Oct. 5, 1937. C. D. KNOWLTON 2,094,896

COIL SUPPORTING AND SPLICING MECHANISM

Filed June 4, 1935 2 Sheets-Sheet 1

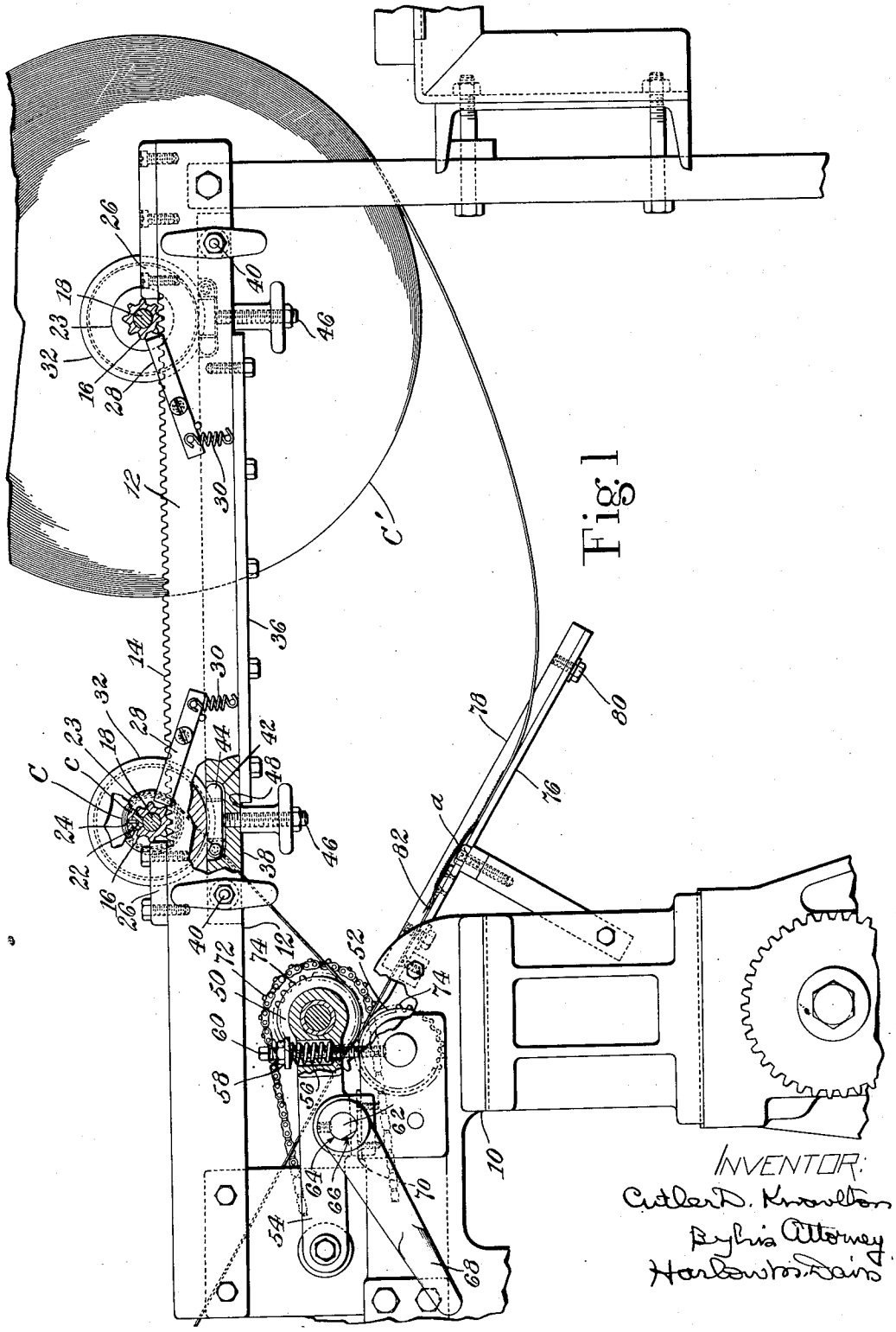


Fig. 1

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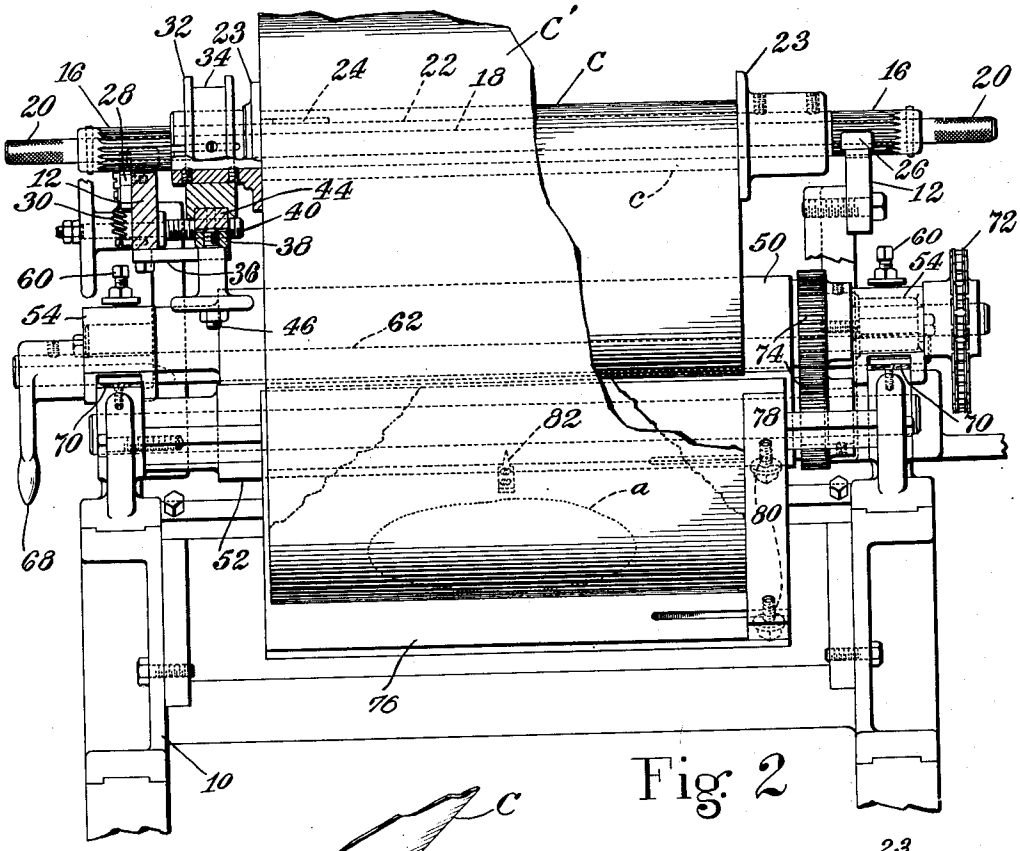


Fig. 2

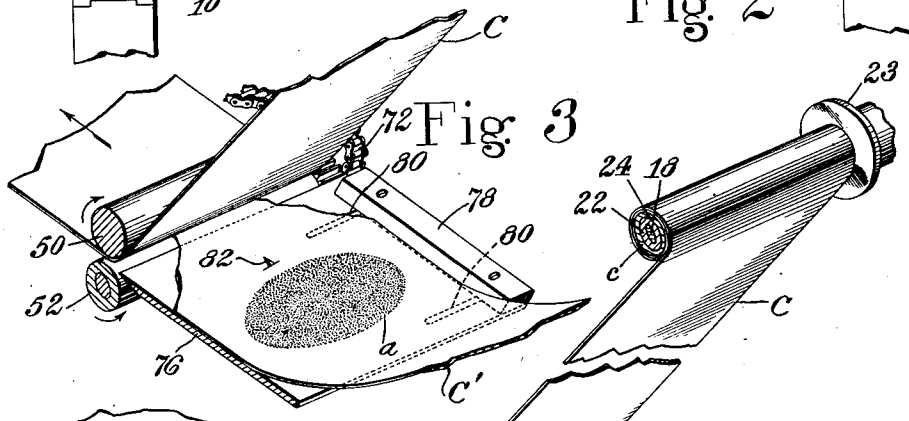


Fig. 3

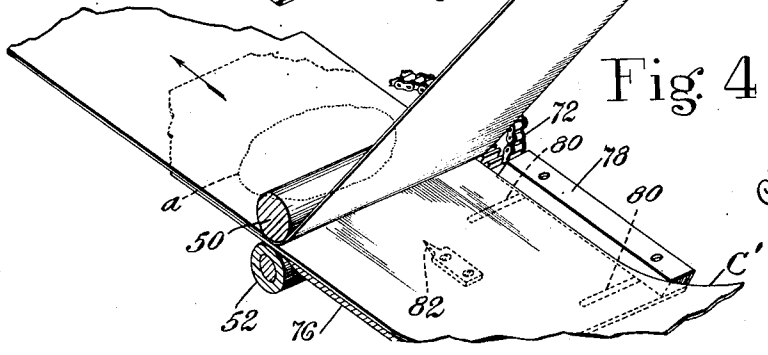


Fig. 4

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Patented Oct. 5, 1937 2,094,896

UNITED STATES PATENT OFFICE

2,094,896

COIL SUPPORTING AND SPLICING MECHANISM

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Application June 4, 1935, Serial No. 24,877

17 Claims. (Cl. 242—58)

This invention relates to means for supporting and splicing such web-material as paper. It may usefully be employed in connection with the cover-paper or liner for box-blanks in such blank-making machines as that of Letters Patent of the United States No. 1,988,451, Knowlton, January 22, 1935.

The above-mentioned machine is of the continuous production type, long webs of shell-, stay-, cover- and liner-material being combined and subjected to successive operations to produce blanks which are discharged from the machine one after another without interruption. To obtain such continuity, it is desirable that not only may the production be unbroken for one coil of any of the blank-materials, but that fresh coils may be introduced into the machine while its operation continues.

It is an object of my invention to support effectively in a blank-making or other machine, both the coil which is being used and that which is to next replace it, and to facilitate the joining of the fresh coil to the exhausting coil while the making of the blanks goes on. With this object in view, the invention provides means, as intermeshing toothed elements, by which one or more supports for coils may be maintained in the desired axial relation at their opposite extremities and two of such coils be readily interchanged, and means whereby said coils may be adjusted transversely of the machine and their rotation retarded to prevent spinning when they are being unwound, this being accomplished by support-shifting and -braking devices, which act upon the supports for both coils. There is further furnished pressure means, preferably in the form of normally separated rolls between which the exhausting coil passes, there being associated with the rolls a table which retains the extremity of the fresh coil in place for the splicing operation and presents it to said rolls. An adjustable edge-gage upon the table insures the correct presentation of the fresh web to the exhausting web. These features of coil-support and -adjustment, and web-presentation and -gaging for splicing are of particular importance in connection with such material as cover-paper and liner for box-blanks, these being so wide that their accurate control is highly desirable.

In the accompanying drawings,

Fig. 1 shows in broken side elevation a particular embodiment of my invention;

Fig. 2 is a broken end elevation, looking from the right in Fig. 1, and

Figs. 3 and 4 are perspective views illustrating successive steps taken in the making of a splice.

At opposite sides of a frame **10** and extending longitudinally thereof are rails **12, 12**, having along their upper edges racks or series of teeth **14**. Meshing with these racks are pinions or toothed rolls **16** secured near the opposite extremities of spindles **18**. Outside the pinions are hand-holds or extensions **20** to facilitate manipulation of the spindles. Surrounding and loose upon each spindle is a sleeve **22** provided with end-flanges **23, 23** and which, by a key **24**, may be made fast to the core *c* of a coil of material, which may be paper to cover or line box-blanks and which is of considerable width. Two of these supports **18, 22** are shown, and the coils of material upon them may be distinguished by designating that at the left (Fig. 1), which is in active use, as C, while the other, which is awaiting substitution for C when this has become nearly exhausted, is C'. Except during the time that the supports are being interchanged, they are held at the opposite extremities of the racks **14**, being retained from displacement outwardly by abutments **26** fixed to the tops of the rails **12** and engaged by the pinions **16**. Inward movement is normally prevented by detents **28, 28** pivoted upon one of the side-rails, and drawn into the path of the pinions by springs **30**. When these detents are displaced by the operator, the coil-supports may be shifted inwardly away from the abutments, the pinions rolling upon the racks. It is to be observed that because of the toothed engagement, the axes of the spindles, and therefore of the coils, may be maintained in their true relation. This is at right angles to the path which the web is to follow, or that of the shell-web with which the paper is to be combined in the blank-making machine.

The longitudinal center lines of the webs C and C' should coincide with that of the shell-web, and to accomplish this, each coil-support may be adjusted transversely of the frame **10**. Fast upon one extremity of each sleeve **22** is a drum **32** in the periphery of which is a groove **34**. Attached to one of the side-rails is a longitudinally extended bracket **36** upon which rests a bar **38** entering the grooves in both drums **32**. Into the bar near its opposite extremities screws **40** are threaded, these screws being mounted to rotate horizontally in one of the side-rails. By turning the screws, the bar **38** may be shifted transversely of the frame, correspondingly moving the coils to produce the desired web-relation. The screws being separated by a considerable space

and each being located close to a vertical through the axis of one of the drums, each coil may be thus positioned without materially affecting the other. With the adjusting bar is combined means for sufficiently resisting the rotation of the coils to prevent them from spinning as they are unwound. In the bar beneath each drum **32** is a recess **42** in which is pivoted a brake member **44** movable in engagement with the inner wall of the drum-groove **34**. To effect this movement, a vertical screw **46** is threaded through the bar beneath each brake member, its end contacting with said member. As illustrated, each screw **46** is shouldered at **48** for engagement with the bottom of the bar **38**, the arrangement being such that, when this engagement is established, the screw will have lifted the brake member sufficiently to take the weight of this end of the coil and its support. This gives the necessary braking effect.

From the coil C, which is in use, the web passes between a pair of pressure-rolls **50**, **52** and then on for the combining operation, it bearing constantly against the upper roll **50**, and being somewhat spaced from the lower bed-roll **52**. To produce this separation while permitting the pressure of the rolls also to be applied to the webs, the roll **50** is shown as journaled in a pair of opposite arms **54**, **54** pivoted upon the frame. Springs **56** interposed between the arms and nuts **58**, surrounding screws **60** rising from the frame, urge the upper roll toward the lower. A shaft **62** is journaled in the opposite arms, and has near its extremities cams each furnished by a circular portion **64** and a flattened portion **66**. To one end of the shaft a hand-lever **68** is attached. When the curved surfaces of the cams bear upon wear-plates **70** fixed to the frame, the roll **50** is raised from the roll **52**, but when the lever is turned to bring the surfaces **66** over the plates, the springs and gravity will move the upper roll into web-feeding relation with the lower. The rolls are rotated in opposite directions to advance the webs which are between them, by sprocket-gearing **72** and spur-gearing **74**.

Situated below the rolls **50** and **52** and extending upwardly into proximity to their bite is a table **76**. The web C′ may be positioned upon this table by an edge-gage **78** extending along one side thereof. To allow this web to be brought into registration with the web C, the edge-gage is adjustable transversely of the table by slot-and-screw connections **80**. The thus-supported web may be retained for its splicing by a prong or projection **82**, inclined forwardly toward the rolls and adapted to puncture the web.

As shown in Fig. 1, the coil C is approaching exhaustion. When it has been nearly all unwound, the operator takes the end of the full coil C′, and positions it upon the table **76** under the guidance of the edge-gage **78** and held in place by the prong **82**, with the forward extremity resting upon the bed-roll **52**. The inclination of the table is such that it directs the fresh web between the rolls smoothly and along a path without abrupt changes, the prong being so inclined upwardly in the same general direction as the table that the weight of the web maintains it in place upon the table, yet allows ready disengagement by an upward pull. An adhesive is applied at *a* to the web upon the table (Fig. 3), and as the end of the web C approaches the rolls, the operator throws down the lever **68** so the cam-surfaces **66** will permit the springs **56** to lower the roll **50** (Fig. 4). This causes the end of the web C′ to travel forward with web C, drawing the former free from the prong **82**. When the coated area *a* reaches the web C, it is pressed against it by the rolls to complete the connection. Now, the forward detent **28** may be lowered to free the spindle **18** of the coil C and said spindle and its sleeve removed. A similar lowering of the rear detent allows the entire support of the coil C′, with said coil, to be rolled forward along the racks **14** and to be secured in the place left by the removal of the empty support. This may be done without interrupting the web-delivery, and, because of the toothed engagement, the angular relation of the support remains always the same. Finally, the removed support, with a fresh coil C′ upon it, is mounted at the rear of the machine ready for the succeeding change. During all the operations, by the adjustments of the coil by the screws **40** and of the coil-end by the edge-gage **78**, there may be effected and maintained the proper transverse relation of the two webs with respect to each other and to the other webs of blank-material.

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

1. The combination with a frame provided with toothed portions, of a spindle having a toothed roll meshing with each of the toothed portions of the frame, and a sleeve rotatable about the spindle and adapted to receive a coil of web-material.

2. The combination with a frame provided with toothed portions, of a spindle having a toothed roll meshing with each of the toothed portions of the frame, a sleeve rotatable about the spindle and adapted to receive a coil of web-material, stop-abutments secured to the frame at the opposite ends of the toothed portions, and detents movable upon the frame into and out of the path of the toothed rolls at their inner sides.

3. The combination with a frame, of opposite side-rails supported thereon and provided with toothed upper edges, a spindle having a toothed roll meshing with each of the toothed edges of the side-rails, a sleeve rotatable about the spindle and adapted to receive a coil of web-material, and means arranged to shift the sleeve longitudinally of the spindle.

4. The combination with a frame, of opposite side-rails supported thereon and provided with toothed upper edges, a spindle having a toothed roll meshing with each of the toothed edges of the side-rails, a sleeve rotatable about the spindle and adapted to receive a coil of web-material, means arranged to shift the sleeve longitudinally of the spindle, and a brake for the sleeve carried by said means.

5. The combination with a frame, of opposite side-rails supported thereon and provided with toothed upper edges, two spindles having toothed rolls meshing with each of the toothed edges of the side-rails, a sleeve rotatable about each spindle and adapted to receive a coil of web-material, and means for releasably retaining the spindles and their sleeves at the opposite extremities of the rails.

6. The combination with a frame, of a movable coil-support, an adjusting member movable transversely of the frame and contacting with the coil-support to impart movement to it, and a brake for the coil, said brake being mounted upon the adjusting member.

7. The combination with a frame, of a spindle

extending transversely of the frame and being movable longitudinally thereof, a sleeve movable upon the spindle and adapted to receive a coil of web-material, and an adjusting member movable transversely of the frame and acting upon the sleeve to shift it longitudinally of the spindle.

8. The combination with a frame, of a spindle extending transversely thereof, a sleeve movable upon the spindle and adapted to receive a coil of web-material, an adjusting member movable transversely of the frame and acting upon the sleeve to shift it longitudinally of the spindle, and a brake carried by the adjusting member and acting upon the sleeve.

9. The combination with a frame, of opposite side-rails supported thereon and provided with toothed upper edges, a spindle having a toothed roll meshing with each of the toothed edges of the side-rails, a sleeve rotatable about the spindle and adapted to receive a coil of web-material, a grooved drum fixed to the sleeve, a member guided for movement transversely of the frame and entering the drum-groove, and means arranged to move the member.

10. The combination with a frame, of opposite side-rails supported thereon and provided with toothed upper edges, a spindle having a toothed roll meshing with each of the toothed edges of the side-rails, a sleeve rotatable about the spindle and adapted to receive a coil of web-material, a grooved drum fixed to the sleeve, a member guided for movement transversely of the frame and entering the drum-groove, and a screw rotatable in the frame and threaded through the member.

11. The combination with a frame, of opposite side-rails supported thereon and provided with toothed upper edges, a spindle having a toothed roll meshing with each of the toothed edges of the side-rails, a sleeve rotatable about the spindle and adapted to receive a coil of web-material, a grooved drum fixed to the sleeve, a member guided for movement transversely of the frame and entering the drum-groove, means arranged to move the member, and a brake movable upon the member within the drum-groove.

12. The combination with a frame, of opposite side-rails supported thereon and provided with toothed upper edges, a spindle having a toothed roll meshing with each of the toothed edges of the side-rails, a sleeve rotatable about the spindle and adapted to receive a coil of web-material, a grooved drum fixed to the sleeve, a member guided for movement transversely of the frame and entering the drum-groove, means arranged to move the member, a brake movable upon the member within the drum-groove, and a screw threaded through the member and engaging the brake.

13. The combination with a frame, of two spindles extending transversely of the frame and spaced from each other longitudinally thereof, a sleeve rotatable about each spindle and adapted to receive a coil of web-material, a grooved drum fixed to each sleeve, a bar guided for movement transversely of the frame and entering both drum-grooves, and means acting near opposite extremities of the bar to move it.

14. The combination with a frame, of two spindles extending transversely of the frame and spaced from each other longitudinally thereof, a sleeve rotatable about each spindle and adapted to receive a coil of web-material, a grooved drum fixed to each sleeve, a bar guided for movement transversely of the frame and entering both drum-grooves, means acting near opposite extremities of the bar to move it, and a brake for each of said drums, each of said brakes being movable upon the bar.

15. The combination with a frame, of two coil-supports interchangeable in position thereon, pressure means through which the web from one of the supported coils passes as it is uncoiled, means for releasably holding the pressure means normally in condition to receive the webs, and a table provided with means for retaining the end of the web carried by the other support and presenting it to the pressure means, the table being upwardly inclined in the general direction of the rising portion of the loop of web between said other support and the table and the retaining means situated upon the table rearwardly from the pressure means and being adapted to hold the web against downward displacement over the inclined surface.

16. The combination with a frame, of two coil-supports interchangeable in position thereon, a bed-roll over which the web from one of the supported coils passes as it is uncoiled, a pressure-roll co-operating with the bed-roll upon the opposite side of the web, a cam-lever for holding the pressure-roll normally separated from the bed-roll, and a table extending into proximity to the bite of the rolls and provided rearwardly of said rolls with a prong inclined toward the rolls and penetrating and temporarily retaining the web from the other support.

17. The combination with a frame, of two coil-supports interchangeable in position thereon, a pair of co-operating pressure-rolls between which the web from one of the supported coils passes as it is uncoiled, means for releasably holding the rolls normally separated from each other, a table extending into proximity to the bite of the rolls and provided rearwardly of said rolls with means for retaining the end of the web carried by the other support upon the table and presenting it between the rolls, and an edge-gage adjustable transversely of the table.

CUTLER D. KNOWLTON.