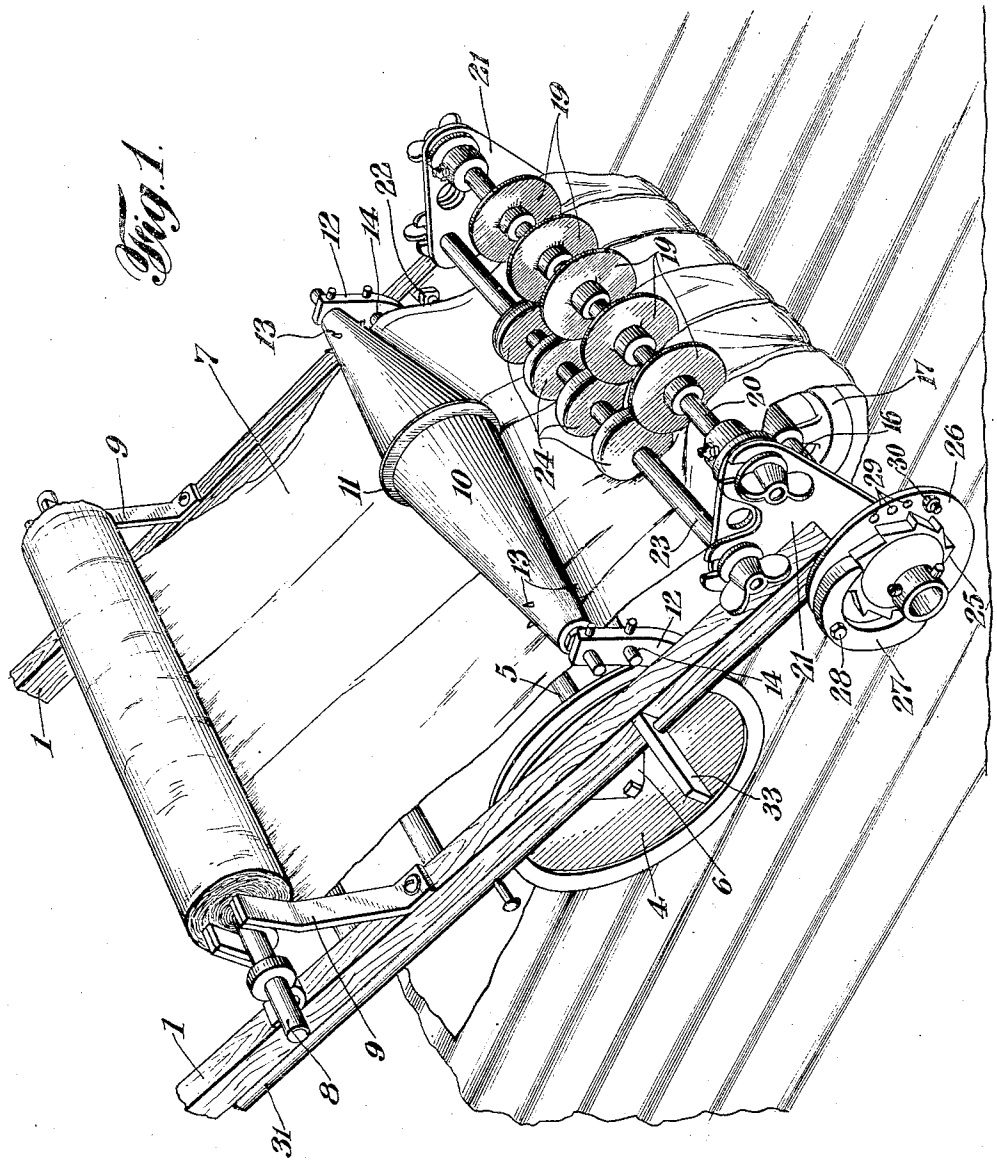
Jan. 19, 1937. C. D. HINDALL 2,068,133

MACHINE FOR APPLYING OR LAYING FLEXIBLE SHEET MATERIAL OVER CORRUGATED SURFACES

Filed March 11, 1932 3 Sheets-Sheet 1

Fig. 1.



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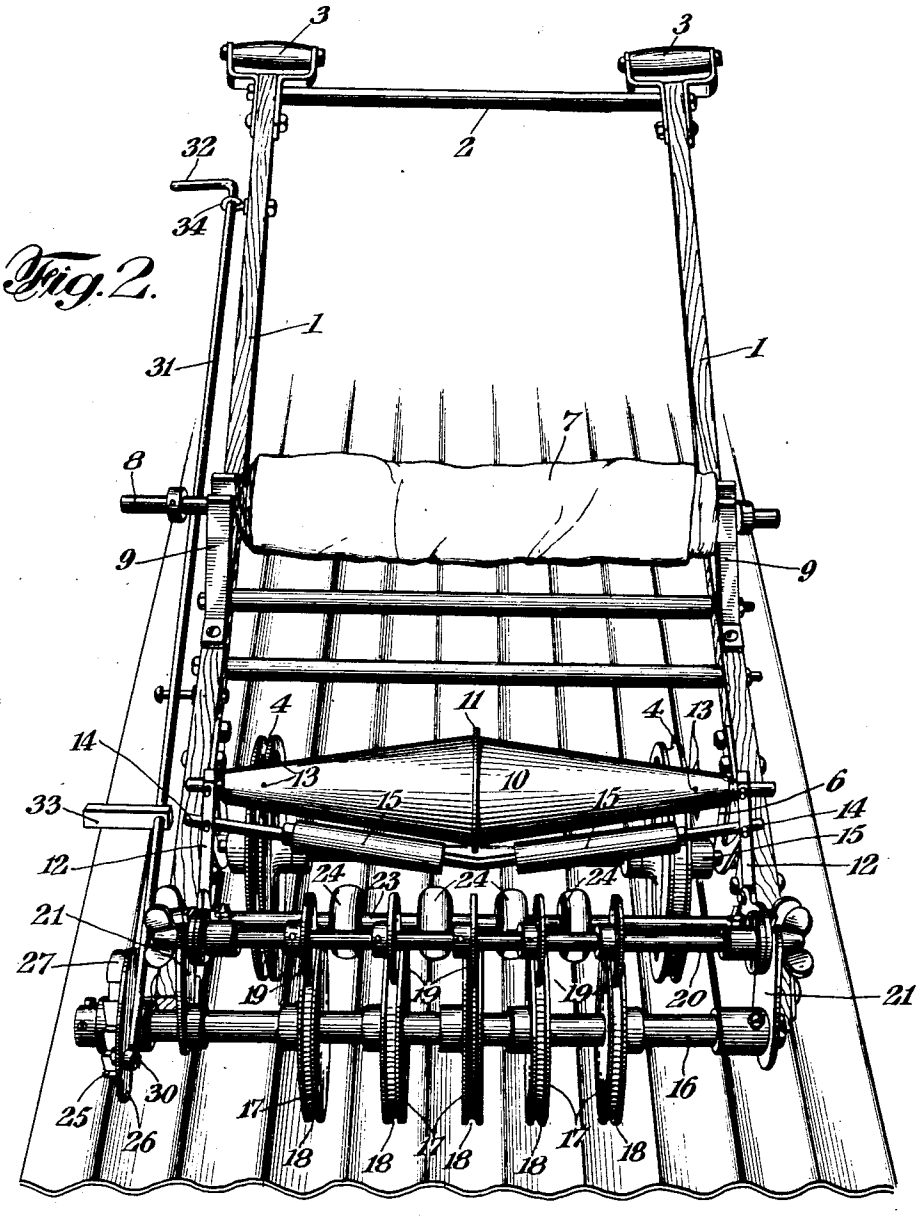
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Fig. 2.



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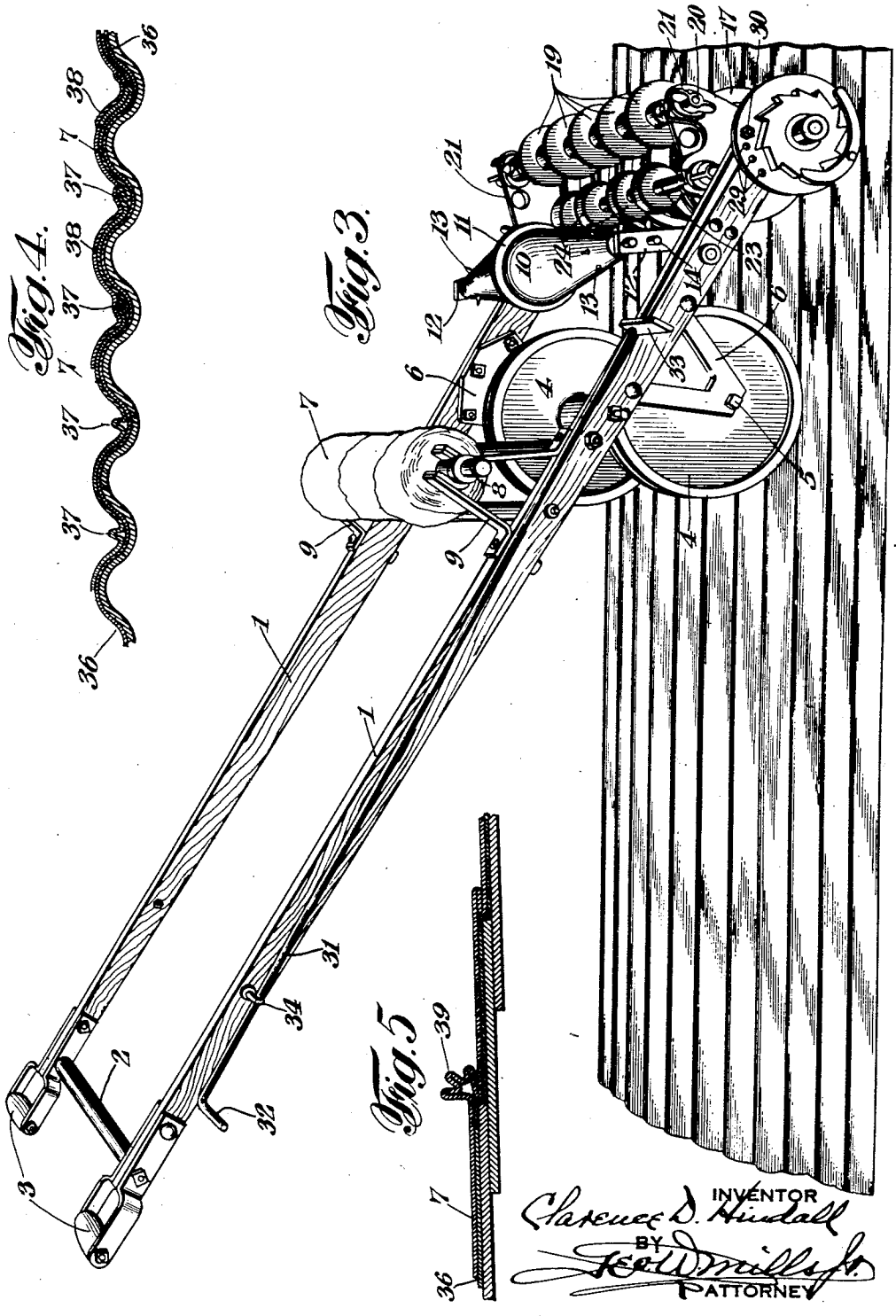


Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE

2,068,133

MACHINE FOR APPLYING OR LAYING FLEXIBLE SHEET MATERIAL OVER CORRUGATED SURFACES

Clarence D. Hindall, Ada, Ohio, assignor of one-fourth to The Philip Carey Manufacturing Company, a corporation of Ohio

Application March 11, 1932, Serial No. 598,185

23 Claims. (Cl. 216—6)

My invention relates to improvements in machines for applying or laying flexible sheet material over a corrugated surface. It is particularly adapted to the application of flexible sheet material to corrugated roofs and similar constructions.

One of the objects of the invention is to provide a machine that will apply flexible sheet material over corrugated surfaces on which has been mopped a film of adhesive material to which the flexible material is applied and is held in adhesive contact. Another object is to provide means for applying the flexible material so that it is provided with means permitting expansion and contraction of the corrugated material upon which it is applied without damage to the flexible sheet material and without distinctively affecting the adhesive contact between the flexible sheet and the corrugated material.

In the drawings I have shown one embodiment of my invention in which;

Figure 1 is a perspective view of the machine setting on a sheet of corrugated material.

Figure 2 is an end view of the machine.

Figure 3 is a side view of my machine.

Figure 4 is a cross section showing how the crimps or pleats are formed on the corrugated sheet.

Figure 5 shows the means provided at the end of a corrugated sheet to permit expansion and contraction of adjacent sheets.

In the drawings in which like characters relate to like parts, my machine is shown consisting of a frame composed of the side members 1—1 which are connected by suitable cross members 2—2. The frame is provided with handles 3—3. The frame is carried on suitable traction wheels 4—4 mounted on an axle 5 in the bracket 6 depending from and secured to the frame on the side members 1—1. 7 is the flexible material, such as canvas, roofing material or any suitable material, carried on spindle 8 in the yoke 9 mounted on the side members 1—1 of the frame. Toward the lower end of the machine is mounted a tension device 10 consisting of a roller mounted on the arms 12 supported on the frame 1—1. This tension device consists of a roller composed of a central disc 11 having on opposite sides of it cone shaped portions gradually decreasing in diameter toward the end of the tension roller. The disc 11 is slightly greater in diameter than the adjacent portions of the tension roller. Near the ends of the cone shaped portions are located pins 13 adapted to engage with the canvas or other material that is being applied for the purpose of retaining same in proper relation to the crimping or pleating devices hereafter referred to. In conjunction with the tension roller 10 and mounted on the same arms 12 that support the tension roller is a shaft 14 bent or formed so that it is approximately parallel to the tension roller 10. Rotatably mounted on this shaft are two sleeves 15—15 separated at the center so that disc 11 in the center of the tension roller extends a small distance into the intervening space between the ends of the sleeves 15—15. As will be seen from Figure 2 the cone tension device tends to draw the canvas toward the center while the pins 13—13 engaging with the canvas near the edges of it tend to hold it from being pulled away from either side. This cone shaped tension device with the complementary rollers 15—15 permit the supply of the canvas to be sufficient so that it will answer the requirements caused by the crimping or pleating means which will now be described.

16 is a shaft, mounted on the ends of the side members 1—1, which on one side, as shown in Figure 2, extends beyond the side member and has fixedly secured to it, adjacent the end beyond the frame, means for partially rotating the shaft for the purpose hereinafter described. 17 are wheels or rotating discs fixedly secured to the shaft 16 so as to rotate therewith by any suitable means. In the periphery of each of the wheels or discs 17 is a relatively deep groove 18 of sufficient width to provide space for a double thickness of the canvas and the edges of one of the discs 19. These discs 19 are fixedly mounted on a shaft 20 carried in a bracket 21 fixed to the side members 1—1 of the frame. These brackets 21 are bolted to the side member of the frame by the bolts 22 and these brackets 21 form not only the bearing or support for the shaft 20 but for the shaft 16 heretofore described. Carried and adapted to rotate in the same bracket 21 is a shaft 23 upon which are fixedly secured rollers 24. These rollers 24, the discs 19 and the discs 17 are all mounted on their respective shafts so that they will rotate with same and so that they may be moved with respect to each other a distance apart at least equal to the distance apart of adjacent corrugations in the corrugated surface upon which the flexible sheet material is to be applied. As shown in Figures 1 and 2, it will be noted that the discs 17 are arranged that they are in the valleys formed by the corrugations. The discs 19 which register with the grooves 18 are therefore in the same line with the discs 17 and the rollers 24 are arranged so that they are located between the discs 17. The object of this arrangement will

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be understood from the following. In use the flexible material is fed as shown in Figure 1 under the tension device 10, up over the rollers 15, under the rollers 24 and between the discs 17 and 19, the pins 13 on the tension device engaging with the edge of the canvas so as to maintain it properly centered whereby the canvas is held a proper distance on each side of the outside of the outermost discs 17 as shown in Figure 1. The rollers 24 movably mounted on the shaft 23 are so arranged that they cause the canvas to be drawn transversely of the sheet and form a surplus amount of canvas to be taken up in part by the grooves 18 to form folds and the balance to overlay the elevated portions of the corrugated roof. As the canvas passes over the discs 17 the rotating discs 19 cause the canvas to pass into the grooves 18 in the discs 17 and create the pleat or fold that is located in the valley of each of the corrugations as shown in Figure 4. As will be seen in Figure 1 the operation of my machine as it is pushed forward deposits the flexible sheet material 7 upon a corrugated sheet so that the valleys in the corrugated sheet are provided with pleats or crimps 37 which by reason of the corrugated sheet having first been coated with a suitable adhesive 36, such as asphalt or other suitable material, causes the flexible sheet to adhere to the corrugated foundation and holds the crimps or pleats 37 in position. After a sheet has been applied to a corrugated foundation workmen mop a coat of water proof material 38, such as asphalt or other suitable material over the surface of the flexible sheet 7 and in doing so press the crimps or pleats down as shown in the third and fourth valley in Figure 4. This, however, does not interfere with the operation of these pleats when the sheet expands or contracts because the material in the pleat is sufficient to move without pulling the flexible material away from the foundation and the material 7 and the waterproof coatings 36 and 38 are preferably of a plastic like or relatively non drying character. Of course if desired 38 may be a paint coat to give color to the surface.

In the application of a flexible sheet material to a corrugated roof in which the corrugated roof is composed of a plurality of independent corrugated sections each section at one end overlapping the next adjacent section, when the machine reaches the end of a corrugated section it is raised or tilted on the traction wheels 4 and the discs 17 are through operation of the handle 32 caused to rotate a sufficient distance to accumulate or pile up sufficient of the flexible material (as shown in 39 Fig. 5) at the end of a corrugated section to provide for expansion or contraction of adjacent sections of the corrugated material without placing any strain upon the flexible sheet material that has been applied to the surface of adjacent sections. The discs 17 are rotated when the machine is tilted on the traction wheels by the following means. These means consist of a ratchet 25 fixedly secured to the end of the shaft 16. Adjacent to the ratchet is loosely mounted on the shaft 16 a disc 26 upon which is pivoted a click or pawl 27 by pivot 28. The disc 26 is provided with a number of holes 29 to which a pivot 30 operatively connects rod 31. This rod 31 is provided with a handle 32 and a foot piece 33. One end of the rod near the handle is supported by a hook or ring 34 attached to the side 1 of the frame and the opposite end of the rod 31 engages the pivot 30. When the end of a corrugated section has been reached and it is desired to pile or accumulate the flexible material to allow for movement of the corrugated sections independent of each other, the operator of the machine pressing down on the handles 3 tilts the machine on the traction wheels 4, operates the handle 32 either with or without the use of the foot plate 33 by pressing down on the rod 31, the click or pawl 27 engages the ratchet 25 and rotates shaft 16 the desired distance. This distance may be regulated by placing the pivot 30 connecting the rod 31 with the disc 26 in whichever of the holes 29 provided by the pivot 30 is desired. The further it is desired to rotate the shaft 16, the nearer to the upper end of the machine the rod 31 will be pivoted in the disc 26. As will be seen from the foregoing when the shaft 16 is rotated, it rotates the discs 17 thereby rotating the discs 19 and rollers 24 through the middle of the canvas 7 which is drawn down and is piled up under the disc 17.

I claim:

1. In an apparatus, for applying flexible sheet material to a surface, a frame, means to carry a supply of flexible material, rotating means adapted to apply flexible material to a surface, and a second rotating means located between the said last mentioned means and the supply of flexible material, provided with means adapted to positively engage with said flexible material to hold it in alignment as it passes from the supply to the means applying it.

2. In an apparatus, for applying flexible sheet material to a surface, a frame, means mounted on said frame to carry flexible material, rotating means to apply flexible material to the surface being covered, a tension device located between the source of supply and said rotating means, and a flange on said tension device arranged intermediate the ends of said device.

3. In an apparatus, for applying flexible sheet material to a surface, a frame, means mounted on said frame to carry flexible material, rotating means to apply flexible material to a surface, a tension device consisting of a roller having diameters of different sizes, the greatest diameter being intermediate the ends of the roller and a flange in the center of said tension device.

4. In an apparatus, for applying flexible sheet material to a surface, a frame, means mounted on said frame to carry flexible material, rotating means to apply flexible material to a surface, a tension device consisting of a roller having diameters of different sizes, and a flange arranged intermediate the ends of said roller, said flange having said surfaces arranged transverse to the axis of rotation of the tension device.

5. In an apparatus, for applying flexible sheet material to a surface, a frame, means mounted on said frame to carry flexible material, rotating means to apply flexible material to a surface, and a tension device consisting of a roller having a flange intermediate the ends of said device arranged transversely to the axis of rotation of the device.

6. In an apparatus, for applying flexible sheet material to a surface, a frame, means mounted on said frame to carry flexible material, rotating means to apply flexible material to a surface, a tension device consisting of a central disc having on its opposite sides rollers of less diameter than the disc.

7. In an apparatus, for applying flexible sheet material to a surface, a frame, means mounted on said frame to carry flexible material, rotating means to apply flexible material to a surface, a tension device consisting of a roller hav-

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ing gradually decreasing diameter toward its ends and a roller having a longitudinal portion of its surface arranged parallel to the longitudinal portion of said first mentioned roller adjacent to the said longitudinal portion of the second roller.

8. In an apparatus, for applying flexible sheet material to a surface, a frame, means supported by said frame adapted to carry a supply of flexible material, means carried by the frame for depositing flexible material on a surface so that a portion of the flexible material will be held away from the surface between two adjacent portions in contact with the surface and a tension device between said supply means and said depositing means, said tension device consisting of a central flange like portion having on its opposite sides rollers of less diameter than the flange portion.

9. In an apparatus, for applying flexible sheet material to a surface, a frame, means supported by said frame adapted to carry a supply of flexible material, means carried by the frame for depositing flexible material on a surface so that a portion of the flexible material will be held away from the surface between two adjacent portions in contact with the surface and a tension device between said supply means and said depositing means, said tension consisting of rollers arranged so that the flexible material may pass between them, one of said rollers having a central flange portion and on opposite sides adjacent to the flange portion surfaces of less diameter than the flange portion.

10. In an apparatus, for applying flexible material to a surface and providing said flexible material with longitudinal portions contacting with the surface and intermediate longitudinal portion out of contact with the surface, consisting of a frame, rotating means provided with grooves, means for feeding flexible material into said grooves, a guiding means for positively holding flexible material in longitudinal alignment with said grooves and means for slacking said material before it is fed into the said grooves.

11. In an apparatus, for applying flexible material to a surface and providing said flexible material with longitudinal portions contacting with the surface and intermediate longitudinal portions out of contact with the surface, consisting of a frame, rotating means provided with grooves, means for feeding flexible material into said grooves, a guiding means for positively holding flexible material in longitudinal alignment with said grooves and means for slacking said material before it is fed into the said grooves, and tension means located between said slacking means and the source of supply.

12. In an apparatus of the character described, a frame, means for carrying a source of supply of flexible material, rotating means provided with grooves, means for guiding the flexible material into said grooves, means for slacking the flexible material, and means for rotating the said rotating means when the machine is stationary.

13. In an apparatus of the character described, a frame, means for carrying a source of supply of flexible material, rotating means provided with grooves, means for guiding the flexible material into said grooves, and means for rotating the said rotating means when the machine is stationary.

14. In an apparatus of the character described, a frame, means for carrying a source of supply of flexible material, rotating means provided with grooves, means for guiding the flexible material into said grooves, means for slacking the flexible material, and means for rotating the said rotating means when the machine is stationary, said last mentioned means consisting of a ratchet fixed to the rotating means provided with grooves, and a pawl adapted to be brought into engagement with said ratchet so as to move same whereby the rotating groove means are rotated a predetermined distance.

15. In an apparatus, adapted to apply flexible sheet material to a corrugated surface, rotating devices provided with grooves adapted to be brought into register with the valleys in a corrugated sheet, means adapted to guide flexible material into said grooves and a plurality of rollers movably mounted on a shaft adapted to slack the material between said grooves.

16. In an apparatus, adapted to supply flexible sheet material to a corrugated surface, rotating means provided with grooves adapted to be brought into register with the valleys in a corrugated sheet, means adapted to guide flexible material into said grooves and a plurality of rollers movably mounted on a shaft adapted to slack the material between said grooves, and a tension device located between the source of supply of flexible material and said plurality of rollers.

17. In an apparatus, adapted to apply flexible sheet material to a corrugated surface, rotating device provided with grooves adapted to be brought into register with the valleys in a corrugated sheet, means adapted to guide flexible material into said grooves, and means adapted to slack the material between adjacent grooves, said slacking means consisting of a shaft, rollers arranged independently of each other movably mounted on said shaft.

18. In an apparatus, adapted to apply flexible sheet material to a corrugated surface, rotating means provided with grooves adapted to be brought into register with the valleys in a corrugated sheet, means adapted to guide flexible material into said grooves, means adapted to slack the material between adjacent grooves, said slacking means consisting of a shaft, a plurality of rollers arranged independently of each other movably mounted on said shaft, and a tension device located between the source of supply of said flexible material and said slackening means.

19. In an apparatus, for applying flexible sheet material to a surface, a frame, means mounted on said frame to carry flexible material, rotating means to apply flexible material to the surface being covered, a tension roller having a surface of greater diameter intermediate the ends than the diameter at the ends located between the source of supply and said rotating means, said tension roller provided with a surface having a plurality of different circumferences and means carried by said tension roller adapted to positively engage flexible material passing through the machine.

20. In an apparatus, for applying flexible sheet material to a surface, a frame, means mounted on said frame to carry flexible material, rotating means to apply flexible material to the surface being covered, a tension roller located between the source of supply and said rotating means, a flange on said tension device intermediate the ends thereof and means carried by said tension device to positively engage flexible sheet material passing through the machine.

21. In an apparatus, for applying flexible sheet material to a surface, a frame, means mounted on said frame to carry flexible material, rotating means to apply flexible material to a surface, a

tension device consisting of parallel rollers between which the flexible material passes, and positive engaging means carried by the tension device adapted to positively engage with flexible sheet material and hold same against movement independent of the movement of the tension device.

22. In an apparatus for applying flexible sheet material to a surface, a frame, means to carry a supply of flexible material, rotating means adapted to apply the flexible material to a surface, and means located between the supply means and the applying means adapted positively to engage said flexible material for holding same in alignment as it passes from the supply to the applying means.

23. In an apparatus, for applying flexible sheet material to a surface, a frame, means mounted on said frame to carry flexible material, rotating means to apply flexible material to the surface being covered, a tension roller located between the source of supply and said rotating means, and a flange on said tension roller arranged intermediate the ends of said roller.

CLARENCE D. HINDALL.

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