Dec. 25, 1934. E. W. STACEY 1,985,524

SYSTEM FOR DELIVERING SHEET MATERIAL

Filed Dec. 16, 1930 3 Sheets-Sheet 1

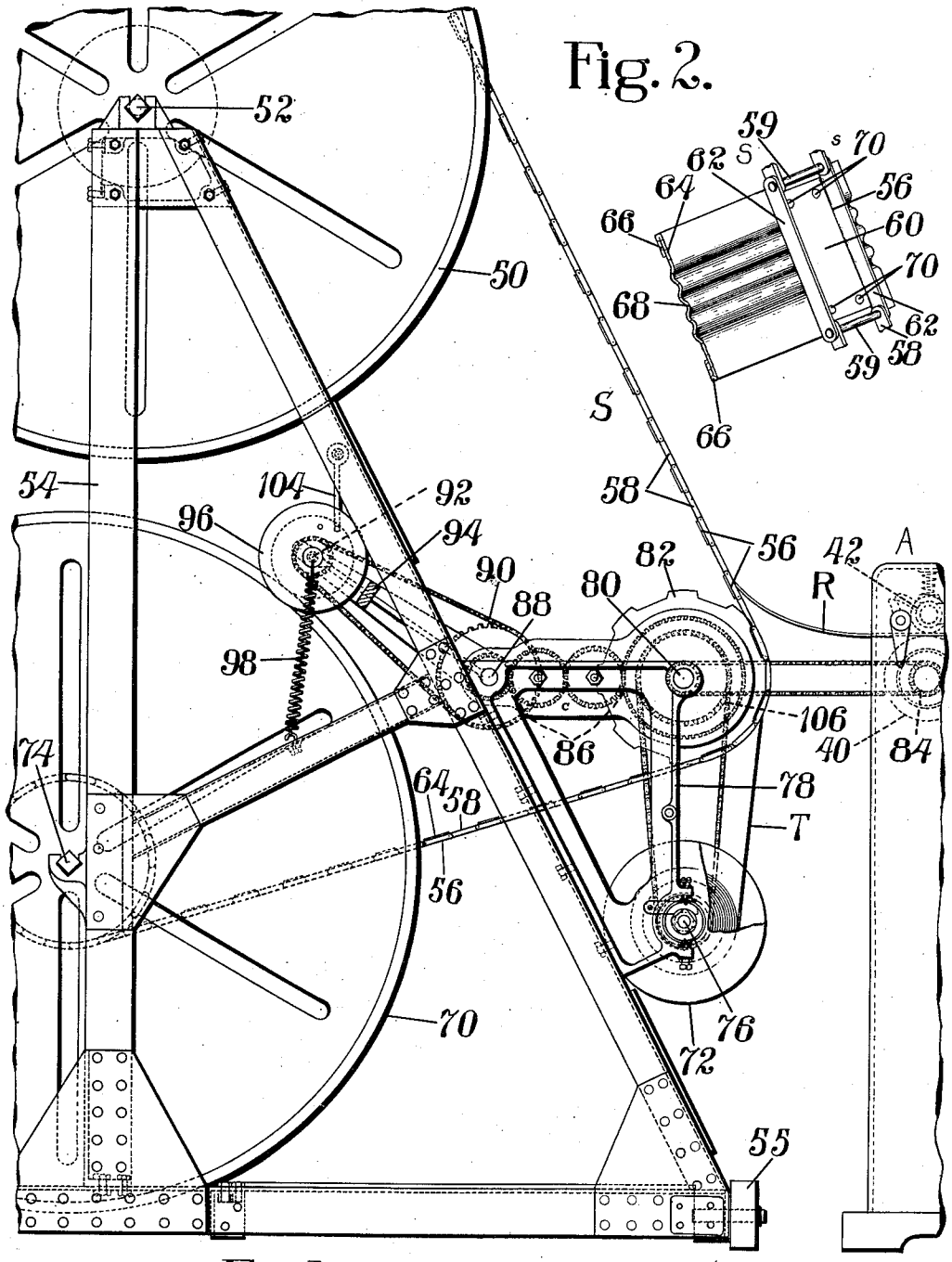


Fig. 1.

Fig. 2.

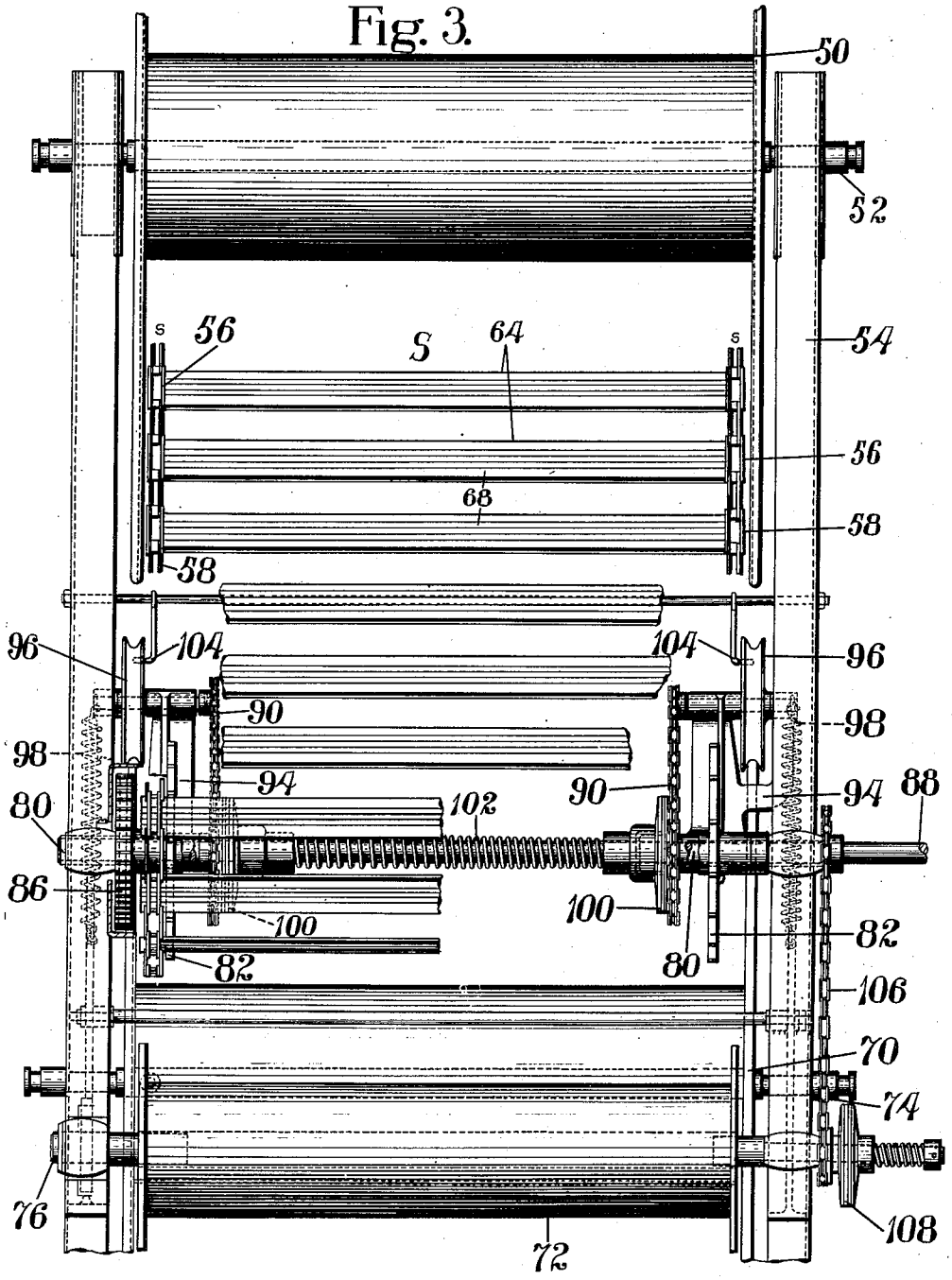
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Fig. 3.



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Fig. 4.

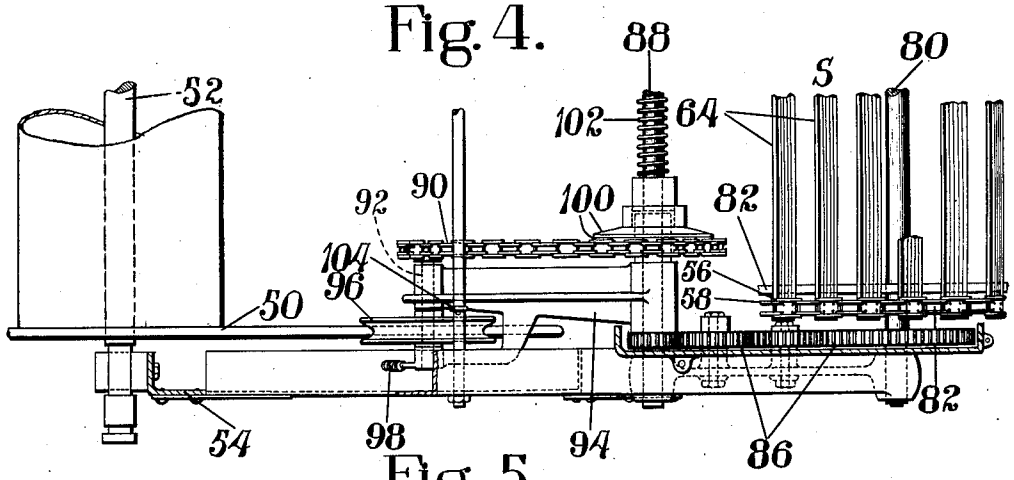
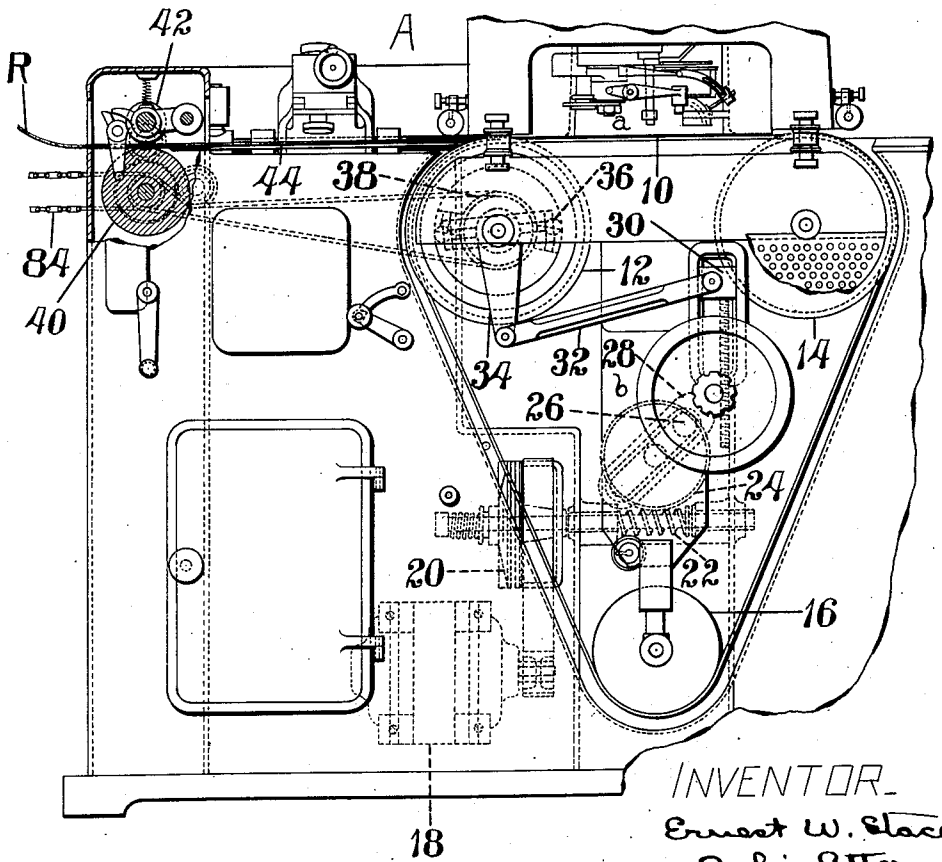


Fig. 5.



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SYSTEM FOR DELIVERING SHEET MATERIAL

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Application December 16, 1930, Serial No. 502,739

20 Claims. (Cl. 242—55)

This invention relates to the delivery of sheet-material, and particularly to its uncoiling from a supply-reel upon which it is carried with one or more protective separators.

An object of my invention is to effect such delivery in correct time-relation with mechanism which is to operate upon the material intermittently. To this end, I combine with the operating mechanism movable means for advancing material intermittently to said operating mechanism at definite time-intervals, a reel arranged to deliver material and a separator, a reel to receive said separator, and connections constructed and arranged to draw the separator from the delivering reel and supply the material to the advancing means synchronously with the movement of the advancing means. In this way, there may be assured a perfectly timed action of the operating mechanism upon the material. Preferably, the unreeling is accomplished by the connections to the driving means of the operating mechanism, which connections act both directly upon the separator to draw it and the material from the delivering reel, and upon the receiving reel for the separator to cause its recoiling, the receiving reel being shown as driven through a friction device. Regardless of the manner in which the unreeling and reeling forces are applied, I prefer to coil the material upon the delivering reel with plural separators; and to receive these separators, I employ receiving reels independent of one another. With the reels, whatever their number, I associate a rotatable member arranged to engage one of the separators and thereby rotate the delivering reel and uncoil the material. In the present instance, two separators are assembled with the material. One, which may be termed the primary separator, includes chains and cross-bars connecting these chains, this holding the convolutions of the material out of contact with one another; and another, or secondary separator, in web form, protects the material from disfigurement by the bars. The rotatable member may be toothed and engage one of the separator-chains to cause the unreeling action.

This invention has, as a further feature, the provision of a light, strong and generally effective separator of the character just described as having for its primary function the maintaining separate of the successive convolutions of a coil of material and as being acted upon to unreel said coil. This separator has spaced sprocket-chains, each comprising a series of links, at least a portion of which are in the form of channel members, and cross-bars connecting the links. One or more of the separator-chains may be engaged by the previously mentioned toothed driving means to effect the unreeling, the side-walls of the channel members and the bars furnishing, when wound upon a reel, a spiral cell, in which the material rests without pressure, other than that of its own weight. Alternate links of each chain appear as channel members, to the bottoms of which members the cross-bars are secured, as by welding. The cross-bars are preferably of sheet-metal, stiffened by being doubled at their edges and corrugated longitudinally.

The accompanying drawings illustrate a particular embodiment of my invention,

Fig. 1 being a broken side elevation of the reels and the immediately associated driving means;

Fig. 2, a detail in perspective of a portion of the primary separator;

Fig. 3, a broken end elevation looking from the right in Fig. 1;

Fig. 4, a partial top plan view of the same elements; and

Fig. 5, a view in side elevation of the driving means associated with the operating mechanism supplied.

At A (Fig. 5) appears a machine for operating upon such sheet-material as rubber stock R from which shoe-soles are to be formed. This machine has cutting mechanism *a*, the particular form of which is not important in the present connection, except it is preferable that the stock upon which it acts shall be at rest during the cutting operation. A mechanism suitable for this purpose is described in detail in an application in my name for Letters Patent of the United States, this having been filed February 1, 1932 and bearing the Serial No. 590,109. Of this application, a divisional application for unreeling mechanism was filed on April 3, 1933, Serial No. 664,190. The material, preferably in web-form, is advanced intermittently step by step by a conveying member furnished by an endless belt 10, which also supports the work upon a horizontal portion directly beneath the mechanism *a* while the cutting is being carried on. The belt 10 is shown as running over rolls 12, 14 and 16 arranged at the apices of a triangle, the roll 12 having power applied to it through intermittently effective driving mechanism *b*. This includes a motor 18 belted through a clutch 20 to a worm 22. The worm rotates a worm-wheel 24 carrying a crank-pin 26 operating in the slotted arm of a bell-crank-lever 28. Adjustable along a second arm of the bell-crank, to vary the throw it produces, is a block 30, to which is pivoted a link 32.

The opposite extremity of the link is articulated to an arm 34, which, through clutch mechanism 36, indicated as of the Horton type, turns the roll 12 in one direction only, in steps timed to give periods of rest corresponding to the cutting action of the mechanism *a*. The length of the steps is equal throughout a series in which soles of a particular size are being cut, but may be adjusted, as desired, by the variation in the position of the block 30. Driven in the proper time-relation by sprocket-gearing 38 from the roll 12 is another part of the material-advancing or conveying mechanism, consisting of a bed-roll 40, against which the material R is forced into feeding engagement by an idle spring-actuated pressure-roll 42. From the rolls, the material is fed across a table 44 to the belt 10.

Referring to Figs. 1, 3 and 4, the material R is delivered to the machine A for the operation upon it in a coil carried by a delivering reel 50 supported for rotation upon a spindle 52 mounted upon a frame 54. This frame is illustrated as being movable upon rollers 55, so it may readily be associated with the particular apparatus which it is to supply with stock. Since the material for use in connection with which this system is especially designed is adhesive, soft and easily marred and distorted, each convolution of the coil is maintained out of contact with the adjacent convolutions by interposed separating means. In the present instance, two separators are coiled with the material. One of these, the primary separator S, is illustrated in detail in Fig. 2. It includes two sprocket-chains *s, s*, which may be identical in construction. Each chain has alternate wide links 56 and narrow links 58 joined by pivot-pins 59. I prefer to form the links 56 as channel members, each having a bottom wall 60 and opposite side walls 62, 62, through openings in the latter of which the pins 59 pass and are upset at their outer extremities to prevent displacement. To the bottom walls 60 of alined wide links of the two chains are secured cross-bars 64, which may be of relatively thin sheet-metal, and which furnish the supporting means for the stock. To render the bars resistive to bending, they are shown as doubled over at 66 at their opposite edges, and are further preferably corrugated longitudinally at 68. Thus constructed, they are both light and rigid. The ends of each bar may be attached to their links by spot-welding, as appears at separated points 70 for each link. This attachment is secure and facilitates the manufacture of the separator. The coiled separator S forms a spiral space having its radial dimension corresponding to the depth of the walls 62, in which space the material R may lie without pressure, save as it rests by its own weight upon the bars 64. To prevent these bars from indenting the material, I prefer to place between them, at the inner side of said material, a secondary separator T. This may be a web of textile material treated to prevent adhesion of the stock to it.

Upon the frame 54, below the delivering reel 50, are a receiving reel 70 for the primary separator S, a receiving reel 72 for the secondary separator T, and a continuation *c* of the driving mechanism *b*, which acts to unreel the combined coil 50 to deliver the material R to the conveying means, and to rotate the receiving reels 70 and 72, respectively, upon a spindle 74 and a shaft 76, which support them on the frame. The driving mechanism *c* is carried by brackets 78 upon the frame. Journaled in the brackets at the side toward the apparatus at A is a shaft 80, upon which are fast toothed wheels 82, one for engagement with each of the chains *s*. The teeth of these wheels are so formed as to enter the links 58 and drive the chains by engagement with the pins 59. The shaft 80, and therefore the wheels 82, are rotated by sprocket-gearing 84 from the material-feeding or conveying roll 40. A chain of spur-gears 86 turns a shaft 88 journaled at the inner side of the brackets 78, and this shaft is joined by sprocket-gearing 90 to a shaft 92 rotatable in arms 94 pivoted about the shaft 88. Fixed to the shaft 92 are grooved rolls 96 drawn by springs 98 against the flanges of the reel 70 to turn this upon its spindle and thus coil up the separator S as it is delivered from the reel 50. The force is transmitted from the gearing 86 to the shafts 88 and 92 through friction-disks 100 forced into engagement by a spring 102 surrounding the shaft 88. Thus, as the separator accumulates upon the reel and the diameter of the coil increases, the friction may slip and compensate for the constant rate of unreeling produced by the toothed wheels 82. There are shown as pivoted upon the frame 54, arms 104, which may be brought into engagement with openings in the rolls 96, the relation being such that the engaged rolls are held out of contact with the flanges of the reel 70 to stop the rotation. Sprocket-gearing 106 rotates the shaft 76 from the shaft 80 through a friction device 108, and thus the separator T is coiled upon its reel as it is delivered, in the same manner as is the separator S.

In utilizing the system, a reel 50 of the combined sheet-material R and the superposed separators S and T is mounted upon the spindle 52, and the outer ends unwound sufficiently to permit the chains *s* to be led over the toothed wheels 82 and connected to the core of the reel 70, while the separator T is attached to the core of the reel 72. The rubber stock is carried forward from the separators, as clearly appears in Fig. 1 of the drawings, between the rolls 40 and 42, over the table 44 until its end is beneath the cutting mechanism *a* ready for the operation upon it. The apparatus A having been started, the cutting mechanism is alternately put in operation and allowed to remain at rest by the intermittent action of the driving mechanism *b*. During the latter period, the bed-roll 40 of the conveying means is rotated to advance the stock over the table 44 and along the upper run of the conveyor 10, which is also in motion; and, at the same time, rotation is imparted to the wheels 82 to draw off the combined coil from the reel 50. This unreeling tension is applied wholly to the primary separator S, which is particularly designed to receive and transmit the force. The material is therefore, without rupturing stress, delivered to the conveying means for advance thereby to the cutting mechanism. As this is occurring, both the primary separator S and secondary separator T are wound upon their reels 70 and 72 by the gearing and frictional connections to the driving mechanism through the shaft of the wheels 82. The proper area of the material having been brought into cutting position, the feed stops and the mechanism *a* acts, synchronism between the apparatus A and the unreeling system being always perfectly maintained throughout successive operations.

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

1. In a system for operating upon sheet-material, the combination with a machine having operating mechanism, movable means for advancing material intermittently and means for moving the advancing means to feed material to the operating mechanism in a series of equal steps, of a reel arranged to deliver the material and a separator, a reel arranged to receive the separator, and connections to the machine constructed and arranged to draw the separator from the delivering reel and deliver the material to the advancing means in synchronism with the movement of said advancing means.

2. In a system for operating upon sheet-material, operating mechanism, movable means for advancing material to the operating mechanism at definite time-intervals, driving means for operating said advancing means intermittently, a reel arranged to deliver material, a separator coiled with the material upon said reel, a reel arranged to receive the separator, and connections operable by the driving mechanism and acting directly upon the separator to draw it from the delivering reel and deliver the stock to the advancing means in synchronism with the movement of said advancing means.

3. In a system for operating upon sheet-material, operating mechanism, movable means for advancing material to the operating mechanism, a reel arranged to deliver material, a separator coiled with the material upon said reel, a reel arranged to receive the separator, and connections constructed and arranged to rotate the receiving reel, said connections also acting directly upon the separator at a point removed from the reels to draw it from the delivering reel.

4. In a system for operating upon sheet-material, operating mechanism, movable means for advancing material to the operating mechanism, driving means for operating said advancing means intermittently, a reel arranged to deliver material, a separator coiled with the material upon said reel, a reel arranged to receive the separator, and connections between the driving means and receiving reel for rotating the latter, said connections also engaging the separator at a point between the delivering reel and the receiving reel to draw said separator from the delivering reel.

5. In a system for operating upon sheet-material, operating mechanism, movable means for advancing material intermittently to the operating mechanism, driving means for the advancing means, a reel arranged to deliver the material, superposed separators coiled with the material upon said reel, a receiving reel for each separator, and connections between the driving means and receiving reels for rotating each of said reels to draw the separators from the delivering reel and deliver the material to the advancing means in synchronism with the movement of said advancing means.

6. In a system for operating upon sheet-material, operating mechanism, movable means for advancing material intermittently to the operating mechanism, driving means for the advancing means, a reel arranged to deliver the material, superposed separators coiled with the material upon said reel, a receiving reel for each separator, and connections between the driving means and receiving reels for rotating each of said reels, said connections also acting directly upon the separator to draw it from the delivering reel.

7. The combination with cutting mechanism, of a conveyor for delivering sheet-material to the cutting mechanism, intermittently operating driving mechanism for the conveyor, a delivering reel for the material, a separator coiled with the material upon said reel, a receiving reel for the separator, gearing joined to the driving mechanism and arranged to act upon the separator to draw it from the delivering reel and present the material to the conveyor, and connections to the gearing for rotating the separator-receiving reel.

8. The combination with cutting mechanism, of a conveyor for delivering sheet-material to the cutting mechanism, intermittently operating driving mechanism for the conveyor, a delivering reel for the material, a primary separator coiled with the material upon said reel and arranged to hold the successive convolutions of the material out of contact with one another, a secondary separator interposed between the material and the primary separator, a receiving reel for each of the separators, gearing joined to the driving mechanism and arranged to act upon the primary separator to draw it and the secondary separator from the delivering reel and present the material to the conveyor, and connections to the gearing for rotating both separator-receiving reels.

9. The combination with cutting mechanism, of a conveyor for delivering sheet-material to the cutting mechanism, intermittently operating driving mechanism for the conveyor, a delivering reel for the material, a primary separator coiled with the material upon said reel and arranged to hold the successive convolutions of the material out of contact with one another, a secondary separator interposed between the material and the primary separator, a receiving reel for each of the separators, gearing joined to the driving mechanism and including a toothed wheel arranged to engage the primary separator, and frictional driving means rotatable by the gearing and arranged to act upon the receiving reels.

10. The combination with a reel arranged to deliver material, of a separator coiled with the material upon said reel, means for receiving the delivered material, a reel arranged to receive the separator, a movable member arranged to engage the separator and thereby rotate the delivering reel and deliver the material, and means for rotating the receiving reel.

11. The combination with a reel arranged to deliver material, of a separator coiled with the material upon said reel, means for receiving the delivered material, a reel arranged to receive the separator, a rotatable member arranged to engage the separator and thereby rotate the delivering reel and deliver the material, and gearing connecting the rotatable member to the receiving reel, there being a friction member included in the connections and arranged to slip as the separator accumulates upon the receiving reel.

12. The combination with a reel arranged to deliver material, of a plurality of separators coiled with the material upon said reel, means for receiving the delivered material, reels independent of one another and arranged to receive each separator, a rotatable member arranged to engage one of the separators and thereby rotate the delivering reel and deliver the material, and means for rotating each of the receiving reels.

13. The combination with a reel arranged to deliver material, of a plurality of separators coiled with the material upon said reel, means for

receiving the delivered material, reels independent of one another and arranged to receive each separator, a rotatable member arranged to engage one of the separators and thereby rotate the delivering reel and deliver the material, and gearing connecting the rotatable member to each receiving reel.

14. The combination with a reel arranged to deliver material, of a plurality of separators coiled with the material upon said reel, means for receiving the delivered material, reels independent of one another and arranged to receive each separator, a rotatable member arranged to engage one of the separators and thereby rotate the delivering reel and deliver the material, and gearing connecting the rotatable member to each receiving reel, there being friction members included in the connections and arranged to slip as the separators accumulate upon the receiving reels.

15. The combination with a reel arranged to deliver material, of a separator coiled with the material upon said reel and including chains and cross-bars connecting the chains, a separator-web resting upon the cross-bars, a movable conveyor for the delivered material, a rotatable toothed member having driving engagement with a chain of the separator, a reel arranged to receive the chain-separator, a reel arranged to receive the web-separator, and means for rotating the receiving reels.

16. The combination with a reel arranged to deliver material, of a separator coiled with the material upon said reel and including chains and cross-bars connecting the chains, a separator-web resting upon the cross-bars, a movable conveyor for the delivered material, a rotatable toothed member having driving engagement with a chain of the separator, a reel arranged to receive the chain-separator, a reel arranged to receive the web-separator, connections to the conveyor to rotate the toothed member, and gearing connecting the toothed member to both receiving reels.

17. In a separator for sheet-material, spaced sprocket-chains each having a series of links in the form of channel members, and cross-bars connecting links of the chains and furnishing with the inner side walls of the channel members a space to receive the sheet-material.

18. In a separator for sheet-material, spaced sprocket-chains each having a series of links, the alternate links being in the form of channel members each provided with a bottom and side-walls, and cross-bars secured to the bottoms of the channel members.

19. In a separator for sheet-material, spaced sprocket-chains each having a series of links, the alternate links being in the form of channel members each provided with a bottom and side-walls, and cross-bars consisting of sheet-metal welded to the bottoms of the channel members.

20. In a separator for sheet-material, spaced sprocket-chains each having a series of links, the alternate links being in the form of channel members each provided with a bottom and side-walls, and cross-bars secured to the bottoms of the channel members and consisting of sheet-metal doubled at their longitudinal edges and having corrugations extending longitudinally between said edges.

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