

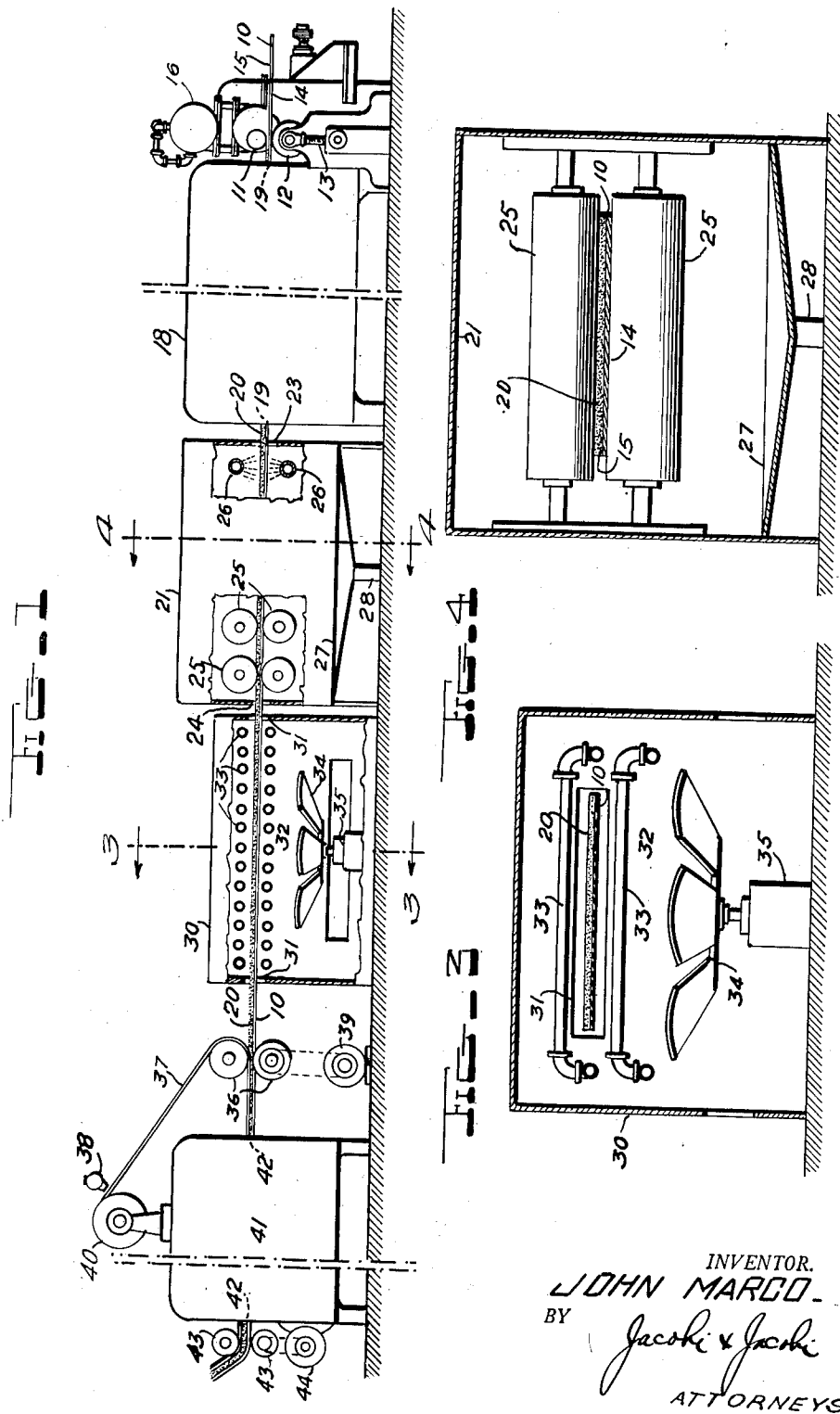
June 9, 1953

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OF FOAM RUBBER CUSHIONING TO A CARPET

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2 Sheets-Sheet 1

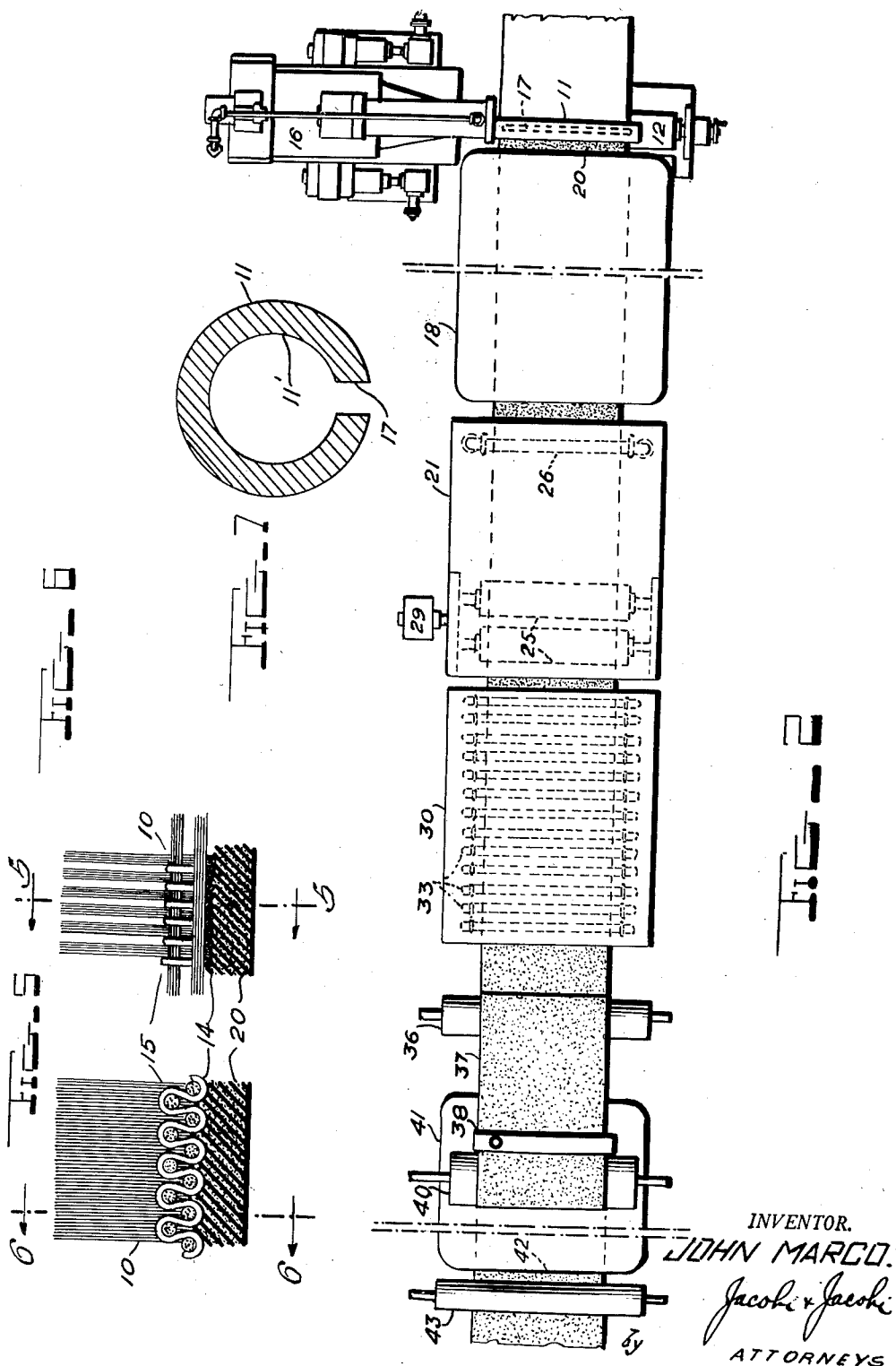


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UNITED STATES PATENT OFFICE

2,641,296

MACHINE FOR THE CONTINUOUS APPLICATION OF FOAM RUBBER CUSHIONING TO A CARPET

John Marco, Wilmington, Del.

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7 Claims. (Cl. 154—1)

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This invention relates to the manufacture of carpets and more particularly to a machine for the integral application of foam rubber to the underside of a carpet, to make the latter softer to walk on.

It is customary to lay carpets of the more expensive and elaborate types with a felt lining extended underneath. The lining is a separate item and serves to make the carpet softer to walk on and more agreeable to use. It has the disadvantage of being porous enough to hold and accumulate the dirt and lint working its way through the weaves of the carpet. Further, they are both loose from each other, so that the lining tends to wear the carpet and the carpet wear the lining. This adds more lint and reduces the lives of both. The dirt and lint also works its way through the lining eventually and deposits a certain amount on the floor as dust. Sooner or later, the carpets must be removed from the floor and the area under which they are laid cleaned and swept. After this they are cleaned and relaid, ready for further use. When stored during periods when their use is not required, the carpet is rolled up separately from the lining, as they cannot be rolled together conveniently.

This invention consists of the making of a carpet with an integral cushion backing, so it can render the carpet easy to walk on and serve all purposes intended for lining, used in the manner described above. The carpet is manufactured in any conventional manner. It is taken and treated with a suitable compound applied to its back, followed by the application of foam rubber which bonds itself to the compound, making a combined carpet and cushioning underlay ready for placement and use on a floor. This novel product is made in a machine described herein, and the latter does so continuously. Other methods of doing this work have been tried out, especially employing a process wherein the foam rubber was made in a batch, then spread on the carpet laid out on a table. The batches being made at different times, by different artisans, and under conditions subject to vary, produced resultant products variable in type, strength, color and other qualities. This caused many difficulties of a physical and commercial nature interfering with the normal distribution of the product. This invention by using its continuous process, enables the foam rubber to be made uniformly. It can be applied uniformly and while it is in the best condition for application, without delay between the time of

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pouring it out and its settlement on the carpet. Further it carries the carpet along in a definite plane and rate, without wrinkles, crookedness or unevenness. Little or no handling of the product during the process is required, and by the time it completes its run through the machine it is finished and ready for removal and distribution commercially. The product resulting is in perfect condition when normally processed, with all applications of the same quality, color, inherent characteristics, and such adjusted amounts of underlay as the user may select. The machine embodies all the parts of the process required to provide and attach the underlay to a conventional carpet, and contains them in such alignment and position as to enable it to do its work continuously.

It is therefore an object of this invention, to provide a new and improved machine that will apply an underlay of foam rubber to the back of a carpet, while avoiding the disadvantages and limitations existing in the previous art.

Another object of the invention is to provide a new and improved underlay applying machine for carpeting that will do the work continuously.

Still another object of the hereindescribed invention is to provide a new and improved underlay applying machine for carpeting that can apply and bond foam rubber thereto and doing it in an integral manner and with control of the thickness and qualities thereof to any degree selected.

An additional object of the invention is to provide a new and improved foam rubber underlay machine for carpeting that will underlay the carpeting, bond, cure and otherwise finish the integral attachment of the underlay to the carpet quickly, economically, controllably and effectively.

A further object of the invention is to provide a new and improved process for applying foam rubber to carpeting integrally and continuously.

Other objects will become apparent as the invention is outlined in more detail.

For a better understanding of the invention, its principles, objects and operation, reference is made to the accompanying drawings, which disclose a particular form of the invention, by way of example, while the claims emphasize the scope thereof.

Referring to the drawings:

Figure 1, is a side elevation in diagrammatic outline, and partly in section, of a foam rubber underlay machine embodying this invention;

Figure 2, is a plan view of Figure 1;

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Figure 3, is a sectional view on line 3—3 of Figure 1;

Figure 4, is a sectional transverse view on line 4—4 of Figure 1;

Figure 5, is a sectional view through the carpet on line 5—5 of Figure 6; with foam rubber underlay attached;

Figure 6, is a similar sectional detail on line 6—6 of Figure 5; and

Figure 7, is a transverse sectional view of the foam rubber feeding drum showing the hollow construction and feeding slot.

The same reference characters are used on the same parts throughout the figures unless otherwise noted.

In the construction shown in the drawings and referring particularly to Figures 1 and 2, a foam rubber underlay machine is shown. It is preferably made on a single frame, but in view of the size and nature of the parts, they may be arranged on a floor in alignment with one another and supported thereby as a unit. It is indicated in this manner as a matter of convenience. The carpet, designated by the numeral 10, is directed to the machine with the pile projecting downwardly. The first section of the machine consists of feeding and carrying drums 11 and 12, one above the other. The latter is supported on shafts and bearings 13 adjustably mounted on the floor. The carpeting 10 is inverted, that is the pile face 14 is directed downwardly, while the back surface 15 is facing upwardly, as it is fed to the drums. The upper drum 11 is hollow and through it passes fluid foam rubber compound 20 from a foam rubber making machine 16 and this fluid foam rubber is distributed to the rear face of the carpeting through openings provided in the peripheral wall of said drum 11, so that said fluid foam rubber is longitudinally distributed over the carpeting. This foam making machine includes the mixing apparatus for the ingredient forming the fluid foam rubber and passes them under pressure to the interior 11' of feed drum 11. It passes out of rectangular slot 17 of suitable length and width to deliver a slab 20 of foam-rubber of selected thickness. The slab 20 lays on the back surface of the carpet and spreads itself out in the layer or underlay as the carpet travels along into the vulcanizing chamber or primary structure 18 of the main machine. The vulcanizing chamber 18 consists of a walled box with openings 19 at both ends through the carpet and underlay can pass as they travel along. The interior of the chamber is heated up by steam pipes (not shown) to an appropriate temperature to vulcanize the foam rubber to the carpet's back surface. The foam rubber is fluid and sticky in form as it is fed on to the carpet and readily embeds and attaches itself to the latter, so that when the compound is vulcanized, it is firmly bonded thereto. The travel of the carpet and the length of the chamber 18 are arranged to provide a period of time for the passage of the carpet and foam rubber underlay through it, to do this work of bonding thoroughly. The bonded material leaves the chamber 18 at a high vulcanizing temperature, so to cool it to a normal temperature and harden the foam rubber to the proper degree, it is carried to a walled washer or secondary structure 21. This has an inner chamber 22 of ample capacity with entrance 23 and exit opening 24 for the unobstructed passage of the carpet through it. A set of sprayers 26 is provided to spray hot water un-

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der pressure to the upper and lower surfaces of the carpeting material for the washing thereof. The carpet material then passes through sets of wringers or mangles 25, which squeeze out the water and dry the vulcanized foam rubber carpet material before it leaves the washer structure 21. The sprayers are suitably supported by brackets, not shown, to the walls of the structure and receive the water under pressure from an extraneous source. The excess water is drained off through a pan 27 and piping 28 from the washer. The wringers 25 are operated by a motor 29 through suitable gearing and transmission coordinated to the rate of travel established for the carpeting.

The washed carpeting is next carried to a dryer tertiary structure 30, also having openings 31 for the passage of the carpet into and from its interior 32. The interior 32 is rectangular in form with ample room for air circulation through it and the equipment used therein. A series of steam pipes 33 are laid horizontally across the interior, close to and above and below the moving carpet and reheat the latter to a suitable drying temperature. These pipes 33 are connected to a source of steam extraneous to the machine and passes through continuously at sufficient temperature to dry the carpet of its remaining moisture. The air in the chamber is circulated about the carpet and pipes 33 by a large open bladed fan 34 pointed up towards them. This fan is operated by its own motor 35, and runs directly from it at an appropriate speed. The dryer structure is made of a suitable size to enable the drying to be done effectively, while at the same time maintain the temperature of the foam-rubber to make it ready for the next part of the process.

The carpeting passes through the dryer into the open, where sufficient access is provided for its inspection by the supervisors of the work. It is pulled along by secondary drums 36 termed together, a lining applicator which also press the carpet 10 underneath, a flexible sheeting 37 on top, with the foam rubber 20 in between, and a coating of rubber cement for gluing the sheeting or lining 37 to the latter. The cement is applied from a cement spray pipe 38 erected above the machine adjacent to a roll 40 of sheeting 37. The cement spray is distributed to the face of the sheeting under pressure and is supplied from an extraneous source, not shown. It covers the sheeting and makes it tacky, so that by the time it reaches the drum 36 that receives it, it will bond itself to the foam rubber properly and become a part of the carpeting. The sheeting 37 is reeled off as it is needed and is pulled off by the rotation of the drums 36 as they rotate under the action of the motor 39 and the incidental gearings used therewith. The complete bonding of the sheeting to the carpeting, the latter is pulled through another or secondary vulcanizing chamber 41 and vulcanized. It passes through the openings 42 on its travel doing this. The drums 43 pull the carpeting through the chamber and deliver the finished product after cooling, to the shipping department or for storage. The cooling may be done through the use of fans or other suitable means as may be deemed desirable or necessary. The motor 44 drives the drums 43 through a suitable transmission. The machine as a whole is relatively simple, while at the same time effective. It keeps the carpeting in a horizontal plane throughout without any arcuate or bending paths to follow. This avoids

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undesirable stretching and stressing of the material during its processing and greatly adds to its possible usable existence. The continuous processing is economical from several manufacturing standpoints, as time is saved, motions are reduced, handling is avoided, delays in the use of materials eliminated, and the mixtures or compounds are used while they are fresh and uncontaminated. Control of the thickness of the underlay is provided by providing slots in the feeding drum for the foam rubber of the desired size, which enables the product to be varied to suit the commercial requirements it is used for.

The reference to foam rubber is intended to be broad, so that the application of any underlay whether made of natural or synthetic foam rubber or similar substance can be included in the scope of its making. The machine is divided up into sections to permit facile installation, changing, replacement and operation. It also has the important feature of providing ample inspection possibilities during the processing. The product manufactured by it, is effective, sanitary, uniform in character and otherwise desirable.

While but one form of the invention is illustrated in this application, it is not desired to limit the structures included therein to such form, as it is appreciated that other constructions could be developed and made that would employ the same principles and come within the scope of the appended claims.

The process indicated in Figure 1, and described ahead of this paragraph is a preferred arrangement. However, the process may also be proceeded within a quasi-reverse manner, so that the latex foam is deposited by the device 16, at the beginning of the machine running in the original direction, on a backing, used in place of the carpet 10, and then continued through the vulcanizer 18, washer 21, and dryer 30, to cure the material as a primary step. Then when the cured foam rubber reaches the secondary pressurizing drums 36, a carpet replaces the backing 37, and has the cement applied to its rear surface. This carpet is then impressed and incorporated with the cured foam-rubber as it reaches the drums 36. This cemented carpet and foam rubber is then run through the chamber 41 to complete the combination of the cement from 38 on the carpet (now 37) to the foam rubber 20 and backing (now 10), by curing them together. Each method has its advantages and can be used on the same machine without changing the structure of its components. The only difference is that the backing in the second process is supplied in place of the carpet at the beginning of the process through the machine and the carpet in place of the backing near the end of the process. Some adjustments to anticipate thickness and the flexibility may be made, but otherwise the machine is actuated just the same, for either process. The carpet is faced outwardly from the side opposite to that of the foam rubber cushioning.

For convenience in the reference to the sequential steps taken in the processing of the materials, the vulcanizing chamber 18 is arbitrarily designated as the primary structure of the apparatus embodying this invention. The washer chamber 21 is likewise termed the secondary structure, and the dryer 30, the tertiary structure. They are so termed because of their sequence of operation during the making of the product, and the facility of following the functions of the ma-

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chine that this terminology gives to the observer. This also makes the reference to them more succinct when the details of their structures in the specifications have been understood.

5 Having thus described my invention, I claim:

1. A machine for the application of foam rubber to a carpet, comprising in combination, a fluid foam rubber feeding unit, a carpet delivering means for guiding a carpet along in a predetermined plane, by said unit so as to receive a layer of fluid foam rubber thereon as the carpet travels thereby, a vulcanizing chamber for combining the foam rubber layer and carpet together, a washer structure for receiving the combined vulcanized foam rubber and carpet material continuously, a reinforcing lining applicator means for applying a lining over the surface of said layer, means for removing the lined foam-rubber carpet material from said means continuously, means for actuating said means for delivering and guiding said material from the feeder to its removal from said machine, said applicator means including a sprayer for spreading cement to the lining to facilitate its attachment to said foam rubber layer and vulcanizing means for making a permanent attachment of the lining thereto and a single frame for coupling and aligning the unit, means, chamber, structure together, said unit being arranged to peripherally and longitudinally distribute said fluid rubber to said carpet.

2. A machine for the application of foam rubber cushioning to a carpet, comprising in combination, a fluid foam rubber feeding unit including a slot for delivering said rubber in a layer of predetermined width and thickness, a carpet delivering means disposed adjacent said unit and connected therewith for guiding a carpet along in a predetermined plane, by said unit so as to receive the layer of fluid foam rubber thereon as the carpet travels thereby, a vulcanizing chamber connected to said means for combining the foam rubber layer and carpet together, a washer structure for receiving the combined vulcanized foam rubber and carpet material including means for maintaining it at a predetermined temperature, a lining applicator means for including drums for feeding and forcibly applying a lining over the surface of said layer, means for carrying the lined foam rubber carpet material from said means continuously, means for actuating said means for delivering and guiding said material from the feeder unit to its removal from said machine, said applicator means including a sprayer for spreading cement to the lining to facilitate its attachment to said foam rubber layer and another continuous vulcanizing chamber for making a permanent attachment of the lining thereto, drums adjacent one side of the material for supplying lining continuously to the material as it travels along, said means in the washer including water to drench the heated vulcanized material and afterwards squeezing the excess water therefrom and an enclosing structure for drying said material as it leaves said washer said unit being arranged to peripherally and longitudinally distribute said fluid rubber to said carpet.

3. A machine for the application of foam rubber to a carpet comprising in combination, a fluid foam rubber feeding unit, a carpet delivering means for guiding a carpet along in a predetermined plane, by said unit so as to receive a layer of fluid foam rubber of predetermined width and thickness thereon as the carpet travels thereby, a vulcanizing chamber for combining

the foam rubber layer and carpet together, a washer structure for receiving the combined vulcanized foam rubber and carpet material including means for washing it, a lining applicator means for applying a lining over the surface of said layer, means for carrying the lined foam rubber carpet material from said means continuously, means for actuating said means for delivering and guiding said material from the feeder unit to its removal from said machine, said applicator means including a sprayer for spreading cement to the lining to facilitate its attachment to said foam rubber layer and vulcanizing means for making a permanent attachment of the lining thereto, means for supplying lining continuously to the material as it travels along, said means in the structure including water to drench the heated vulcanized material and afterwards squeezing the excess water therefrom, an enclosing structure for drying said material as it leaves said washer including fan means, heating pipes to provide heated air circulation around and about said material and connections for continuously supplying foam rubber, cement, heat and water from extraneous sources and mechanism and power means for the operational components of the machine and a single frame for connecting said structural components together in operational alignment and in predetermined sequence to provide a carpet with a vulcanized foam layer cushioning and lining therefor integrally combined, said unit being arranged to peripherally and longitudinally distribute said fluid rubber to said carpet.

4. A machine for the application of foam rubber to a carpet comprising in combination, a fluid foam rubber feeding unit including a delivery slot of predetermined length and height, a carpet delivering means for guiding a carpet along in a predetermined plane, past said unit so as to receive a predetermined layer of fluid foam rubber thereon from said unit as the carpet travels thereby, a vulcanizing chamber for combining the foam rubber layer and carpet together as such travels therethrough, a washer structure for receiving the combined vulcanized foam rubber and carpet material including means for washing it at a predetermined temperature, a lining applicator means for applying a lining over the surface of said layer, means for carrying the lined foam rubber carpet material from said means continuously, means for actuating said means for delivering and guiding said material from the feeder unit to its removal from said machine, said applicator means including a sprayer for spreading cement to the lining to facilitate its attachment of the layer, means for supplying lining continuously to the material as it travels along, said means in the washer including water to drench the heated vulcanized material and afterwards squeezing the excess water therefrom an enclosed drying structure for drying said material as it leaves said washer including fan means, heating pipes to provide heated air circulation around and about said material and connections for continuously supplying foam rubber, cement, heat and water from extraneous sources and mechanism and power means for the operational components of the machine, said foam rubber layer being applied to the rear face of said carpet and the lining external to said layer and a frame for connecting the comprising components of the machine together, said unit being arranged to peripherally

and longitudinally distribute said fluid rubber to said carpet.

5. A machine for the continuous application of a rubber foam cushioning to a carpet, comprising, a frame, a foam rubber feeding unit on said frame including an elongated slot for delivering a layer of unvulcanized fluid foam-rubber composition under pressure in a sheet of predetermined thickness and rate of delivery, a set of cylindrical drums mounted on said frame for engaging and pulling carpet material between their peripheral surfaces, and carrying it under said orifice at a predetermined rate of travel to receive a layer of said composition of predetermined thickness and consistency tending to adhere to the fabric of said carpet, a vulcanizing chamber on said frame with openings in opposite walls thereof to allow the carpet to pass continuously therethrough, said chamber including means for vulcanizing the layer and carpet together as they travel at a predetermined rate through the chamber and integrally bond them together, a washer enclosure on said frame adjacent said chamber with openings in opposite walls to facilitate the passage of the vulcanized layer and carpet therethrough, said enclosure including water nozzles, cylindrical drums for conveying, guiding and squeezing the layered carpet and inducing the removal of the water before said carpet passes out of the enclosure and also including a drainage system to convey away said water squeezed out, an enclosed drying structure with openings in opposite walls located adjacent said washer enclosure so said layer carpet can continuously pass therethrough, said structure including heating means aligned above and below said carpet as it passes through said structure and a blower for creating a draft to facilitate the evaporation of the water left in said carpet, the rate of travel and length of said structure being designed to complete the drying during the time of travel of the carpet through said structure, a set of drums disposed against one another in a frame adjacent said structure and aligned to engage said carpet as it leaves said structure, means for feeding a lining with cement applied thereto between said drums to apply said lining in a continuous sheet to said layer, a second vulcanizing chamber with openings in opposite walls to permit the passage therethrough of the carpet, layer and lining applied to one another so as to be integrally vulcanized together and roller means disposed adjacent to the last mentioned chamber for pulling the vulcanized carpet material therefrom and delivering it extraneously with the carpet, foam rubber cushioning and lining firmly and flexibly incorporated together.

6. A machine for applying foam rubber and a reinforcing lining to a carpet as a continuous operation comprising in combination means to convey a carpet through said machine in a predetermined path, a fluid foam rubber feeding unit including means to deposit a layer of said rubber on said carpet as said carpet moves through said machine, a vulcanizing chamber following said feeding unit whereby upon passage of said carpet therethrough said rubber layer will be bonded to said carpet, washing apparatus following said vulcanizing chamber and including means for washing said carpet and rubber layer at a predetermined temperature and a lining applicator following said washing apparatus and including means for applying and

securing a reinforcing lining to the surface of said rubber layer.

7. A machine for applying foam rubber and a reinforcing lining to a carpet as a continuous operation comprising in combination means to convey a carpet through said machine in a predetermined path and at a predetermined rate, a fluid foam rubber feeding unit including means to deposit a layer of said rubber of predetermined thickness on said carpet as said carpet moves through said machine, a vulcanizing chamber following said feeding unit whereby upon passage of said carpet therethrough said rubber layer will be bonded to said carpet, washing apparatus following said vulcanizing chamber and including means for washing said carpet and rubber layer at a predetermined temperature and a lining applicator following said washing apparatus and including means for applying and se-

curing a reinforcing lining to the surface of said rubber layer.

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