Aug. 12, 1941. A. KLAMMT 2,252,432

ADHESIVE APPLYING APPARATUS

Original Filed July 23, 1938 3 Sheets-Sheet 1

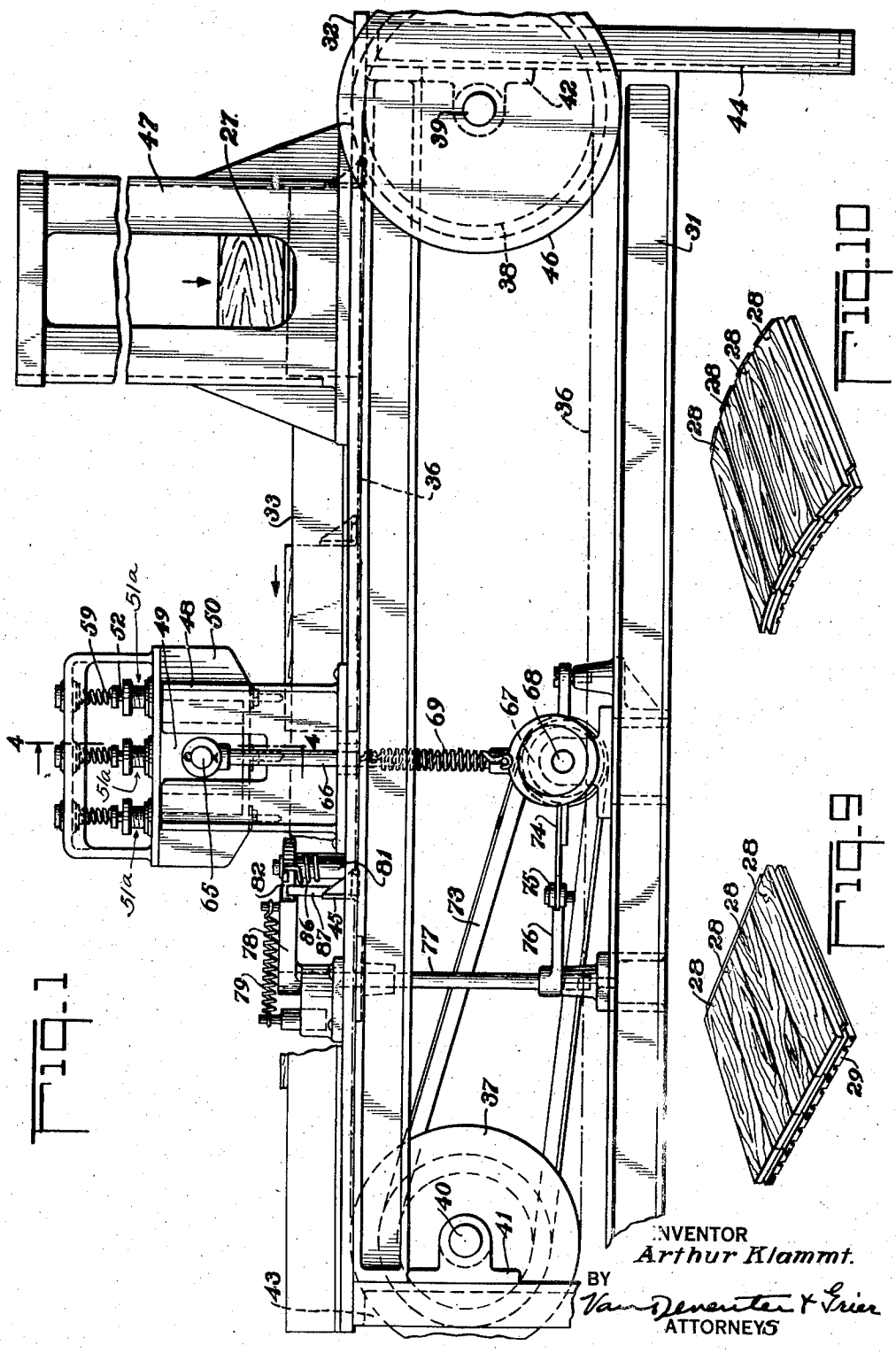


Fig. 1

Fig. 10

Fig. 9

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ADHESIVE APPLYING APPARATUS

Original Filed July 23, 1938 3 Sheets-Sheet 2

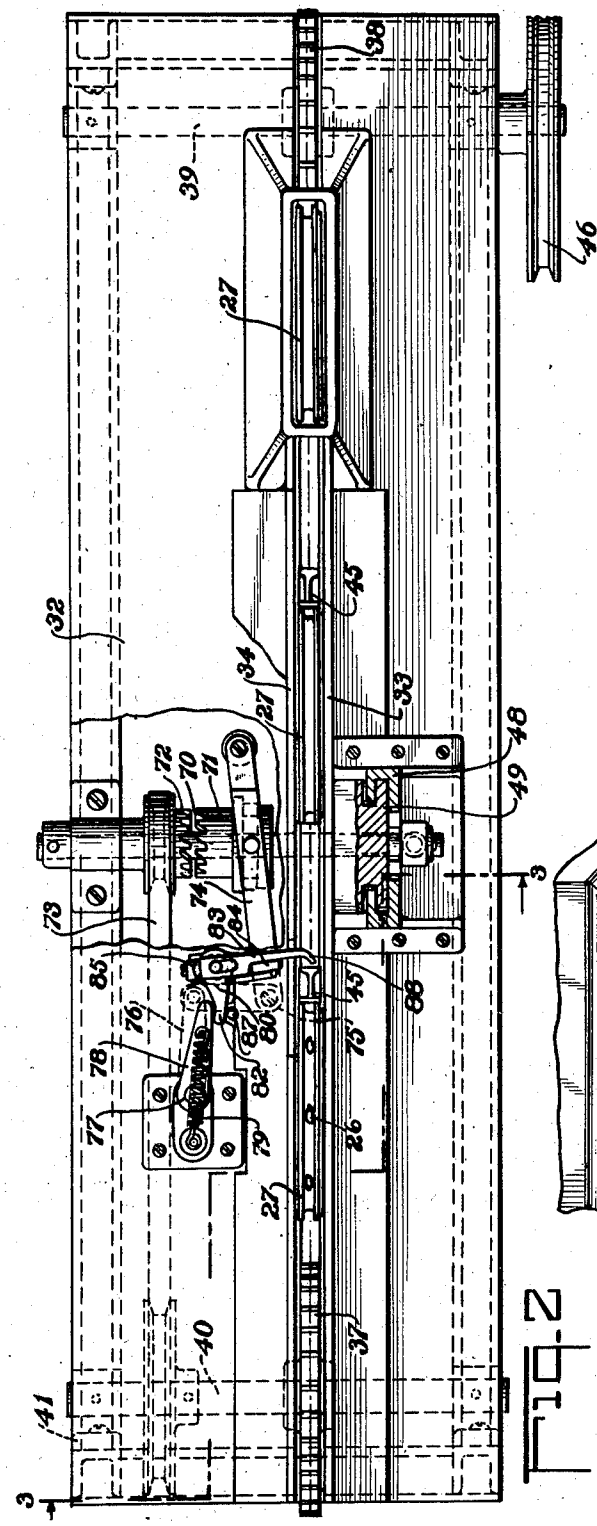


FIG. 2.

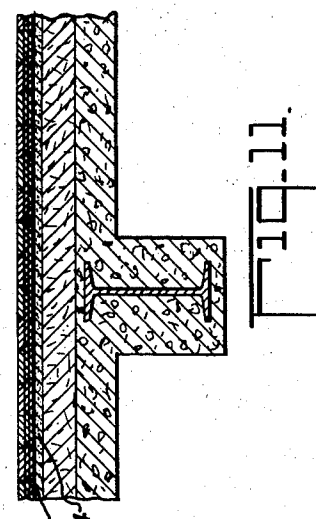


FIG. 11.

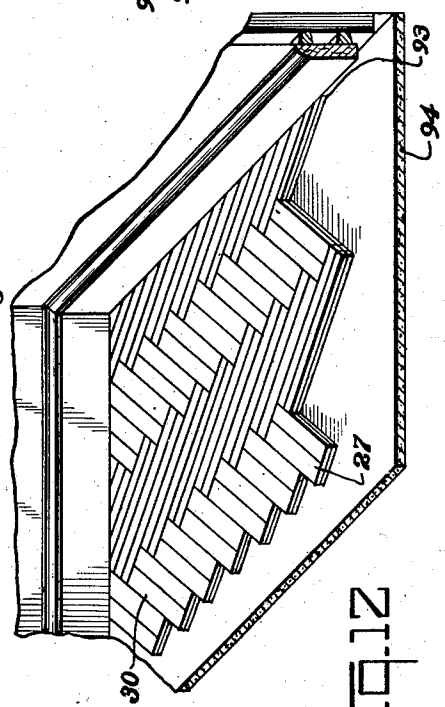


FIG. 12.

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ADHESIVE APPLYING APPARATUS

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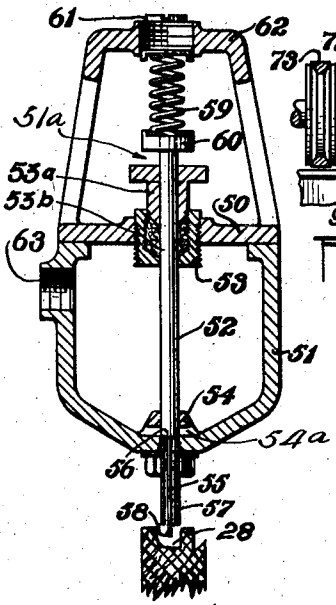


FIG. 4

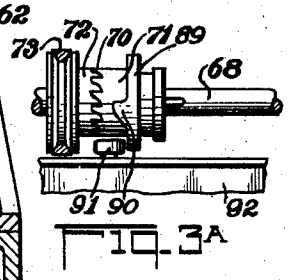


FIG. 3A

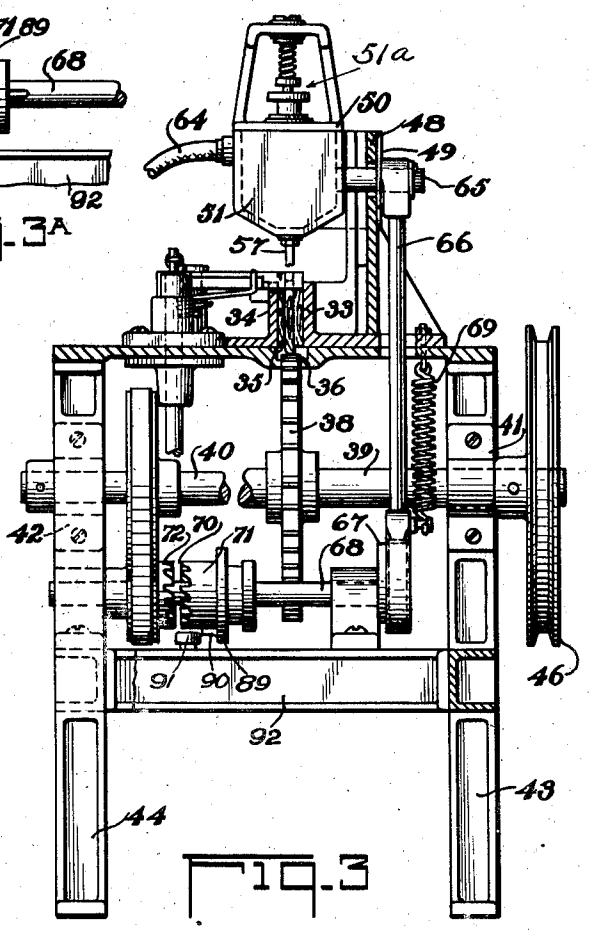


FIG. 3

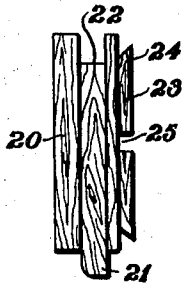


FIG. 5

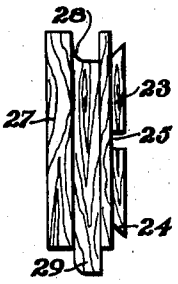


FIG. 6

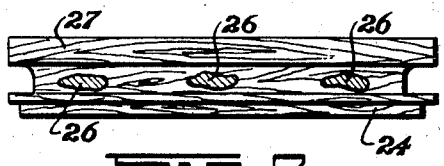


FIG. 7

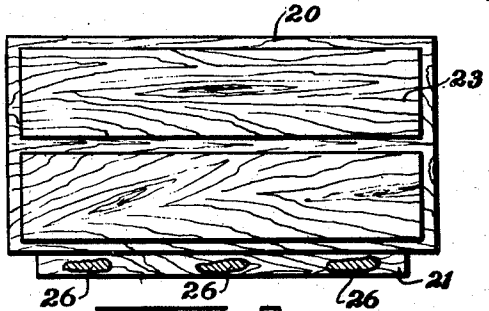


FIG. 8

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Patented Aug. 12, 1941 2,252,432

UNITED STATES PATENT OFFICE

2,252,432

ADHESIVE APPLYING APPARATUS

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Original application July 23, 1938, Serial No. 220,845. Divided and this application February 7, 1939, Serial No. 254,989

5 Claims. (Cl. 144—280)

This invention pertains to apparatus for producing composite floor products, the present application being a divisional application of application Serial No. 220,845, filed July 23, 1938.

An object of the invention is to provide a suitable machine for applying adhesive or the like to individual slats or lengths of materials.

A further object is to provide a machine of the above type adapted to apply flexible adhesive to individual slats of parquetry to facilitate assembly of the latter into composite flooring blocks.

A still further object is to provide a machine of the above type which is adapted to apply spots of adhesive in predetermined locations and spaced relationship, and which is automatic in action.

Other objects and advantages of the invention will appear during the course of the following description in connection with the accompanying drawings, in which:

Figure 1 is a side elevation of a preferred type of machine for applying spots of flexible cement;

Figure 2 is a plan view of the same partially broken away to show the clutch and related structures;

Figure 3 is a cross sectional view on the lines 3—3, Figure 2;

Figure 3A is a detail view of the clutch release mechanism;

Figure 4 is an enlarged detail cross sectional view of a spotting head;

Figure 5 is an end elevation of a typical flooring slat;

Figure 6 is an end elevation of an improved type of slat;

Figure 7 is an edgewise view of a slat illustrating the application of spots of cement to the groove;

Figure 8 is a bottom view of a slat illustrating application of the spots of cement to the tongue;

Figure 9 is a perspective view of a typical composite block or section;

Figure 10 is a similar view showing the block bent to illustrate the flexibility of the hinged structure;

Figure 11 is a cross sectional view of a section of flooring laid in accordance with the improved method; and

Figure 12 is a perspective view of a parquet floor constructed and laid in accordance with the invention.

It is obvious that where a floor is made up of small individual pieces, there is a distinct advantage in using grouped members if they can be so grouped as to not interfere with some preconceived design or cause a balance of the labor saving by costs incident to breakage in transit or separation of the members during handling.

Many methods have been advanced for uniting individual members to form a composite section suitable for use in laying floors. In most of these methods a rigid structure is produced which is not good practice because these rigid sections when joined over a slightly uneven base will cause a strain at the joints unless an excess of plastic cement is used on the base to adjust for its irregularities.

Another undesirable feature of many of the proposed methods of forming composite sections is that when a cementing medium is applied to the tongue and groove either a snug fit is not obtained or the cement present in excess extrudes between the joints causing an unsightly appearance and endangering the perfection of the finish by the possibility of some component of the adhesive bleeding into the finishing material. If the adhesive used is a water soluble material, such as glue, under conditions of excess humidity, swelling may occur causing undue expansion of the sections and even breakage at the joints.

It has hitherto been proposed, as set forth in U. S. Patent No. 2,018,711, to produce a preformed flooring in which wood tiles are united by an elastic rubber-like cement, the cement being of substantial thickness. It is apparent to those skilled in the art that this method of construction even if applied to comparatively small units would not only be expensive, but would make prefinishing of the wood sections almost imperative because the finishing materials ordinarily used for wood flooring are not satisfactory as finishes for elastic rubber on account of the great difference in elongation. Then too, modern vulcanized rubber compounds usually contain accelerators and antioxidants which have a tendency to discolor varnish films applied over them.

The present invention avoids the use of any method which will result in a composite structure having the individual members separated by a continuous sheet of cementing material throughout the joints. Such a result would be undesirable for the reasons before stated.

In the present invention a new and improved result is accomplished, which eliminates the difficulties and disadvantages of prior methods in the following manner:

Referring to Figure 5, the numeral 20 denotes a short slat of flooring having a rounded tongue 21 formed along one side and a square groove 22 formed along the other side and also along one or both of the ends. The bottom side of the slat may be formed with an extended portion 23 having angularly undercut edges 24 and one or more grooves 25, this form of bottom being adapted to be firmly engaged by a plastic material in laying the floor as hereinafter described.

In forming a composite section or block of slats such as those shown in Figure 5, instead of applying adhesive throughout the entire tongue

and groove joint, the joint is made by means of small individual spots of flexible adhesive **26**, preferably applied to the flat bottom side of the tongue **21** as shown in Figure 8. When slats spotted in this manner are fitted together the flexible adhesive effect is limited to the lower side of the tongue and groove. Any extrusion of adhesive which may occur takes place at the bottom of the composite section where it cannot interfere with the fit or finish of the composite while each joint forms a flexible hinge.

Figure 6 shows an improved form of strip **27** in which the groove **28** is partially rounded to approximately the same contour as the tongue **29**. In carrying out the method with this type of slat, the adhesive spots **26** are applied to the bottom of the groove **28** as shown in Figure 7. When the tongue **26** is entered firmly in the groove **28** the adhesive flows readily along the tongue and particularly toward the lower corner thereof, giving the greatest hinge effect with the smallest amount of adhesive.

In carrying out the fabricating method of the invention, it is preferred to apply the adhesive to the strips when they are in a position that will cause the surface tension of the adhesive to hold the spot in position until the tongue is entered. With the type shown in Figure 5 the spots are applied with the strip in a horizontal position with the back up, as in Figure 8. With the type shown in Figure 6 the spots are applied with the strip in the vertical position, the groove being up and the tongue down. Any other positions of the respective types of strips would cause the spots to run by gravity unless the adhesive is used in a very viscous form which is undesirable.

In spotting the strips the frequency of the spots of adhesive must necessarily be regulated by the length of the strip, the viscosity of the adhesive, and the clearance between the tongue and the bottom of the channel. In all cases, regardless of the number of spots applied to any particular length of strip, it is preferred to keep the spots at the ends of pieces far enough away to avoid extrusion of the adhesive. The intermediate spots are spaced to allow sufficient flow of the adhesive material to follow along the tip of the tongue instead of up the sides. This result is best accomplished if the spots do not unite when the tongue is fully entered into the channel.

As an adhesive for use in producing the composite blocks by the new method described, it has been found that aqueous dispersions of tube or tire reclaim or rubber latex compounds give the best results. Rubber cements may be used as well as other solvent solutions of flexible adhesive materials such as nitrocellulose and various synthetic resins. Even thermo plastic materials such as non-hardening synthetics may be used, although in this case it is necessary to apply them at temperatures above that used for other materials. The preference for aqueous dispersions of rubber arises from the fact that the dried out films are inherently elastic and adhesive. The use of water emulsions of rubber permits carrying a very high solid content, even as high as 70% without attaining any substantial viscosity which would retard the flow. Another reason for preferring aqueous dispersions of rubber is that by their use fire hazards are eliminated, a very important consideration in factories producing wood flooring strips.

Due to the more or less temporary nature of the effect desired in producing composite sections or blocks by the method described, the method is not limited to any particular rubber compound. Rosin soap dispersions of inner tube reclaim work very well. Good results have also been achieved with commercial 60% latex as well as 70% latex known as Revertex. Vulcanizing ingredients are not necessary although they can be added. In cases where commercial latex products are used which do not penetrate well it has been found that the addition of about .2% of Tergitol as a wetting agent promotes better adhesion. The main qualifications desired in the adhesive are good adhesive qualities, sufficient elasticity to allow recovery when the composite block is flexed, and enough durability to withstand atmospheric changes during the interval between the manufacture of the block and its use as a flooring unit.

By the foregoing method of fabrication, composite blocks of various shapes and forms can be made, depending on the type of flooring pattern in which they are to be used, and while it is desirable for most purposes that the slats have the bottom extension **23** shaped as shown in Figures 5 and 6. It will be understood that the invention is not limited to this precise shape of slat. For example, Figure 9 illustrates a composite block of square shape, composed of slats **28** having grooved flat bottoms **29**. Such a block being fabricated by the spot adhesive method as illustrated in Figure 7 or as in Figure 8, may readily be flexed as shown in Figure 10, allowing for shipment without breakage and for ease of handling and proper laying under a variety of conditions encountered, the resilience of the adhesive spots permitting the unit to return to shape for accurate fitting. Blocks may also be formed in staggered or herring-bone sections for laying patterns such as the herring-bone floor **30** shown in Figure 12.

In producing blocks by the method described, it is evident that for best results the spots should be accurately located and the quantities of adhesive should be uniformly and accurately regulated. It is also obvious that for speed and economy in manufacture the spotting operation should be carried out with rapidity. To accomplish the above ends, a spotting machine such as that shown in Figures 1, 2, 3, 3A, and 4 may be provided.

Referring to the above figures, the numeral **31** indicates an elongated machine frame having a top plate **32** upon which are secured two longitudinal guide angles **33** and **34**. A channel **35** in the late **32** between the two angles **33** and **34** carries a conveyor chain **36**, Figure 3, provided with sprockets or pulleys **37** and **38** carried on shafts **39** and **40**, the shafts **39** and **40** being journalled in pillow blocks **41** and **42** secured respectively to the end uprights **43** and **44** of the frame **31**. As conveyors of this type are well known, the precise structure of the chain need not be described herein, and to simplify the drawings, has been represented by a dotted and dashed line in Figure 1 and 2.

The conveyor **36** has attached thereto a succession of cleats **45**. The shaft **39** carries a drive pulley **46** adapted to be connected to any suitable source of power. Obviously, if desired the pulley may be mounted on the shaft **40**. When the shafts are revolved, the conveyor **36** draws the cleats **45** successively along the channel **35** from right to left, (Figure 1), throughout the length of the top plate or table **32**.

A feed hopper 47 secured to the plate 32 and spanning the path of the conveyor 36, is adapted to receive a stack of slats 27 disposed vertically with their grooved edges upward. Thus as the cleats 45 move under the hopper 47, each withdraws the lowermost slat from the stack, and the slats are successively conveyed along the plate 32 between the angles 33 and 34 which act as guides to maintain the slats in accurate lateral position.

A stationary upright guide 48 has vertically slidable therein a cross head 49 (Figure 2 and 3), to which is secured a spotting head 50. The head 50 overhangs the angles 33 and 34 and the conveyor 36, and comprises principally a fluid-tight tank 51 shown in cross sectional detail in Figure 4. A plurality of valve assemblies 51*a*, disposed in a row longitudinally of angles 33, as shown in Figure 1 and directly above the conveyor 36, as shown in Figure 3, are comprised in the tank 51. The valve assemblies 51*a* are identical in structure, their preferred construction and mounting being shown typically in Figure 4. Each assembly 51*a* has a valve stem 52 vertically slidable in plug 53 in the top of the tank 51 and in a yoke 54 inside the bottom thereof. The valve stem 52 has a reduced lower portion 55 extending from a shoulder 56 downward through a small discharge pipe 57, the tip 58 protruding below the lower end of the pipe. A compression spring 59, disposed between cap 60 on the valve stem 52 and plug 61 in an upper inverted channel member 62, urges the stem 52 downward, normally holding the shoulder 56 against the upper end of pipe 57 to form a valve. A threaded inlet opening 63 is provided in the side of the tank 51, through which opening a suitable adhesive such as an aqueous diffusion of rubber may be fed into the tank under any desired pressure through a flexible hose connection 64 as shown in Figure 3. The adhesive flows under the interior yoke 54 at 54*a*, but is normally held by the shoulder 56 from entering the pipe 57. Obviously if desired, the tank may be partially filled with adhesive and compressed air admitted through the hose 64 to maintain the pressure on the adhesive.

It is evident that if the tank 51 be moved downward above a slat 27 until the tip 58 of the stem 52 encounters the bottom of the groove 28, stem 52 is held stationary and the pipe 57 is moved downward away from the shoulder 56, allowing adhesive to be forced through the pipe 57 and into the groove, as hereinafter set forth. A gland 53*a* and packing 53*b* are provided to prevent leakage upward along the stems 52.

A wrist pin 65 in the cross head 49 is linked by a connecting rod 66 to an eccentric 67 on a lower cross shaft 68. A tension spring 69 (Figures 1 and 3), normally holds the spotter head 50 and cross-head 49 at their top position in the guide 48, the eccentric 67 standing at upper dead center.

Mounted on the cross shaft 68 is a jaw clutch 70 having a driven member 71 slidably keyed to the shaft and a driving member 72 normally rotatable thereon. The driving member 72 is adapted to be continuously rotated by the conveyor shaft 40 through a suitable driving means such as a V-belt 73.

The driven member 71 is provided with a shifter yoke 74 connected by a link 75 to a lever 76 on a vertical shaft 77 extending upward through the table 32 as shown in Figures 1 and 3. Secured on the top of the shaft 77 is a toggle lever 78 equipped with a toggle spring 79. A bell crank member 80, pivoted to an upright 81 on the table 32, has an arm 82 adapted to engage the toggle lever 78 as shown in Figure 2. A finger 83 is slidably mounted on the other arm 84 of the bell crank 80, and is normally held in extended position as shown in Figure 2 by means of a light leaf spring 85 secured to the rear of the member 80. A torsion spring 86 urges the bell crank member 80 counterclockwise against a stop 87, Figure 2. In this normal position, as shown in Figures 2 and 3, the finger 83 lies in the path of slats 27 being carried along by the conveyor cleats 45. The end 88 of finger 83 is curved rearwardly for a purpose hereinafter set forth.

The slidable driven member 71 of the clutch 70 carries a face cam 89 which has a lobe 90. A roller 91, rotatably secured to a frame cross-member 92, is adapted to be engaged by the lobe 90 as the clutch revolves in engaged position as illustrated in Figure 3A. It will be seen that engagement between the cam lobe 90 and roller 91 will force the driven member to the right and thereby release the clutch.

The operation of the machine is as follows: Slats 27 are stacked in the hopper 47 with their grooves upward, as previously noted. The cleats 45 convey the slats one by one under the spotting head 50. As each slat 27 approaches center position under the head, it engages the finger 83, swinging the bell-crank member 80 clockwise, referring to Figure 2. The arm 82 throws the toggle lever 78 over center, rocking the shaft 77 which actuates the lower lever 76, link 75 and shifter yoke 74 to engage the clutch as shown in Figure 3A. The shaft 68 and eccentric 67 are thereby revolved through one revolution, the cam lobe 90 engaging the roller 91 to release the clutch as the end of the revolution approaches, while the tension spring 69 operates to insure exact return of the eccentric to upper dead center. As the eccentric 69 revolves, the spotting head 50 is given a stroke downward and upward. At the lower end of the stroke the valve-stem tips 58 encounter the bottom of the groove 28 as previously described, causing adhesive to be forced through the pipes 57 and deposited in spots 26, Figure 7. The timing of the spotting head is so synchronized with the motion of the slat 27, that the spots are deposited evenly with regard to the length of the slat, and the amount of material deposited is determined by controlling the viscosity and pressure of the adhesive in the tank 51. As illustrated in Figure 1, the spotting head is shown for example with three valve assemblies 51*a* with even spacing. Obviously the head may be designed to deposit any desired number and spacing of spots to properly carry out the method with various standardized sizes of slats. It is also obvious that the head 50 may be provided with a large number of spotting valves and various spotting patterns arranged by removing such valves as are not required for a particular pattern and plugging their openings. To thus eliminate a valve, referring to Figure 4, the upper plug 61, the spring 59 and the cap 60 are first removed, after which the valve stem 52 is withdrawn upward. The plug 53 and pipe 57 may then be removed and replaced with suitable blank plugs. The parts may readily be proportioned, if desired, to carry slats through flat instead of vertically and to deposit the spots 26 on the underside of the tongue 21 in the manner shown in Figure 8.

The purpose of the spring-pressed arrangement of the finger 83 is to permit the latter to snap back to normal position as the clutch is released by the cam 89 as described, since the latter action operates through the yoke 74 and connected mechanism to force the toggle lever back to normal position as shown in Figure 2. After the initial swing of the finger 83 and bell crank member 80 have caused engagement of the clutch, the finger continues its clockwise movement until the curved end 88 over-rides the corner of the moving slat 27. Thereupon, due to the backward curvature of the end 88, counter-clockwise pressure on the finger, generated both by the torsion spring 86 and finally by the releasing of the clutch, causes the finger to telescope back along the bell-crank member and snap to its initial angle without possibility of jamming against the slat. The finger thus rides resiliently against the moving slat until the latter has passed it, whereupon the leaf spring 85 projects the finger forward to engage the next slat.

It is obvious that in carrying out the method of constructing composite units, the operation of the machine described automatically insures rapid, uniform spotting of exactly proper amounts of adhesive to produce the best hinging, resulting in maximum production of uniform sections with minimum expenditure of time, labor and adhesive.

Composite blocks or strips made by the foregoing method may be laid in a number of ways, but a preferred method is to lay them in a layer of permanently resilient mastic comprising an aqueous dispersion of rubber. This material may have various compositions, a typical formula for good results calling for a dispersion of reclaimed rubber containing 50% of rubber solids. To 100 parts of this dispersion may advantageously be added 25 parts of a resilient fibrous material such as shredded cork.

In forming a floor by this method, a thin layer 93 of uncured mastic is spread cold on the supporting surface such as the concrete underfloor 94, Figures 11 and 12. The blocks of slats are then fitted together and pressed down in place in the layer of mastic, which adheres to their lower sides and rises into the lower portions of the joints, but is prevented by the tongues 29 from rising to the upper surface. Such a layer of mastic, when allowed to cure, forms a permanently resilient support which itself is unaffected by heat, cold, moisture or finishing materials. It holds the flooring strips down firmly not only by adhesion but by the formation of a plurality of dovetail joints with the bottom extensions 23. Due to its permanent resilience, the mastic layer allows expansion and contraction without rupture of the upper or lower joinings or disintegration of its own internal structure, and together with the resilient hinging of the composite sections, provides a completely cushioned floor not subject to squeaks.

While the invention has been set forth in preferred form throughout, its practice is not limited to the precise structures, compositions and procedures set forth, as various modifications may be made without departing from the scope of the appended claims.

What is claimed is:

1. In a spotting machine for flooring slats, in combination, a conveyor adapted to move said slats longitudinally with longitudinal edge surfaces thereof directed upwardly, means to drive said conveyor, a hopper adapted to feed said slats successively to said conveyor in said position, means overhanging said conveyor and adapted to apply a plurality of spaced spots of adhesive to said longitudinal edge surface of each of said moving slats, and means operable by said driving means and controllable successively by each of said moving slats to actuate said spotting means.

2. In a spotting machine for flooring slats, in combination, a table, a conveyor adapted to continuously move said slats successively along said table, power means to drive said conveyor, a stationary support on said table, a spotting head vertically slidable on said support and including a tank for adhesive, said tank overhanging said conveyor and moving slats, a normally closed valve in the bottom of said tank, said valve being vertically movable in said bottom to open said valve and thereby to emit adhesive from said tank, means to move said head and tank downward and upward, means to operatively connect said moving means to said power means, and means including a member adapted to be engaged by each slat passing on said conveyor under said tank to actuate said connecting means, whereby said tank may be moved downward toward and immediately upward away from said passing slat, the lower end of said valve momentarily engaging said slat to open said valve and deposit a spot of adhesive from said tank on said passing slat.

3. A machine as claimed in claim 2 including guide angles adapted to maintain said slats in vertical position with the grooved edges thereof upward, and wherein the contact tips and discharge ends of said valves are adapted to enter said grooves to deposit said adhesive spots in the bottoms of said grooves.

4. A machine as claimed in claim 2 including a compressed air conduit adapted to deliver predetermined air pressure to said adhesive in said tank, said adhesive having pre-determined viscosity and said valve being opened a pre-determined distance and time by said movement of said head, whereby the quantities of said adhesive emitted through said valves may be predetermined.

5. A machine as claimed in claim 2 wherein said moving means for said spotting head includes a shaft, an eccentric on said shaft, a connecting rod linking said head to said eccentric, resilient means urging said connecting rod upward to normally hold said head in upper position, means including a clutch adapted to operatively couple said shaft to said power means, to rotate said shaft, and wherein the control means for said actuations includes a trip finger normally overhanging said conveyor and adapted to be engaged by each slat moving under said tank, to cause engagement of said clutch, and stationary means to disengage said clutch as said clutch approaches the end of each revolution thereof.

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