizontal axis and are set at oppositely inclined angles to the axis of the finishing line. It will be appreciated that the filler, which is a very viscous composition, does not penetrate into the wood blocks **10** to any appreciable extent due to its high viscosity and due to the fact that the surfaces of the wood blocks have already been sealed by the wash coat sealer composition.

The wood blocks **10** then enter an infra-red heat oven **32** which is approximately thirty-one and one-half feet long and has a traverse time of about forty-four seconds, in which the filler coating is rapidly dried. In one preferred example, the infra-red oven **32** is formed of a longitudinally spaced group of about 72 750-watt ceramic type infra-red generators to provide a temperature gradient such that the wood blocks, which have a surface temperature of about 85° F. when they enter the oven **32**, leave the oven at a temperature of about 135° F.

The wood blocks **10** then traverse a forced circulation cooling section **33** of about twenty-four feet in length having a traverse time of about thirty-three seconds, wherein the surface temperature of the wood blocks **10** is reduced to about 100° F. at the exit end of the cooling section **33**, and then enter a polishing and brushing section **34** involving a traverse time of about eighteen seconds. In the polishing and brushing section **34**, the blocks **10** are first polished by a wide belt overhead sander **35** using a flexible paper or cloth backed endless abrasive belt ranging from 300 grit to as high as 400 grit. The sander utilizes a resilient rubber covered contact drum which is driven by a motor and in turn drives the abrasive belt at a high rate of speed. It will be appreciated that the nibs on the surface of the blocks **10** were again raised and the surface was aggravated by the padding and brushing which occurred in the filler padding and brushing section **25**. By polishing the surface of the wood blocks after infra-red drying and cooling of the filler coating, a finish which is more uniform in color results, and a smoother final finish with more luster and depth results due to the polishing and removal of nibs, extraneous filler, dirt and dust immediately prior to top coat application. The sander **35** in the preferred embodiment is located seven feet from the exit end of the cooling section **33**, so that a traverse time of about ten seconds is required for the blocks to pass from the exit end of the cooling section **33** to the sander **35**. With proper selection of belt abrasive and bond, feed speed and contact drum pressure, the frictional heat generated by the abrasive belt is dissipated without causing pre-

mature belt filling and burning and uniform results are obtained. A horizontal, cylindrical rotary brush **36** located transverse to the axis of the finish line is also provided in the section **34** for removing surface dust from the wood surface generated by the sander **35**.

At the end of the polishing and brushing section **34**, the blocks **10** are transferred from the belts **11, 12** to similar conveyor belts **37, 38** respectively moving at right angles to the belts **11, 12**. Suitable fixed plates **39** which are of smaller width than the blocks **10** are provided at the points of intersection of the belts **11, 12** with the belts **37, 38** to receive the blocks from the belts **11, 12** until they are withdrawn at right angles to their original axis of movement by frictional contact with the belts **37, 38** moving immediately beneath the plates **39**.

The belts **37, 38** form an edge cleaning and groove edge coating section, indicated at **40** which is approximately twelve feet long, the speed of the belts **37, 38** being such as to provide a traverse time of about seven seconds. While moving along the belts **37, 38**, the wood blocks are first engaged by motor driven rotary wire brushes **41** rotatable on vertical axes and positioned to clean extraneous filler from the groove edges of the wood blocks **10**, which flowed onto the edges from the top surfaces during the padding stage, and are then engaged by vertical coating rollers **42** for coating the groove edges of the wood blocks **10** with a top coat composition.

The top coat composition, which is the final coating applied to the edges, and subsequently to the upper surfaces of the blocks **10**, is a synthetic resin or mixtures thereof that will form a non-thermoplastic film by oxidation or chemical reaction accelerated by proper catalysts and/or heat. The reactive resin mixture used in this process is formulated to produce a film of extremely high solid content which is tough yet flexible and will have maximum abrasion and chemical resistance.

A satisfactory top coat composition is as follows:

	Percent by weight
40% soya-glycerol pythalate alkyd (solids)	25
Butylated urea formaldehyde resin	25
Butyl alcohol	15
Xylol	35

Catalyst—3 to 6% toluene sulfonic acid, based on urea formaldehyde solids.

At the end of the belts **37, 38**, the wood blocks **10** again are transferred to endless conveyor belts **43** and **44** moving at right angels to the belts **37, 38**, transfer plates **39** being also provided at the intersections of these belts. The wood blocks **10** on the conveyor belts **43, 44** first pass through a tongue edge coating section **45** which is about seventeen feet in length, the conveyor belts **43, 44** having a speed to provide a traverse time through the section **45** of about twenty-one seconds. Within the section **45**, the blocks **10** pass before the discharge nozzles of four air brush spray guns **46** disposed to deposit the previously mentioned top coat composition onto the tongue edges of the blocks **10**. At the exit end of the section **45**, the surface of the wood blocks **10** will have a temperature of about 90° F.

The blocks then enter a top coat application station **47** having a length of about fourteen feet and a traverse time of about fourteen seconds, wherein two longitudinally spaced coating cylinders **48, 49** apply the previously mentioned top coat composition to the upwardly facing surfaces of the blocks **10**. A forced air exhaust **50** may be centrally located within the section **47** to vent this section.

The blocks **10** then pass through a flash and flow-out section **51** having a forced air circulation chamber and an exhaust **52** for rapidly evaporating the top coat composition applied by the rolls **48, 49**. The length of the flash and flow-out section may be about thirty-nine feet and have a traverse time of about forty-six seconds. Next the blocks **10** pass through a first stage top coat drying oven **53**, which is preferably a forced circulation hot air oven having a steam coil and fan unit **54** at the exit end and an oven exhaust **55** at the entrance end to provide a gradual rise in the temperature of the surface of the wood blocks **10** from about 90° F. at the entrance end to about 95° F. at the exit end.

The wood blocks are then transferred to a pair of endless conveyor belts **56, 57** spaced laterally from the belts **43, 44** and extending in parallelism therewith, by transfer endless conveyor belts **58, 59** extending at right angles to the previously mentioned belts and having a length of about ten feet and a traverse time of about six seconds.

The blocks **10** on the belts **56, 57** then pass through two sucessive infra-red heat ovens **60** and **61** forming second and third stage top coat drying ovens. The first infra-red oven **60** preferably has about 80 750 watt ceramic type infra-red generators, a length of about thirty-five feet, and a traverse time of about forty-five seconds so that the wood blocks will have a surface temperature of about 115° F. at the exit end of the oven **60**. The third stage oven **61** preferably has about 72 750 watt ceramic type infra-red generators, a length of about thirty-one feet, and a traverse time of about forty seconds, so that the wood blocks **10** will have a surface temperature of about 135° F. at the exit end of the oven **61**.

The blocks **10** then pass through a cooling section **62** which is about fifty-four feet in length and has a traverse time of about seventy seconds. The cooling section **62** has a plurality of fans **63** therein to provide forced air cooling, and provides an exit temperature for the wood blocks of about 100° F. The blocks then pass through an inspection and grading section **64** and then to a packaging section **65** where the blocks are stacked in cartons for delivery to the shipping department.

The schematic illustration of the finishing line in the drawings shows the various longitudinal and transverse sections of the finishing line as having a single pair of conveyor belts for each section, as for example the belts **11, 12** in the first section, for convenience of illustration and description. It will be understood, however, that these sections may be made up of any desired number of sets of conveyor belts arranged in series to successively receive the wood blocks **10**, and where discrepancies in belt speeds occur for different stages in a given section in the specific example herein set forth, this will be effected in actual practice by such successive sets of belts.

In order to provide effective control of the heat output of the infra-red ovens **32, 60** and **61** for varying heat output to suit different conditions, electric timer controls of conventional commercial form are preferably provided for these ovens, which may take the form of timer switches which cycle in sixty seconds and are adjustable to vary the relation of "on" time to "off" time during cycle so as to selectively cycle the infra-red lamps.

If it is desired to seal the entire block **10** against moisture, the wash coat sealer applicator roll **16** may be arranged to simultaneously apply wash coat sealer also to the downwardly facing surfaces of the blocks **10**. The edges of the blocks **10** are substantially coated with sealer which flows from the top surfaces of the blocks after passage through the sealer applicator section **14**.

By this process of finishing wood flooring blocks, a highly satisfactory factory finish having a high gloss and good wearing qualities may be provided on wood blocks by a continuous finishing process involving a total finishing time of about 11 minutes 5 seconds over a finishing line having a total length of about 542 feet. Because no interruptions in the finishing procedure are required to provide for extensive air drying periods, there is no necessity to provide for the extensive storage space required for stacking the flooring in the practice of the previously discussed prior art process and substantial economies in the production of wood flooring blocks may therefore be realized.

While but one embodiment of the invention has been

particularly shown and described, it is apparent that various modifications may be made in the invention without departing from the spirit and scope thereof, and it is desired, therefore, that only such limitations shall be placed thereon as are set forth in the appended claims.

What is claimed is:

1. An integral and continuous process of factory finishing wood flooring to provide a composite type factory finish thereon wherein flooring units are continuously transferred along a production line and the entire composite finishing operation is completed in a period of about eleven minutes comprising the successive steps of applying to the surfaces of the units to be finished a volatile, penetrating type of wash coat sealer composition which provides an adhesive platform for further finishing through penetration of the wood substratum and improves moisture and cold check resistance, drying the sealer coating with hot air under forced circulation for a period of about 65 seconds, sanding the dried sealer coating, cooling the sealer coating for a period of about 50 seconds, applying a volatile filler composition to the sealer coated surfaces to fill the open grain of the wood surfaces, padding and brushing the filler coating while it is still fluid to distribute the same evenly over the coated surfaces and remove surplus filler, drying the filler coating by infra-red radiations for a period of about 44 seconds, cooling the filler coating for a period of about 33 seconds, polishing the filler coated surfaces with a high speed abrasive surface to eliminate raised nibs and surface aggravations, brushing said surfaces to clean them, then applying to said surfaces a top coating of heat convertible synthetic resin coat composition which forms an abrasion resistant and chemical resistant resin film thereon, and drying the top coat through a plurality of successive heating stages, at least one of said heating stages including heating of the top coat by infra-red radiation.

2. An integral and continuous process of factory finishing wood flooring to provide a composite type factory finish thereon blocks and the like wherein the flooring blocks are conveyed continuously along a production line, comprising processing the blocks in three successive and uninterrupted stages; the first stage including the successive steps of applying to the upwardly facing surfaces of the blocks a volatile penetrating type of wash coat sealer composition providing an adhesive platform for further finishing through penetration of the wood substratum and improving moisture and cold check resistance, flashing the sealer coating at substantially ambient temperature to produce rapid evaporation, drying the sealer coating with hot air under forced circulation, sanding the dried sealer coating, cooling the sealer coating, said first stage involving a period of about two to three minutes; the second stage including applying a volatile filler composition to said upwardly facing surfaces to fill the open grain of the wood surfaces, padding and brushing the filler coating while it is still fluid to distribute the same evenly over said surfaces and remove surplus filler, drying the filler coating by heating the same with infra-red radiation, then cooling the filler coating, polishing the filler coated surfaces under light and uniform pressure with a resiliently backed polishing sheet faced with abrasive particles to embed raised nibs into the wood and eliminate surface aggravations, brushing said surfaces to clean them, said second stage involving a period of about two to three minutes; the third stage involving a period of about five to six minutes and including applying to said surfaces a coating of heat convertible synthetic resin which can be cured in about four to five minutes as a top coat composition which forms an abrasion resistant and chemical resistant film thereon, and drying the top coat through a plurality of successive heating stages including first hot air forced circulation heating stage and at least one succeeding infra-red radiation heating stage.

3. An integral and continuous process of factory finishing rectangular wood flooring blocks having tongue and groove edges to provide a composite type factory finish on said blocks in an uninterrupted series of successive operations while the flooring blocks are conveyed continuously along a production line and the entire composite finishing operation is completed in about eleven minutes, comprising the successive steps of applying to the upwardly facing surfaces of the blocks a volatile penetrating type of wash coat sealer composition providing an adhesive platform for further finishing through penetration of the wood substratum and improving moisture and cold check resistance, flashing the sealer coating at substantially ambient temperature to produce rapid evaporation for a period of about five seconds, drying the sealer coating with hot air under forced circulation for a period of about 65 seconds, sanding the dried sealer coating, cooling the sealer coating for a period of about 50 seconds, applying a volatile filler composition to said upwardly facing surfaces to fill the open grain of the wood surfaces, padding and brushing the filler coating while it is still fluid to distribute the same evenly over said surfaces and remove surplus filler, drying the filler coating by heating the same with infra-red radiation for a period of about 44 seconds, then cooling the filler coating for a period of about 33 seconds, polishing the filler coated surfaces under light and uniform pressure with a resiliently backed polishing sheet faced with abrasive particles to embed raised nibs into the wood and eliminate surface aggravations, brushing said surfaces to clean them, brushing the groove edges of the blocks to remove excessive filler from them, applying a resin top coat composition to said groove edges, spraying a resin top coat composition to the tongue edges of said blocks, applying to said upwardly facing surfaces a coating of heat convertible synthetic resin as a top coat composition which forms an abrasion resistant and chemical resistant film thereon, and drying the top coat through a plurality of successive heating stages including first hot air forced circulation heating stage and two successive infra-red radiation heating stages, the first of said last-mentioned infra-red heating stages being for a period of about 45 seconds and the second for a period of about 40 seconds.

4. An integral and continuous process of factory finishing wood flooring blocks and the like to provide a composite type factory finish thereon wherein the flooring blocks are conveyed continuously along a production line, comprising the successive steps of applying to the upwardly facing surfaces of the blocks a volatile penetrating type of wash coat sealer composition of a lacquer type material having a vinyl resin base dissolved in organic solvents providing an adhesive platform for further finishing through penetration of the wood substratum and improving moisture and cold check resistance, drying the sealer coating with hot air under forced circulation raising the temperature of the coating to about 110° F., sanding the dried sealer coating, cooling the sealer coating to about 85° F., applying a volatile filler coating of a urea formaldehyde resin base composition which includes inert filling pigments, organic and inorganic pigments, and organic dye-stuffs to said upwardly facing surfaces to fill the open grain of the wood surfaces, padding and brushing the filler coating while it is still fluid to distribute the same evenly over said surfaces and remove surplus filler, drying the filler coating by heating the same with infra-red radiation to a temperature of about 135° F., then cooling the filler coating to about 100° F., polishing the filler coated surfaces under light and uniform pressure with a resiliently backed polishing sheet faced with abrasive particles to embed raised nibs into the wood and eliminate surface aggravations, brushing said surfaces to clean them, applying to said upwardly facing surfaces a top coat of a butylated urea formaldehyde resin base composition which forms an abrasion resistant and chemical resistant film thereon, and heating the top coat to dry the same

through a plurality of heating stages including a first heating stage to about 95° F., then a second heating stage to about 115° F., then a third heating stage to about 135° F., said second and third stages being infra-red radiation heating stages.

5. The method of claim 1, in which the wash coat sealer composition is a lacquer type material having a vinyl resin base dissolved in organic solvents, the filler composition is a urea formaldehyde resin base composition and includes inert filling pigments, organic and inorganic pigments, and organic dye-stuffs, and the top coat composition is a butylated urea formaldehyde resin base composition.

6. Apparatus for finishing wood flooring forming an integral and continuous processing line therefor to provide a composite type factory finish on the flooring comprising means for applying to the upper surface of the wood flooring a volatile, penetrating type of wash coat sealer composition, hot air forced circulation oven means for heating the sealer coating to dry the same, sanding means adjacent the exit end of said oven for sanding the sealer coated surfaces of the flooring, a cooling stage for cooling the sealer coating, a filler applicator for applying a volatile filler composition to the sealer coated flooring surfaces to fill the open grain of the surfaces, a plurality of padders for distributing the filler coating uniformly over the flooring surfaces, brush cylinder means for removing surplus filler from the flooring surfaces and cleaning the surfaces, a drying oven including an elongated series of infra-red generators for rapidly drying the filler coating, a cooling stage adjacent the exit end of said infra-red oven for cooling said filler coating under forced circulation, means for polishing the filler coated surfaces including a fine grit abrasive belt applied to said flooring surfaces under light uniform pressure for eliminating raised nibs and surface aggravations, brush means for removing surface dust from said flooring surfaces, applicator means for applying to said surfaces a top coat resin composition forming an abrasion resistant and chemical resistant film thereon, a plurality of drying ovens for heating the top coat coated surfaces through a plurality of gradual temperature increments, at least one of said last mentioned ovens including an elongated series of infra-red generators and a conveyor for conveying the flooring past the aforesaid instrumentalities in the order stated.

7. Apparatus for finishing wood flooring forming an integral and continuous processing line therefor to provide a composite type factory finish on the flooring comprising means for applying to the upper surface of the wood flooring a volatile, penetrating type of wash coat sealer composition, hot air forced circulation oven means for heating the sealer coated surfaces to about 110° F. to dry the same, sanding means adjacent the exit end of said oven for sanding the sealer coated surfaces of the flooring, a cooling stage for cooling the sealer coating to about 85° F., a filler applicator for applying a volatile filler composition to the sealer coated flooring surfaces to fill the open grain of the surfaces, a plurality of padders for distributing the filler coating uniformly over the flooring surfaces, brush cylinder means for removing surplus filler from the flooring surfaces and cleaning the surfaces, a drying oven including an elongated series of infra-red generators for rapidly drying the filler coating by heating the same to about 135° F., a cooling stage adjacent the exit end of said infra-red oven for cooling said filler coating under forced circulation to about 100° F., means for polishing the filler coated surfaces including a fine grit abrasive belt applied to said flooring surfaces under light uniform pressure for eliminating raised nibs and surface aggravations, brush means for removing surface dust from said flooring surfaces, applicator means for applying to said surfaces a top coat resin composition forming an abrasion resistant and chemical resistant film thereon, means for flashing and flowing-out the top coat under forced circulation to produce rapid evaporation, a hot air forced circulation drying oven for heating said top coated surface to a temperature of about 95° F., a first infra-red top coat drying oven for heating the top coated surface to a temperature of about 115° F. and a second infra-red top coat drying oven for further raising the temperature of the top coated surface to about 135° F., means for cooling the top coat to a temperature of about 100° F., and a conveyor for conveying the flooring past the aforesaid instrumentalities in the order stated.

8. An integral and continuous process of factory finishing rectangular wood flooring blocks to provide a composite type factory finish on said blocks in an uninterrupted series of successive operations while the flooring blocks are conveyed continuously along a production line and the entire composite finishing operation is completed in about eleven minutes, comprising the successive steps of applying to the upwardly facing surfaces of the blocks a volatile pentrating type of wash coat sealer composition providing an adhesive platform for further finishing through penetration of the wood substratum and improving moisture and cold check resistance, flashing the sealer coating at substantially ambient temperature to produce rapid evaporation for a period of about five seconds, drying the sealer coating with hot air under forced circulation for a period of about 65 seconds, applying a volatile filler composition to said upwardly facing surfaces to fill the open grain of the wood surfaces, padding and brushing the filler coating while it is still fluid to distribute the same evenly over said surfaces and remove surplus filler, drying the filler coating by heating the same with infra-red radiation for a period of about 44 seconds, then cooling the filler coating for a period of about 33 seconds, polishing the filler coated surfaces under light and uniform pressure with a resiliently backed polishing sheet faced with abrasive particles to embed raised nibs into the wood and eliminate surface aggravations, brushing said surfaces to clean them, applying to said upwardly facing surfaces a coating of heat convertible synthetic resin as a top coat composition which forms an abrasion resistant and chemical resistant film thereon, and drying the top coat through a plurality of successive heating stages including first hot air forced circulation heating stage and two successive infra-red radiation heating stages, the first of said last-mentioned infra-red heating stages being for a period of about 45 seconds and the second for a period of about 40 seconds.

References Cited in the file of this patent

UNITED STATES PATENTS

2,341,161	Partee et al.	Feb. 8, 1944
2,450,681	Muench	Oct. 5, 1948
2,772,986	Buck	Dec. 4, 1956