

1,362,066.

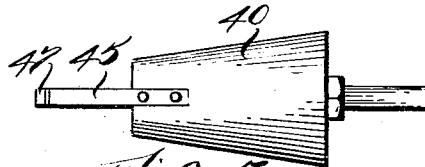
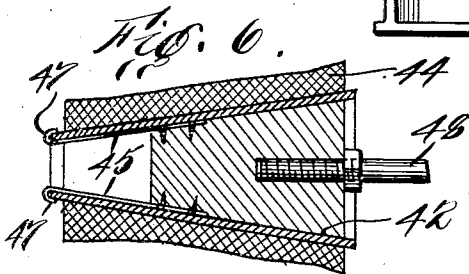
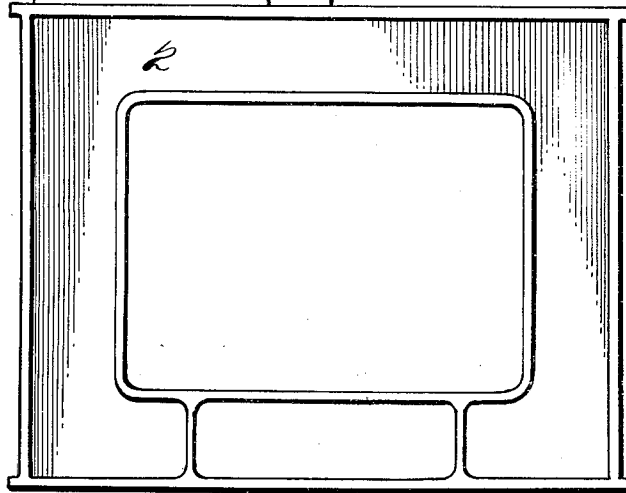


FIG. 5. Inventor
Kurt Wandel

By his Attorneys

Newell & heat

K. WANDEL.
MACHINE FOR MAKING REINFORCED PAPER.
APPLICATION FILED MAR. 27, 1917.

1,362,066.

Patented Dec. 14, 1920.
4 SHEETS—SHEET 2.

Fig. 2.

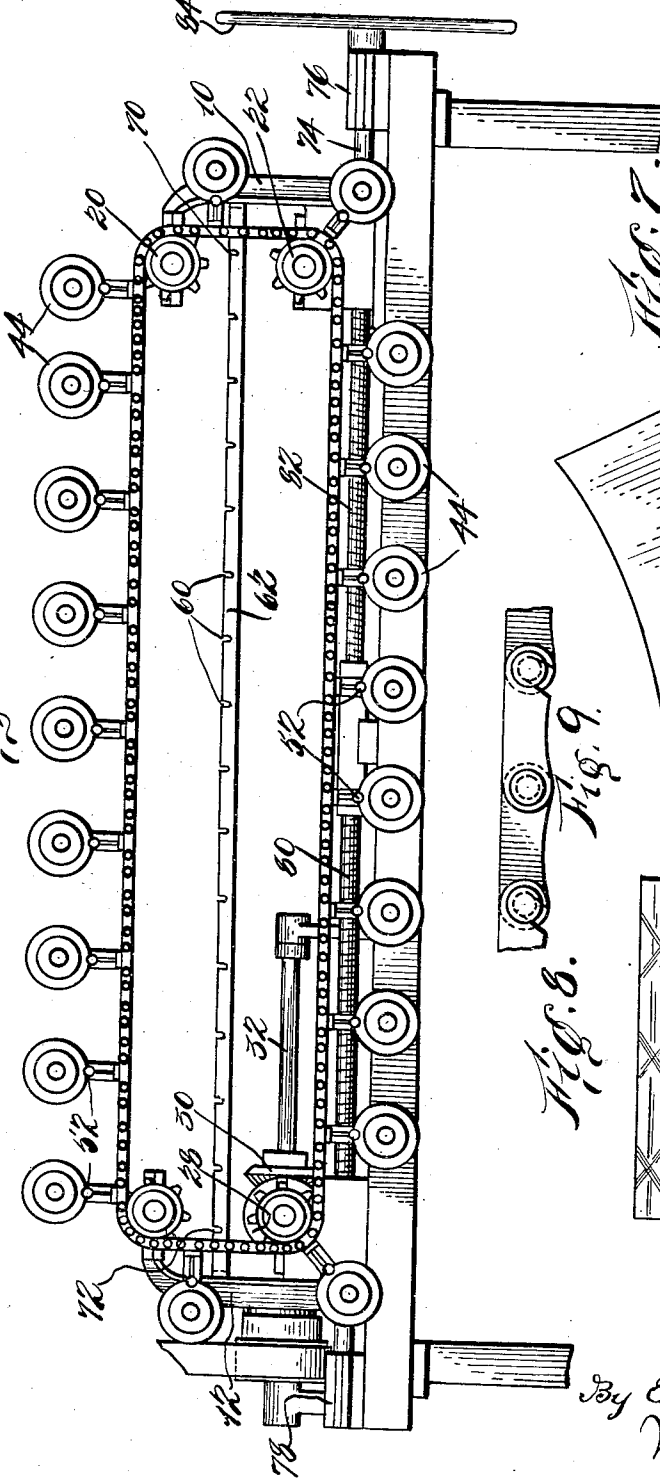


Fig. 7.

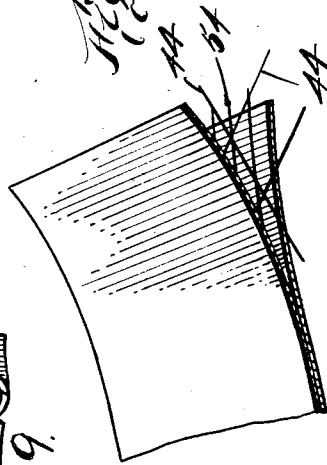
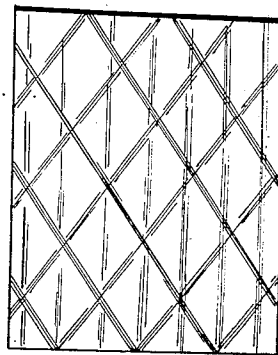


Fig. 9.



Fig. 8.

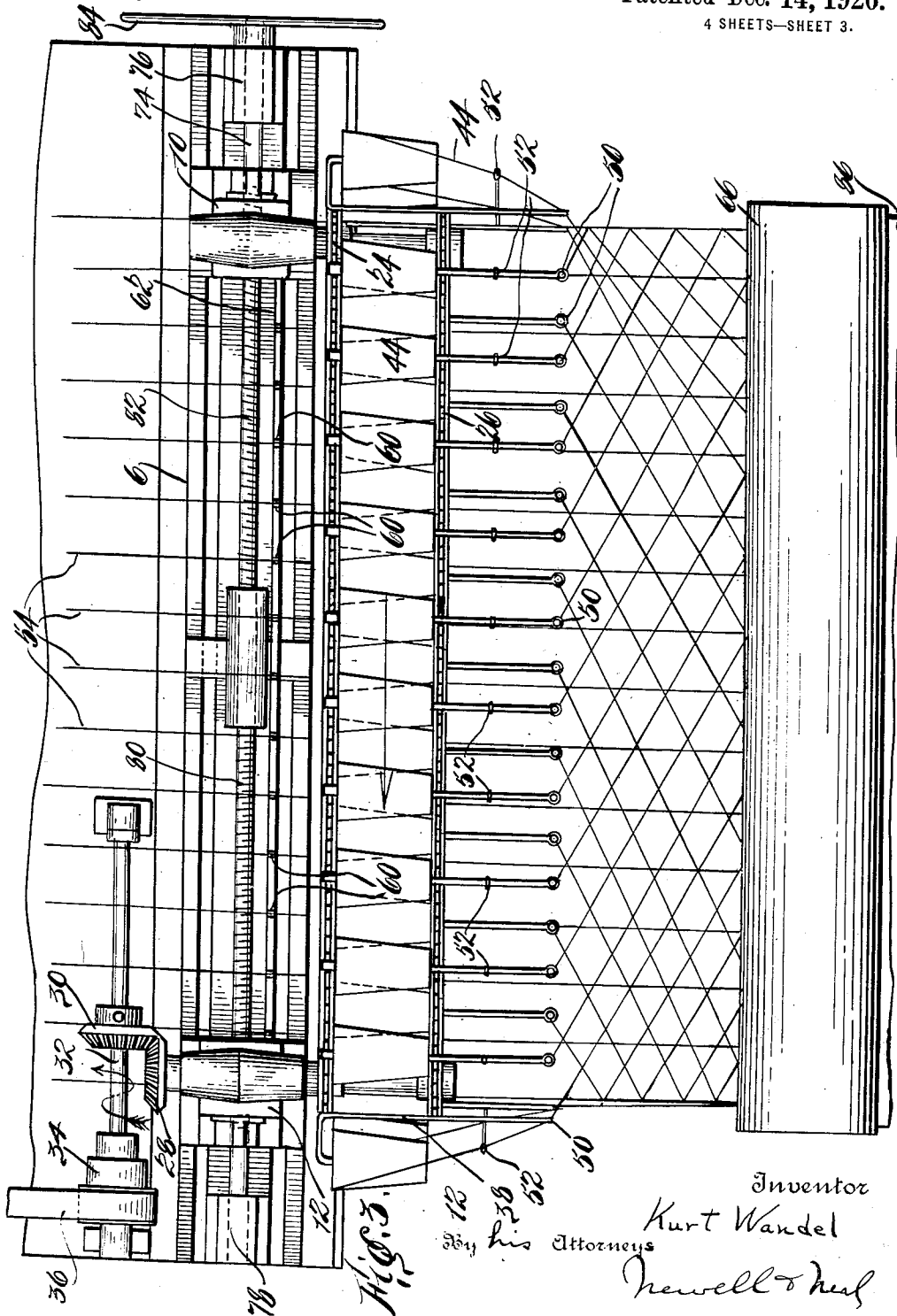


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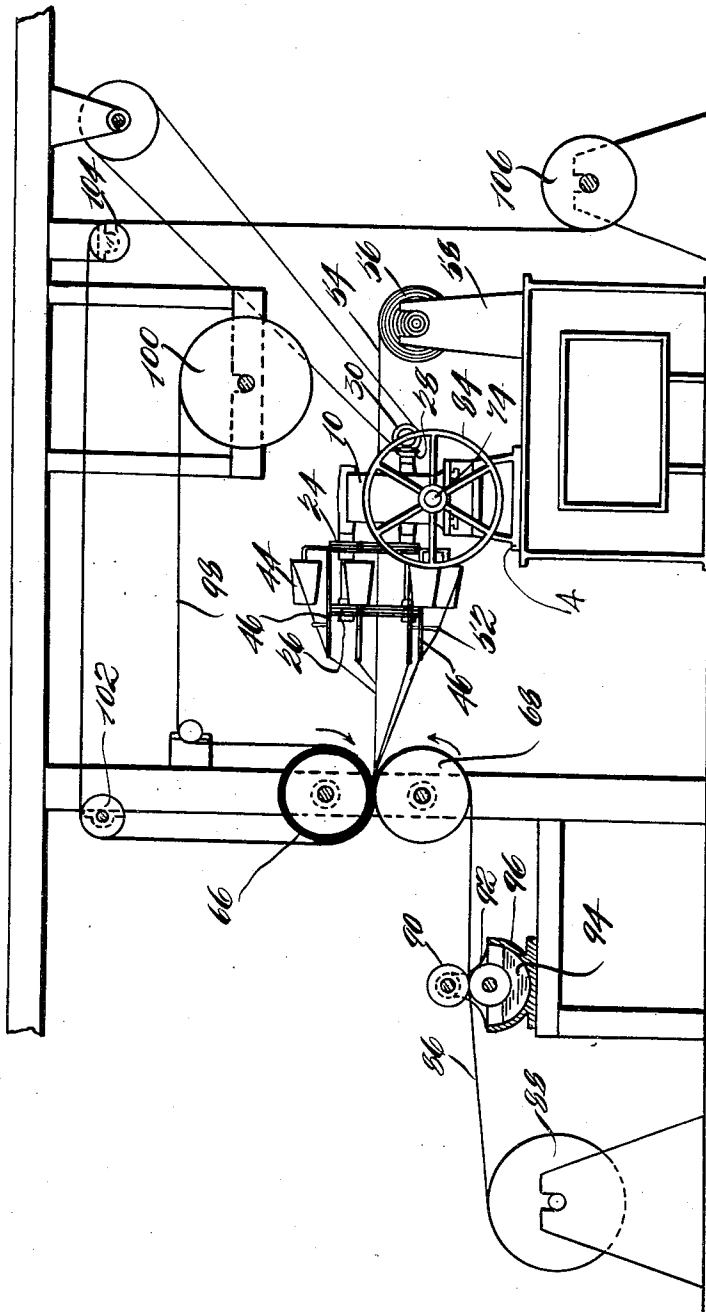


FIG. 4.

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UNITED STATES PATENT OFFICE.

KURT WANDEL, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE
CHEMICAL FOUNDATION, INC., A CORPORATION OF DELAWARE.

MACHINE FOR MAKING REINFORCED PAPER.

1,362,066.

Specification of Letters Patent.

Patented Dec. 14, 1920.

Application filed March 27, 1917. Serial No. 157,659.

To all whom it may concern:

Be it known that I, KURT WANDEL, a subject of the Emperor of Germany, residing at New York, N. Y., have invented certain new and useful Improvements in Machines for Making Reinforced Paper, of which the following is a clear, full, and exact description.

This invention relates to the manufacture of reinforced paper, and particularly to machines for manufacturing reinforced paper in accordance with the process described and claimed in United States Letters Patent to Alexander Wendler, No. 1,169,895, granted February 1st, 1916.

According to the process of the Wendler patent, above identified, the reinforcement, which is preferably incorporated in the paper as fast as it is formed, comprises longitudinal reinforcing strands, about which are wrapped a plurality of continuous transverse strands, the wrapping operation being performed while the longitudinal strands are moving continuously past the point of wrapping. The reinforcement produced by this process thus comprises transverse strands which obliquely cross the longitudinal strands and which, upon opposite sides of the plane of the longitudinal strands, are oppositely inclined to the said longitudinal strands.

In this reinforcement, when made according to the process of the Wendler patent above identified, the inclination of the cross strands to the longitudinal strands is dependent upon the speed of the advancing movement of the longitudinal strands with respect to the speed of wrapping of the transverse strands about the longitudinal strands. Moreover, the uniformity of the spacing of successive transverse strands and the uniformity of the spacing of these strands across the reinforcing fabric produced by this process is dependent both upon the provision of uniform time intervals between the successive wrapping operations for the successive strands, and the avoidance of lost motion at the time when the transverse strand is wrapped over the edge strand of the series of longitudinal strands.

In the machines of the prior art which have been provided for practising the process of the patent above identified, no provision has been made for adapting the machines for the production of reinforcing

fabrics of different widths. Moreover, these machines have all been defective in that the means for carrying the transverse strand about the longitudinal strands has been so guided in its movement through the plane of the longitudinal strands, that the point at which it passes through this plane has been located at a considerable distance outside the edge strand of the series of longitudinal strands; thus providing slack in the transverse strand as said carrying means again moves into position to draw the transverse strand over said edge strand. Inasmuch as the longitudinal strands are advancing continuously during this return movement of the said carrying means, the result is the production of a reinforcing fabric in which the transverse strands do not run straight from edge to edge of the fabric and are frequently not uniformly spaced from edge to edge.

An object of the present invention is to provide a machine for forming paper reinforcement in accordance with the process of the patent to Wendler, hereinabove identified, which not only can be operated to form this reinforcement at a greater rate of speed than machines heretofore designed for this purpose, but which also will produce a reinforcement of this type in which the transverse strands lie more nearly normal to the longitudinal strands than in the product of the machines of the prior art.

Another object of the invention is to provide means for wrapping the transverse strands about the longitudinal strands, which will carry the transverse strands through the plane of the longitudinal strands at a point in close proximity to the edge strand of the series of longitudinal strands. The invention aims further to provide means in a machine of this type to adjust the wrapping mechanism for the formation of reinforced fabrics of different widths, and particularly so to adjust said mechanism to different widths that the transverse strand will always be carried through the plane of the longitudinal strand in close proximity to the edge strand of the series of longitudinal strands.

An important feature of the invention is the novel means for carrying the spools, upon which the transverse strands are wound, about the longitudinal strands in the wrapping operation, a further important

feature of the invention being the combination of this means with guides so located as to guide said means about the longitudinal strands in a substantially rectangular path, having its ends in close proximity to the respective edge strands. Another important feature of the invention is the novel spool support, comprising the novel and convenient means for retaining the spool in position upon the support.

Other objects and important features of the invention will appear from the following description and claims when considered in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of the mechanism for forming the reinforcing fabric;

Fig. 2 is an end elevation of the mechanism shown in Fig. 1, the base being omitted;

Fig. 3 is a plan view of the mechanism showing also one of the paper pressing rolls;

Fig. 4 is a diagrammatic side elevation showing the complete apparatus for making reinforced paper according to the present invention;

Fig. 5 is a side elevation of one of the spool holders;

Fig. 6 is a longitudinal section through a spool holder and a spool carried thereby;

Fig. 7 is a detail view illustrating the manner in which the reinforcing fabric is laid between the sheets of the paper;

Fig. 8 is a plan view of a piece of the completed paper; and

Fig. 9 is a detail view illustrating the construction of the sprocket chain, which permits the lengthening and shortening of the chain to adapt it to different adjustments of the sprocket wheel supports for different widths of fabric.

The illustrated machine comprises a base 2 upon which are mounted standards 4 carrying a transverse supporting and guiding plate 6 provided with dovetail guiding grooves in which are received the dovetail slides 8 of bearing supports 10 and 12 for upper and lower shafts 14 and 16 carrying, respectively, spaced pairs of sprocket wheels 20 and 22, the inner sprocket wheel of each pair supporting an endless sprocket chain 24, and the outer sprocket wheel of each pair supporting an endless sprocket chain 26.

The lower shaft 16 in the bearing support 12 is extended rearwardly of said support and carries a bevel gear 28 meshing with a bevel gear 30 upon a driving shaft 32, the bevel gear 30 being adjustable lengthwise of said driving shaft in order that it may drive the bevel gear 28 in any position of adjustment to which the bearing support 12 may be moved by the mechanism hereinafter to be described. The driving shaft 32 may itself be driven from a source of power in any suitable manner, being

preferably connected to said source of power by variable speed mechanism in order to adapt the speed of drive to different widths of fabric to be formed. The illustrated variable speed mechanism comprises a stepped pulley 34 driven from a belt 36 connected to any suitable source of power.

Spool supporting brackets 38 are carried by the sprocket chains 24 and 26, these brackets being arranged to bridge the space between the chains and comprising the spool support proper in the shape of a cone 40 adapted to receive a hollow conical spool 42 upon which the yarn 44 or other reinforcing thread, cord or wire is wound. Spring clips 45 having hooked-shaped ends 47 and projecting from the smaller end of the cone 40 spring over the end of the hollow spool 42 and automatically lock this spool upon its support when it is thrust into seating position on the support. The bracket 38 has an upright portion 46 at one end and a horizontal portion 48 carrying the cone 40 above the bridging portion of the bracket and over the space between the sprocket chains. The bracket 38 is also extended to the side of the sprocket chains opposite to that upon which the bearing supports are located, and is provided in its end with a thread guide 50, an upright thread guide 52 being also located upon the bracket between the spool and the guide 50.

Longitudinal reinforcing strands 54, which may come from a roll or spools 56 carried upon upright supports 58 on the base 2, see Fig. 4 of the drawings, are led through the loop formed by the sprocket chains 24, 26, being preferably guided in slots 60 in a guide plate 62, the slots 60 being preferably spaced uniform distances apart and the longitudinal strands 54 being preferably drawn through the loop, in which the transverse strands 64, taken from the spools 42, travel, by means of the paper pressing rollers 66 and 68, the longitudinal strands traveling with the paper.

It will be noted from an inspection of Fig. 2 of the drawings that when a fabric of the width of that illustrated in Fig. 3 is being formed, the supports 10 and 12 are so adjusted, with respect to the longitudinal strands located at the edges of the fabric in the slots 70 and 72 of the guide 62, that the sprocket chains carrying the thread guides 50 are in close proximity to these edge strands and in a substantially straight line through the plane of the longitudinal strands. This is an important feature of the invention, as hereinabove pointed out, in that when the transverse strand is traveling from one side of the loop to the other through the plane of the longitudinal strands, no slack is formed, as in prior constructions, by the travel of the strand to a considerable distance beyond the edge of the

fabric and then back. In the illustrated construction, the transverse strand travels through the plane of the longitudinal strands, at a point in close proximity to the edge strand, the closeness of this path of travel to the edge strand being limited in the present construction only by practical considerations, such as the lateral vibration of the endless carriers or of the longitudinal strands when the machine is running at a relatively high speed.

As hereinabove pointed out, the bearing supports 10 and 12 are adjustable toward and away from each other, and means is preferably provided for effecting this adjustment of the two bearing supports equally and simultaneously. The illustrated means comprises a shaft 74 mounted in bearings 76 and 78 upon the plate 6, said shaft having right and left screw threads 80 and 82, which engage correspondingly threaded openings in the base portions of the bearing supports 10 and 12, thus effecting simultaneous movement of these supports toward and away from each other, according as the shaft 74 is turned in one or the other direction by any suitable means, such, for example, as the hand-wheel 84.

When this adjustment of the bearing supports 10 and 12 toward and away from each other is effected, it is necessary of course to shorten or lengthen the sprocket chains 24 and 26, unless provision is made for an adjustment of the upper and lower pairs of sprocket wheels 20 and 22 toward and away from each other to compensate for the variation in the length of the rectangle, and to this end the sprocket chains are preferably so made that one or more of the links carrying one or more of the spool supports may be removed or inserted according as it is desired to shorten or lengthen the chain. Shortening or lengthening the chain with the removal and insertion of one or more spools is usually preferable to the suggested compensating adjustment of the sprocket wheels 20 and 22, since with the variation in the width of the fabric it is usually preferable to vary the number of transverse strands wrapped about the longitudinal strands during each complete travel of the sprocket chains about said longitudinal strands.

As shown in Fig. 4 of the drawings, the reinforcing fabric is preferably incorporated in the reinforced paper, of which it is to form a part, as fast as this fabric is made. The rolls 66 and 68, as shown in Figs. 3 and 4, are preferably located in such proximity to the mechanism for forming the reinforcing fabric that this fabric is drawn between the rolls substantially as soon as the transverse strands are drawn into proper position across the longitudinal strands.

In the apparatus illustrated in Fig. 4, one

of the sheets of paper 86 between which the reinforcing fabric is to be confined, is coated with an adhesive, preferably of a waterproof nature, such as asphaltum, the paper being drawn from a roll 88 and passing between rollers 90 and 92, the roller 92 dipping into the asphaltum 94 or other suitable adhesive in a trough 96, whereby the side of the paper which is adjacent to the other reinforcing sheet 98 and also adjacent to the reinforcing fabric is coated with the adhesive. The sheet 86 passes over the lower roll 68 and the sheet 98 drawn from the roll 100 passes over the upper roll 66. These rolls 66 and 68 are arranged to press the sheets 98 and 86 into adhesive engagement, the lower roll 68 being preferably a metal roll and the upper roll 66 being preferably a rubber roll, whereby that side of the reinforced paper which comes next to the metal roll 68 is substantially smooth in the finished product, and the reinforcement shows on the side which is next to the rubber roll 66. The completed product may be taken care of in any suitable manner. As shown in Fig. 4, it is carried over guide rollers 102 and 104 to a receiving roll 106 located behind the mechanism for forming the reinforcing fabric.

What I claim is:—

1. In a machine of the class described, means, comprising an endless carrier and a spool mounted on said carrier, for wrapping a reinforcing strand transversely about material moving substantially in one plane past the point of wrapping, a strand guide on said carrier for guiding the wrapping travel of the strand as it is unwound from the spool, means for supporting said carrier in such proximity to the edges of the material as it travels about said edges that said strand guide passes through the plane of said material in close proximity to said edges, and means for causing said carrier to carry said strand across said material at a substantially uniform rate of speed.

2. In a machine of the class described, means, comprising an endless carrier and a spool mounted on said carrier, for wrapping a reinforcing strand transversely about material moving substantially in one plane past the point of wrapping, a strand guide mounted on said carrier and arranged to extend from said carrier into close proximity to the edge of said material when said carrier is moving said guide through said plane, and means for causing said carrier to carry said strand across said material at a substantially uniform rate of speed.

3. In a machine of the class described, means for advancing longitudinally a plurality of parallel reinforcing strands, and means operating while said strands are advancing for wrapping about said longitudinal strands a transverse strand, said last mentioned means comprising an endless car-

rier and four supports for said carrier arranged to guide said carrier in a substantially rectangular path having two sides parallel to the plane of the longitudinal strands, two of said supports being above said plane and the other two of said supports being below said plane.

4. A machine for forming a reinforcing fabric comprising, in combination, means for advancing longitudinally a plurality of parallel reinforcing strands, and means operating while said strands are advancing for wrapping about said longitudinal strands a plurality of transverse reinforcing strands, said wrapping means traveling above and below said longitudinal strands in paths substantially parallel to the plane thereof and between said upper and lower paths in paths which are substantially normal to said plane and which pass through said plane at points closely adjacent to the outer longitudinal strands.

5. A machine for forming a reinforcing fabric comprising, in combination, means for advancing longitudinally a plurality of parallel reinforcing strands, and means operating while said strands are advancing for wrapping about said longitudinal strands a plurality of transverse reinforcing strands, said means comprising an endless carrier and guides for guiding said carrier in a substantially rectangular path having its ends closely adjacent to the outer longitudinal strands.

6. A machine for forming a reinforcing fabric comprising, in combination, means for advancing longitudinally a plurality of parallel reinforcing strands, means operating while said strands are advancing for wrapping about said longitudinal strands a transverse strand, said wrapping means comprising an endless carrier and a strand guide mounted on said carrier, and four supports for said carrier arranged to guide said carrier in a substantially rectangular path about said longitudinal strands, said supports comprising two pairs each having its members upon opposite sides of the plane of said longitudinal strands near the edge strands and so located with respect to said edge strands that the strand guide carried by said carrier guides said transverse strand through the plane of the longitudinal strands in close proximity to the edge strands.

7. In a machine for forming a reinforcing fabric, the combination with means for advancing longitudinally a plurality of parallel reinforcing strands, means, comprising an endless carrier, for wrapping about said advancing strands a plurality of transverse reinforcing strands, and independent guiding means located upon opposite sides of the plane of the longitudinal strands and within the endless carrier for guiding said car-

rier in substantially a straight line through said plane in proximity to an edge strand thereof, said guides being arranged to guide said carrier in substantially a straight line across said longitudinal strands.

8. A machine for forming a reinforcing fabric comprising, in combination, means for advancing longitudinally a plurality of parallel reinforcing strands, means operating while said strands are advancing for wrapping about said longitudinal strands a transverse strand, said means comprising a strand guide and a carrier for said guide arranged to move said guide from edge to edge of the longitudinal strands at a uniform strand-delivering speed and to carry said guide through the plane of said longitudinal strands without substantial travel beyond either edge strand, and means for effecting the movement of said carrier.

9. A machine for forming a reinforcing fabric comprising, in combination, means for advancing longitudinally a plurality of parallel reinforcing strands, and means operating while said strands are advancing for wrapping about said longitudinal strands a transverse strand, said means comprising an endless carrier and two pairs of supports for said carrier arranged to guide said carrier in a substantially rectangular path having two sides parallel to the plane of the longitudinal strands, one pair of supports having its members upon opposite sides of said plane near one edge strand, and the other pair having its members upon opposite sides of said plane near the other edge strand.

10. A machine for forming a reinforcing fabric comprising, in combination, means for advancing longitudinally a plurality of parallel reinforcing strands, and means operating while said strands are advancing for wrapping about said longitudinal strands a transverse strand, said means comprising an endless carrier and two pairs of supports for said carrier arranged to guide said carrier in a substantially rectangular path having two sides parallel to the plane of the longitudinal strands, one pair of supports having its members upon opposite sides of said plane near one edge strand, and the other pair having its members upon opposite sides of said plane near the other edge strand, and said pairs of supports being relatively adjustable to provide for wrapping movement through said plane in close proximity to said edge strands for different widths of reinforcing fabric.

11. In a machine of the class described, the combination with means for advancing longitudinally a plurality of parallel reinforcing strands, means for wrapping about said advancing strands a plurality of transverse reinforcing strands, said means comprising an endless carrier moving across the ad-

vancing strands in paths substantially parallel to the plane of said longitudinal strands, independent guides upon opposite sides of said strand plane arranged to guide
 5 said carrier through said plane in proximity to an edge strand, strand carrying spools carried upon the outside of said endless carrier, and strand guides extending to one side of said carrier and substantially into
 10 the plane thereof.

12. In a machine of the class described, means, comprising an endless carrier and a spool mounted on said carrier, for wrapping a reinforcing strand transversely about
 15 material moving substantially in one plane past the point of wrapping, a strand guide on said carrier for guiding the wrapping travel of the strand as it is unwound from the spool, means for supporting said carrier in such proximity to the edges of the
 20 material as it travels about said edges that said strand guide passes through the plane of said material in close proximity to said edges, and means for effecting a relative adjustment of said carrier supports at the
 25 edges of said material toward and away from each other to adapt said wrapping means to materials of different widths.

13. A machine for forming a reinforcing
 30 fabric comprising, in combination, means for advancing longitudinally a plurality of parallel reinforcing strands, means operating while said strands are advancing for wrapping about said longitudinal strands a
 35 plurality of transverse reinforcing strands, said means comprising an endless carrier and guides for guiding said carrier in a substantially rectangular path having its ends closely adjacent to the outer longitudinal

strands, and means for effecting a relative
 40 approach or separation of the opposite end guides to bring said carrier into proximity to outer longitudinal strands spaced different distances apart.

14. In a machine of the class described, 45 means for wrapping a plurality of reinforcing strands transversely about material moving substantially in one plane past the point of wrapping, said means comprising a pair of parallel endless carriers moving in rec- 50 tangular paths about said material, strand-carrying spool supports bridging said carriers, said spool supports being constructed to support the spools over the carriers, and carrier supports arranged in pairs near the 55 edges of said material and having the respective members of each pair upon opposite sides of the plane of said material.

15. In a machine of the class described, means for wrapping a plurality of reinforcing strands transversely about material moving substantially in one plane past the point of wrapping, said means comprising a pair of parallel endless carriers moving in rec- 60 tangular paths about said material, strand-carrying spool supports bridging said carriers, said spool supports being constructed to support the spools over the carriers, carrier supports arranged in pairs near the 65 edges of said material and having the respective members of each pair upon opposite sides of the plane of said material, and strand guides for each spool traveling in a path approaching said material more closely 70 than the path of travel of the spools.

Signed at New York, N. Y., this 19th day of March, 1917. 75

KURT WANDEL.