

July 3, 1923.

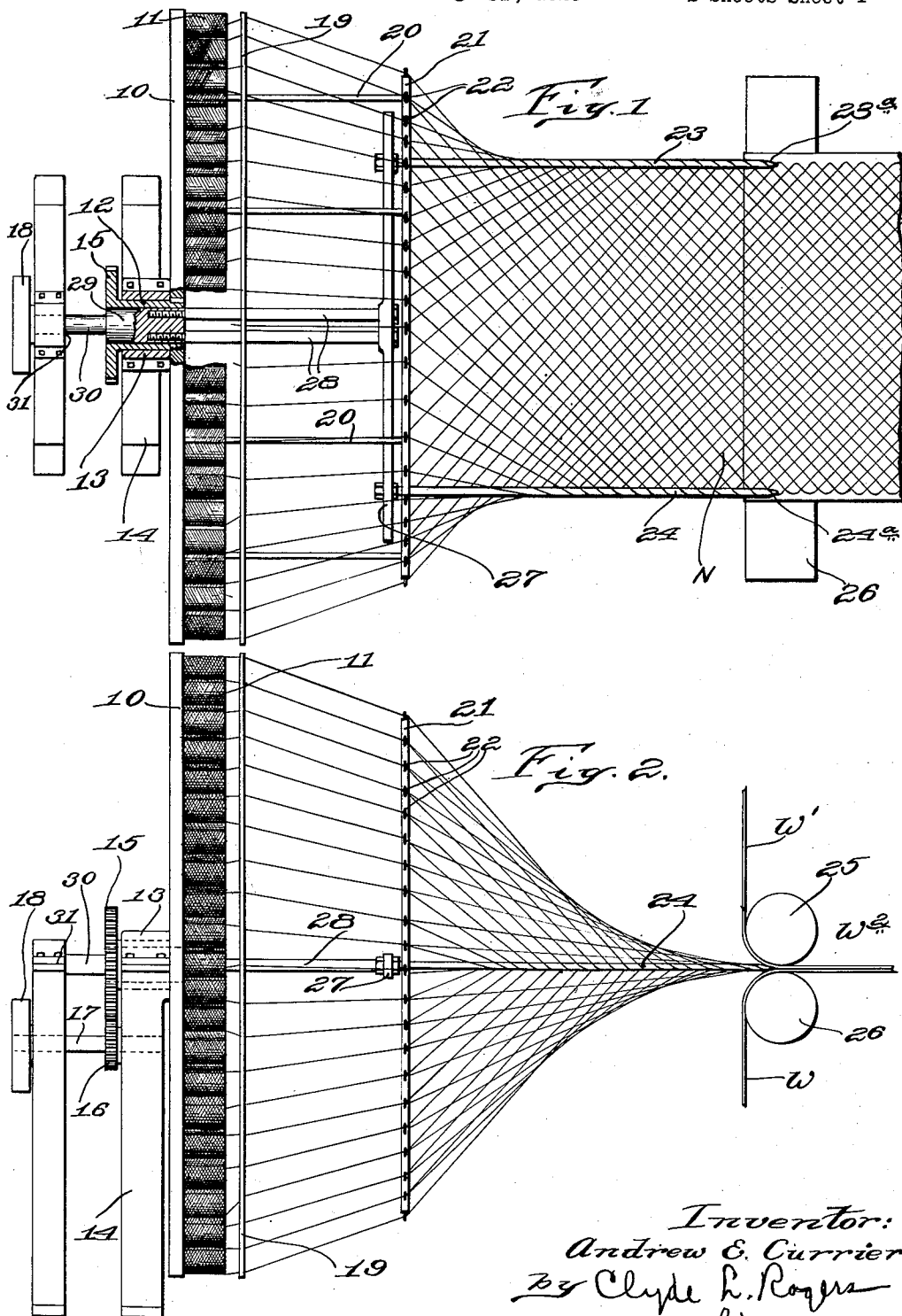
1,460,949

A. E. CURRIER

PAPER REINFORCING MACHINE AND METHOD THEREOF

Filed Aug. 31, 1920

2 Sheets-Sheet 1



Inventor:
Andrew E. Currier
By Clyde H. Rogers
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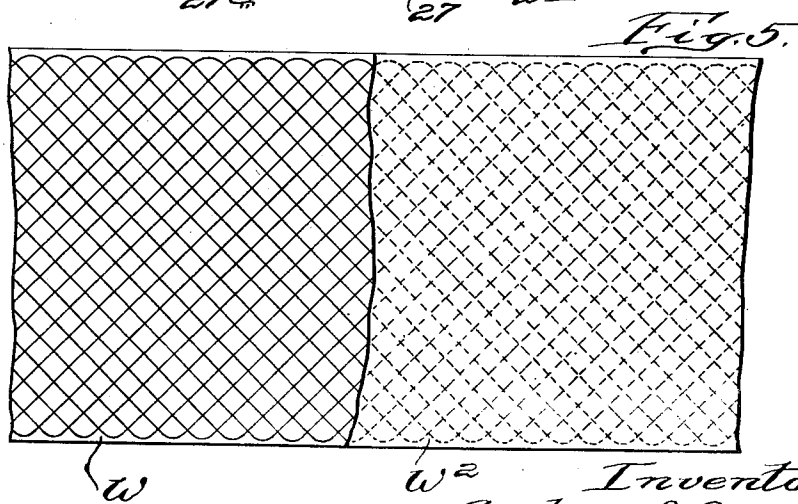
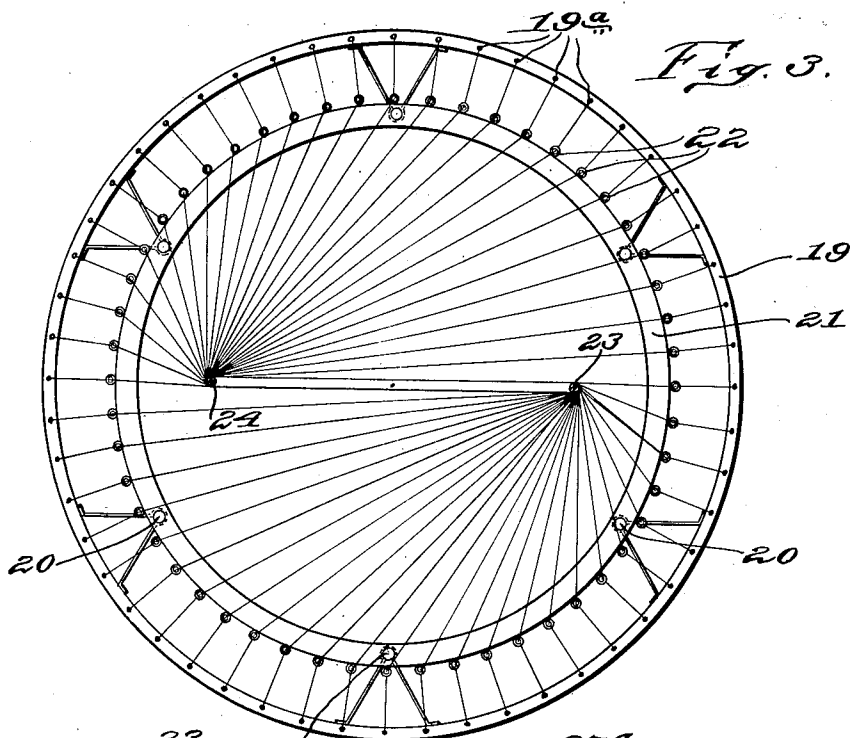
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PAPER REENFORCING MACHINE AND METHOD THEREOF

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

ANDREW E. CURRIER, OF MILLIS, MASSACHUSETTS, ASSIGNOR TO MAX BROWN, OF BOSTON, MASSACHUSETTS.

PAPER-REENFORCING MACHINE AND METHOD THEREOF.

Application filed August 31, 1920. Serial No. 407,163.

To all whom it may concern:

Be it known that I, ANDREW E. CURRIER, a citizen of the United States, and resident of Millis, county of Norfolk, Commonwealth of Massachusetts, have invented an Improvement in Paper-Reenforcing Machines and Methods Thereof, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts in each of the several views.

This invention relates to the reenforcing of paper or other material in the web by the application of threads or filaments thereto. More particularly the invention has to do with improved apparatus for applying series of threads in diagonal criss-cross arrangement continuously upon a moving web or webs of paper to be reinforced. A principal object of the invention is to provide mechanism of an exceptionally simple and inexpensive character, capable of applying filaments with any desired spacing, in diagonal relation upon a paper web at a relatively high rate of speed, and in a manner so that the threads are laid evenly and with the requisite tension upon the paper web, or between two webs, it being understood that the invention finds one of its principal fields of usefulness in the reenforcing of duplex paper wherein two paper webs are united with cementitious binder, the filaments being embedded and held between the paper layers by such cementitious binder of asphalt or other suitable substance. The foregoing and other objects and advantages of the invention will more fully appear from the following detailed description, and the distinctive features of novelty will be pointed out in the appended claims.

Referring to the drawings:

Fig. 1 is a plan view showing the essential features of a paper reenforcing apparatus embodying the invention.

Fig. 2 is a side view thereof.

Fig. 3 is a front view of the thread laying instrumentalities, the thread guiding rods being shown in transverse section.

Fig. 4 is an elevation showing the yoke which bears the thread guiding rods; and

Fig. 5 is an elevation showing a portion of a paper web reenforced in accordance with the invention, a part of one layer thereof being broken away.

10 indicates a spool holding creel which may be in the form of a disc equipped to hold on its front face a series of thread cops or spools 11. This creel is mounted for rotation by means of a central sleeve 12 projecting from the rear thereof and journaled in a bearing bracket 13 mounted upon a suitable base 14. The sleeve 12 is equipped with suitable driving means, shown as a gear 15 fixed at an end thereof which projects inward from the bearing bracket 13, and this gear being engaged by a pinion 16 fixed on a shaft 17 journaled in the framework and constituting the prime drive shaft of the machine with a driving pulley 18 fixed thereon, this typifying any suitable means for the transmission of driving impulse to the machine. The creel 10 has fixed thereto and spaced a small distance in front of the spools 11 a ring 19 equipped with thread guiding passages 19^a and serving to guide and centralize the threads delivered from the spools 11. The creel 10 also bears a series of rods 20 projecting some distance forwardly thereof and supporting at their extremities another ring 21 equipped with a series of thread guiding eyes 22 serving to space and aline the threads as they are transferred to the guiding rods which deliver them to the paper surface. The eyes 22 may be so constituted as to constitute tension devices for supplying a proper tension to the threads as they are applied to the paper. For this purpose the eyes 22 may be equipped with any suitable and known spring tension, or the threads may be wrapped one or more times around and through the eyes so as to create the necessary tension by friction thereagainst. It is important that the threads as delivered from the spacing ring 21 of the creel, be formed into a uniform and even netting or web before they are applied to the paper surfaces and in accordance with my invention I obtain this result by providing a pair of stationary parallel rods 23, 24 spaced apart according to the width of the paper web and extending from a point adjacent the ring 21 to the paper surface upon which the threads are to be laid. In the present case two paper webs W, W' are shown as guided into the bite between a pair of rolls 25, 26 for the production of a duplex paper web W² and the rods 23, 24 extend up into close proximity to the bite between these rolls, having

their extremities tapered as indicated at 23^a, 24^a so as to extend farther between the rolls, and also to facilitate the sliding of the threads therefrom. The rods 23, 24 are mounted at their inner ends upon a horizontal transverse yoke or bar 27 which is of a length as great as the maximum width of paper webs to be handled and is equipped with elongated slots 27^a at its end portions in which the rods 23, 24 may be adjustably clamped according to the width of the paper in any particular case, the rods 23, 24 being so adjusted so as to lie just within the sides of the paper web. The yoke 27 is mounted at the end of a pair of stout rods 28 which are borne by a head 29 stationarily mounted within the sleeve 12 which is journaled thereon and serves as an inner support therefor. The head 29 has a rearward extension 30 which is fixedly clamped in a socket 31 of the framework.

In use the threads are laid upon the rods 23, 24 from the rotating spacing ring 21 in a diagonal direction alternately over and under the rods, those under the rods extending in criss-cross relation to those laid over the rods as will be understood, this diagonal disposition of the threads being due to the constant drawing forward of the threads into the bite between the rolls, the threads sliding along the rods 23, 24 until they are delivered therefrom directly upon the paper surfaces at the bite between the rolls. It will hence be understood that the diagonal angle at which the threads are applied to the paper will depend upon the ratio between the speed of the rolls 25, 26, i. e. the paper feed, and the rate of rotation of the spool holding creel. Thus when the spool holding creel is revolved at relatively higher rates for a given speed of paper feed, the threads will be laid more nearly transverse of the paper web, while with relatively slower rates of creel rotation, the threads will extend more nearly lengthwise of the paper. It will also be understood that spacing of the threads may be varied in any desired manner by bringing into operation a greater or less number of the spools 11 which apply more or less filaments as may be required, and the spacing may also be varied by varying the rate of rotation of the creel, a higher speed of creel rotation spacing the filaments closer together and vice versa. Or both of these factors may be employed in varying the spacing of the threads. With the described mechanism there is thus formed upon the parallel rods 23, 24 a complete reinforcing netting or web N of threads which slides freely from the ends thereof directly into the bite between the rolls 25, 26 so that an even and uniform application of the reinforcing filaments is attained with any required spacing thereof and with the fila-

ments under the requisite tension as they are embedded in the asphaltic or other cementitious binder between the paper layers so as to reenforce or strengthen the paper to the full capacity of the filaments. I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The herein described method which consists in winding filaments continuously upon spaced apart relatively stationary guides to constitute a criss-cross web, and drawing the web so formed constantly along said guides and off from the ends thereof, with a frictional sliding movement, and pressing the same upon a moving paper surface.

2. The herein described method which consists in winding continuously with a uni-directional movement filaments upon spaced apart relatively stationary guides, to constitute a criss-cross web, and drawing the web so formed along said guides and off from the ends thereof, with a frictional sliding movement, and pressing the same continuously between two paper webs united by cementitious binder.

3. Apparatus of the kind described comprising means for continuously advancing a paper web, and means for applying reinforcing filaments thereto consisting of approximately parallel stationary guides presenting ways along which a filament web is adapted to be slid frictionally and extending into close proximity to the paper surface adjacent the edges of the web, and means for winding filaments upon said guides to constitute a web to be drawn constantly from said guides by the paper movement, said paper web advancing means embodying elements adapted to grip and draw said filament web frictionally along said guides and off from the ends thereof.

4. Apparatus of the kind described comprising means for advancing a paper web, stationary, spaced apart guides presenting ways along which a filament web is adapted to be slid frictionally and extending into close proximity to the paper surface, and a uni-directional thread carrier mounted to wind threads upon said guides, to constitute a reinforcing netting adapted to be drawn from said guides by the paper movement and applied to the paper surface.

5. Apparatus of the kind described comprising a pair of co-acting rolls adapted to press between them two paper webs, sta-

tionary spaced apart guides presenting ways along which a filament web is adapted to be slid frictionally and extending in substantial parallelism to a point relatively close to the bite between said rolls, and a unidirectional thread carrier mounted to wind threads upon said guides to constitute a netting adapted to be drawn into the bite between said rolls for the purpose stated.

6. Apparatus of the kind described comprising a pair of co-acting rolls adapted to press together two paper webs to constitute a duplex paper, relatively stationary guides mounted in substantial parallelism and extending relatively close to the bite between said rolls, said guides presenting ways along which a thread netting is adapted to be slid frictionally to be released from the ends thereof the mounting of said guides permitting adjustment thereof toward and from each other, and a thread holding creel mounted for rotation to wind threads upon said guides to constitute a netting adapted to be drawn from the guides into the bite between the rolls for the purpose stated.

In testimony whereof, I have signed my name to this specification.

ANDREW E. CURRIER.