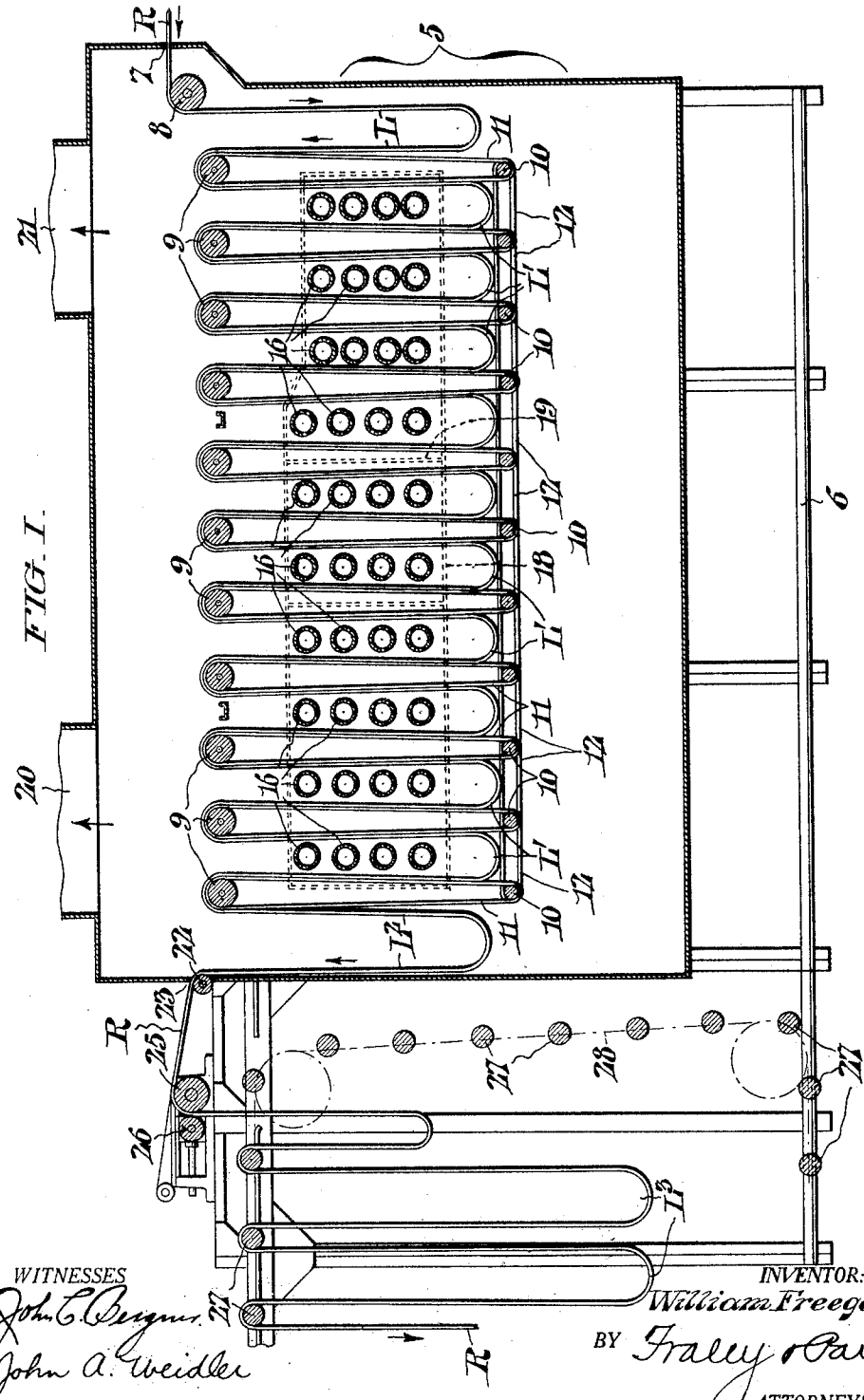
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APPARATUS FOR TREATING CONTINUOUS SHEET MATERIAL

Filed Sept. 12, 1927 2 Sheets-Sheet 1



WITNESSES

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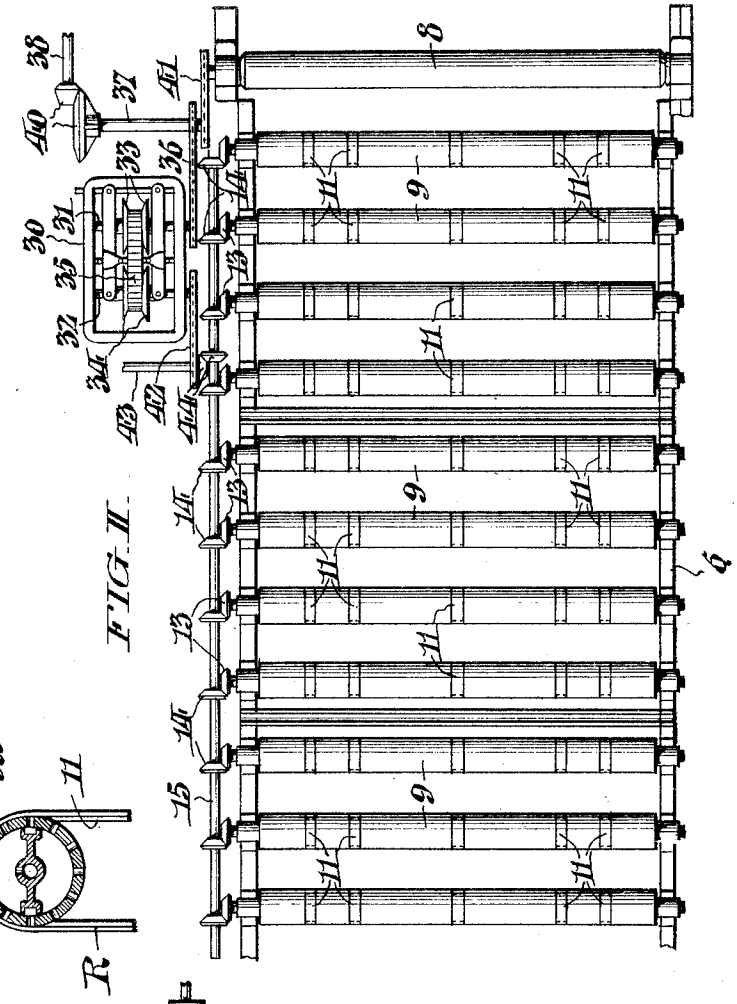


FIG. II.

FIG. IV.

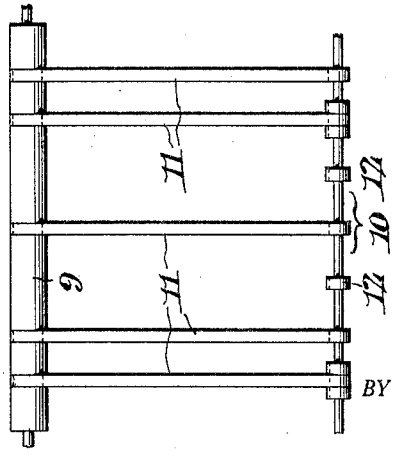


FIG. III.

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APPARATUS FOR TREATING CONTINUOUS SHEET MATERIAL.

Application filed September 12, 1927. Serial No. 219,115.

This invention relates to apparatus for treating continuous sheet materials of various kinds, and in certain forms of embodiment is especially useful in connection with the manufacture of flooring felt, prepared roofing, etc., to dry such materials after having been fresh coated on one side with water proofing compounds, paint or other surfacing.

The main objects of my invention are to enable rapid treatment without necessitating contact with the wet coated face of the material incidentally to propulsion thereof through a treating atmosphere; and to secure the above desideratum in an extremely compact apparatus predetermining an extensive circuitous course for the material while it is progressed through a treating chamber by means contacting continuously lengthwise of the material but with the back only, so that the coated side is entirely free for insurance against injury and for exposure at all times to the treating medium throughout the period of treatment.

My invention is particularly advantageous in the specific connection referred to in that the material may be rolled or otherwise packed immediately after drying without requiring use either of anti-stick powder such as talc, or specially prepared paper between layers to prevent adhesion as has been necessary heretofore.

Other objects and attendant advantages of my invention will become readily obvious from the detailed description of the typical embodiment shown in the drawings, whereof

Fig. I is a more or less diagrammatic longitudinal sectional view of the treating apparatus;

Fig. II is a plan view showing means whereby the continuous sheet material is progressed within the treating chamber;

Fig. III is an end view of the progressing means; and

Fig. IV shows a modified detail of the apparatus.

With more specific reference first to Fig. I of these illustrations, 5 designates an enclosure which may be of sheet metal suitably braced by a supporting skeleton frame 6 of structural iron, so as to afford a restricted space serviceable as a treating chamber, for example, in drying the continuous sheet roofing conventionally indicated in the illustration by the letter R. Assuming that its upper side has just been fresh coated with moist water-proofing compound, or other surfacing, the roofing R is conducted by suitable means, not shown, to the chamber 5 at the right-hand end (as considered in Fig. I) through a transverse slot or opening 7 en route to a feed roll 8 which is suitably supported at the top of the skeleton frame 6.

Within the chamber 5, the roofing R is confined to an extensive vari-directional path of travel by a novel progressing means which is unique in that driving contact is made with the material substantially along its entire length but at the back only, so that its face is left absolutely free for subjection to the influence of air or other fluent medium to dry the coating as later on more fully explained. As shown, the progressing system just referred to in the present instance comprises a multiplicity of vertically-spaced equi-distanced upper and lower pulley rollers 9, 10 which are journaled for rotation in bearings supported by parallel horizontals of the skeleton frame 6. The rollers 9, 10 are coordinated in pairs by comparatively narrow vertical progressing belts 11, while adjacent pairs of the lower pulley rollers 10 are similarly connected by horizontal belts 12. As shown in Figs. II and III, the upper pulley rollers 9 are recessed at the regions over-travelled by the belts 11 so that the outer belt surfaces and the pulley faces are flush for uninterrupted contact with the roofing R. The upper rollers 9 are driven positively by the driving connections shown in Fig. II, wherefrom it will be noted that each roller is equipped at one end with a bevel gear pinion 13. These several pinions mesh with companion bevel pinions 14 all fast on a line shaft 15. With this arrangement the rollers 9 are obviously all rotated in unison and the belts 11, 12 driven at uniform surface speed. In passing from the feed roll 8 in the direction of the arrow in Fig. I, the roofing R is obliged to trace a compensatory drop loop L on its way to the first of the upper pulley rollers 9, and, as it passes over and between the succeeding upper rollers of the series, is confined, by co-operation of the belts 11, to an undulatory path up and down within the chamber 5 through a succession of loops L'.

For the purpose of hastening the drying of the coating and at the same time main-

taining the roofing R in contact with the belts 11, I provide an air jet system including a multiplicity of tubes 16 which extend transversely of the chamber 5 and which are grouped in vertical series within the intervals of the loops L′. Each of the tubes 16 has longitudinally arranged jet apertures at intervals around its circumference, through which air under pressure is released to impinge at distributed points against the exposed coated surface of the roofing within the loops L′. In this way, it will be apparent that the coating is effectively dried and the roofing at the same time urged against the belts 11 so as to be positively driven thereby incidentally to travel through the enclosure. The tubes 16 communicate at one end with a manifold indicated in dotted lines at 18 in Fig. I, the same communicating through a duct 19 with a suitable source of air supply, not shown. The spent air is discharged through exhaust outlets 20, 21 at the top of the chamber 5. A continuous circulation of air is thus maintained within the chamber 5 at all times. Upon leaving the last of the upper pulley rollers 9, the roofing is caused to trace a final compensating loop L^2 on its way to a delivery roll 22 by which it is guided from the chamber 5 through a contiguous transverse exit opening 23 in the left hand end wall of the latter.

As it emerges from the chamber 5, the roofing is directed to a pair of co-operative draw rolls 25, 26 and, for the purpose of cooling, may be formed into a succession of festoon loops L^3 over bars 27 carried crosswise between spaced sprocket conveyer chains 28. The festooning mechanism just briefly described forms no part of the present invention, and need not, therefore, be further referred to herein.

In order that the speed of the feed roll 8 may be synchronized with that of the pulley rollers 9, 10 and the progressing belts 11, 12, I employ a variable speed drive device represented diagrammatically at 30 in Fig. II. This variable speed device may be of a well-known type known as a "Reeves" drive, comprising two parallel shafts 31, 32 respectively equipped with coned pulley disks 33, 34 which are compensatively separable to different extents in determining different relative speeds through an interposed self-positioning belt 35. The primary shaft 31 of the variable speed drive receives motion through a sprocket chain connection 36 from a counter-shaft 37, which is in turn driven from a power shaft 38 by bevel gearing 40. From the counter-shaft 37, motion is directly communicated to the feed roll 8 by a sprocket chain connection 41. The secondary shaft 32 of the variable speed device 30 transmits motion through a chain 42, to a shaft 43 which is co-ordinated by a bevel gear couple 44 with a line shaft 15 by which the several pulley rollers 9 are driven. A similar variable speed device may be employed to drive the draw rolls 25, 26 at the discharge end of the chamber 5.

In the operation of the apparatus, the variable speed devices are adjusted so that the loops L, L^2 within the chamber 5 are maintained substantially uniform as to length for capacity to automatically compensate for any irregularities in the travels of the material while tracing the intermediate loops L′ between the belts 11. Ordinarily the depth of the loops L′ is so ordered that they are free of the horizontal belts 12. Should any of these loops become too long, contact with the belts 12 will tend to stop them and lift the material R from the pulley rollers 9 so that through attendant slippage, the sheet will be slowed down until the normal balance is re-established in the whole group of the loops. However, since the horizontal belts 12 run at the same surface speed as the vertical belts 11 and the pulley rollers 9, they will obviously assist in promoting uniform travel of the material.

When treating very heavy materials, I may resort to the use of hollow perforate suction rollers 9^a, Fig. IV, in lieu of the solid type rollers 9 shown in Fig. I. The rollers 9^a may have tubular trunnions for communication with a suitable source of suction after a manner well known in the art. Under the effect of the suction, it will be obvious that any inherent springiness of the material tending to prevent its bending around the rollers 9^a is entirely overcome. The material is accordingly obliged to cling to the rollers and to be thereby positively progressed along the desired path of travel.

Having thus described my invention, I claim:

1. In apparatus for treating continuous sheet material, a treating chamber, progressing means continuously contacting lengthwise on one side of the material only while confining it to an extensive vari-directional path of travel within the chamber, and means directing pressure fluid against the free opposite side of the material to maintain the material in contact with the progressing means.

2. In apparatus for treating continuous sheet material, a treating chamber, progressing means continuously contacting lengthwise of the material but with one side only while confining it to an undulatory path of travel within the chamber, and jet pipes in the intervals of the convolutions to direct fluent pressure at distributed points against the free side of the material to maintain it in contact with the progressing means.

3. In apparatus for treating continuous sheet material, a treating chamber, and means to progress the material within the chamber including a multiplicity of spaced upper and

lower rollers connected in pairs by vertical belts and said lower rollers in turn connected by horizontal belts, all said belts adapted for lengthwise contact with the material in confining it to an undulatory path of travel.

4. In apparatus for treating continuous sheet material, a treating chamber, and means to progress the material within the chamber including a multiplicity of spaced upper and lower rollers connected in paths by vertical belts and said lower rollers in turn connected by horizontal belts, all said belts adapted for lengthwise contact with one side only of the material in confining it to an undulatory path of travel, and vertically-arranged jet pipes in the intervals of the convolutions discharging fluid under pressure against the other free side of the material to maintain it in contact with the belts.

5. In apparatus for treating sheet material such as prepared roofing fresh coated on one side with moist surfacing, a treating chamber, progressing means continuously contacting lengthwise only with the back of the roofing while confining it to an extensive vari-directional path of travel within the chamber, and means directing jets of air under pressure against the coated face of the material to dry the surfacing and at the same time maintain the material in contact with the progressing means.

6. In apparatus for treating continuous sheet material, a plurality of progressing means, each of which includes an upper and a lower roller and a belt trained about said upper and lower rollers, a clear space being provided between the belts of adjacent progressing means, and means for driving said belts in the same direction and with substantially the same surface velocity whereby sheet material suspended over successive belts and extending down therebetween may be driven through the apparatus.

7. In apparatus for treating continuous sheet material, a plurality of progressing means each of which includes means defining a continuous surface composed of straight line elements and moving in a cyclical path in directions at right angles to such elements, the said elements of the successive progressing means being parallel, a clear space being provided between adjacent progressing means, and means for driving said moving means in the same direction and with substantially the same surface velocity, whereby sheet material suspended over successive progressing means and extending down therebetween may be driven through the apparatus.

8. In apparatus for treating continuous sheet material, a plurality of progressing means, each of which includes an upper and a lower roller and a belt trained about said upper and lower rollers, a clear space being provided between the belts of adjacent progressing means, means for driving said belts in the same direction and with substantially the same surface velocity whereby sheet material suspended over successive belts and extending down therebetween may be driven through the apparatus, and moving means arranged to engage the sheet material depending between successive belts.

In testimony whereof, I have hereunto signed my name at Maurer, New Jersey, this 1st day of September, 1927.

WILLIAM FREEGARD.