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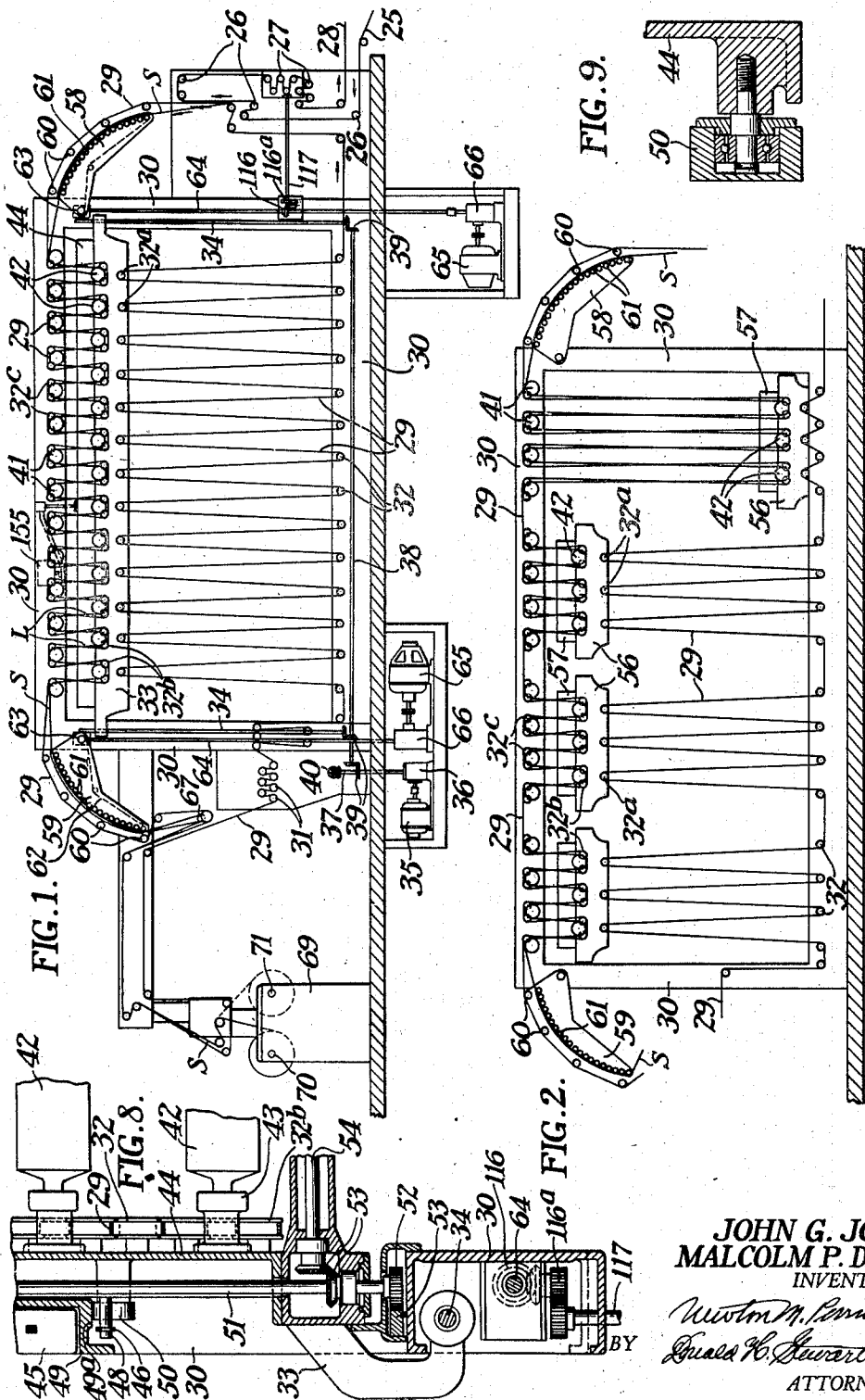
J. G. JONES ET AL

2,253,076

STRIP MATERIAL TAKE-UP

Filed Oct. 28, 1939

6 Sheets-Sheet 1



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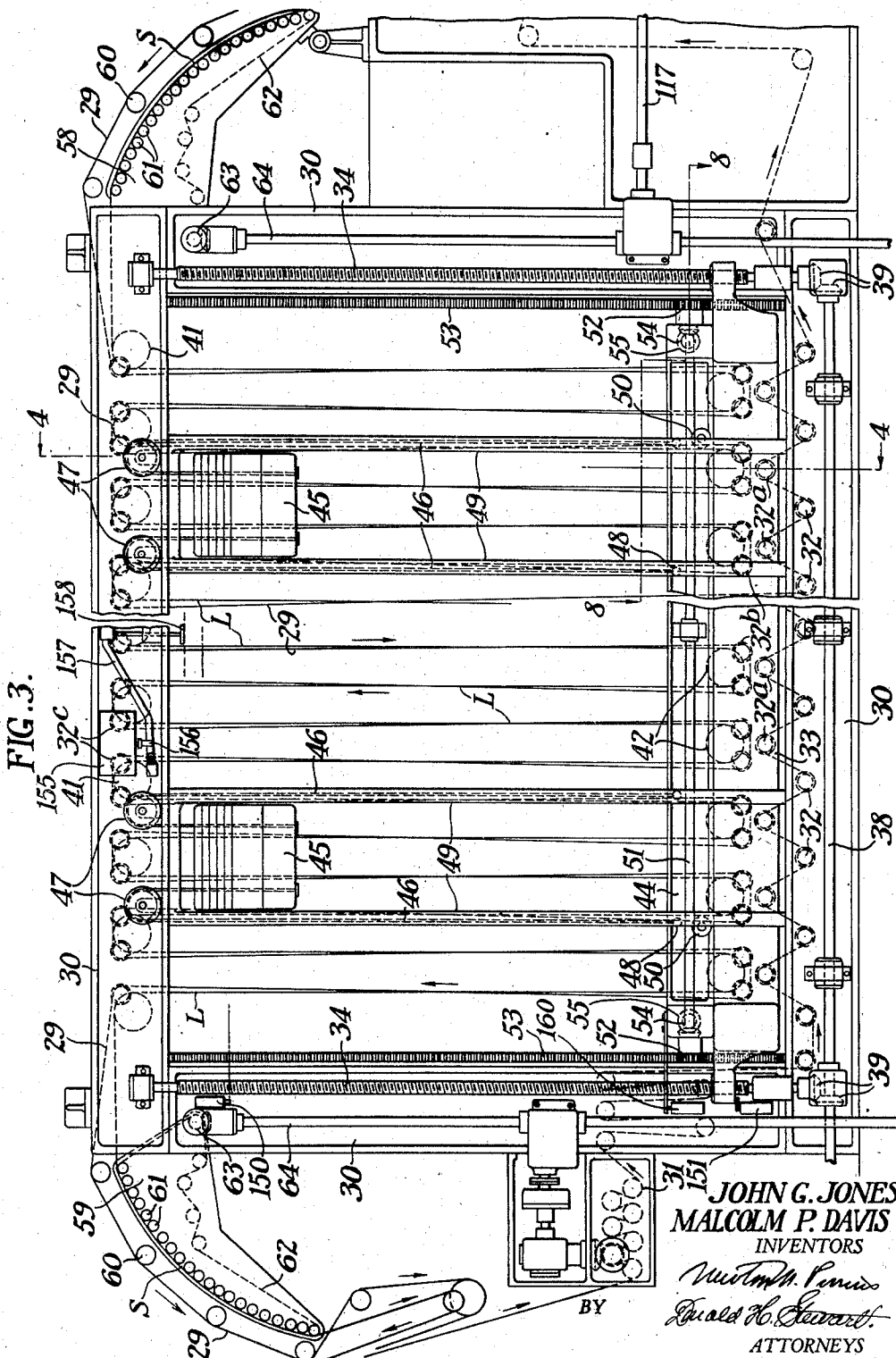
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STRIP MATERIAL TAKE-UP

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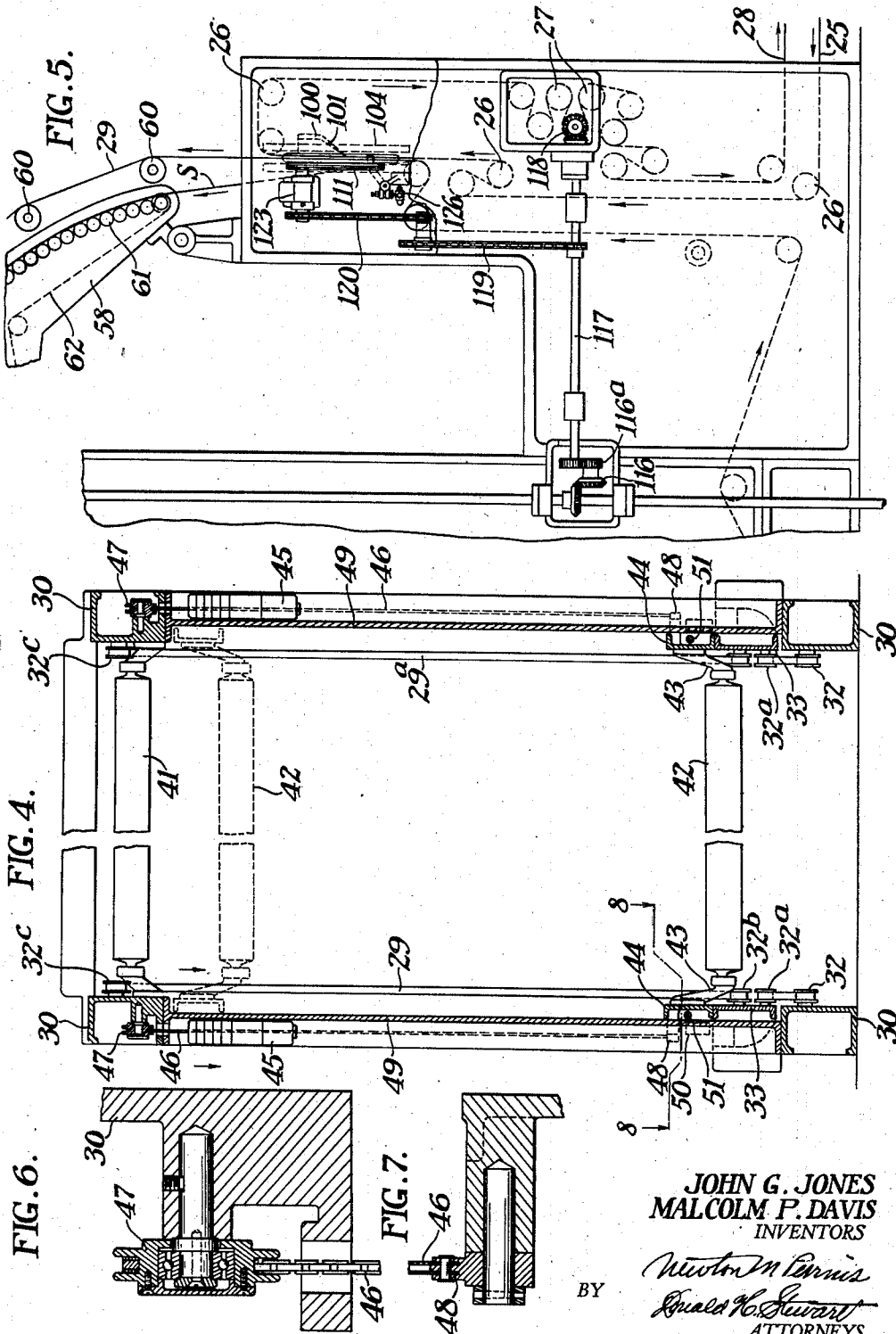
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STRIP MATERIAL TAKE-UP

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6 Sheets-Sheet 3



Aug. 19, 1941.

J. G. JONES ET AL
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2,253,076

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FIG. 13.

FIG. 14.

FIG. 15.

FIG. 16.

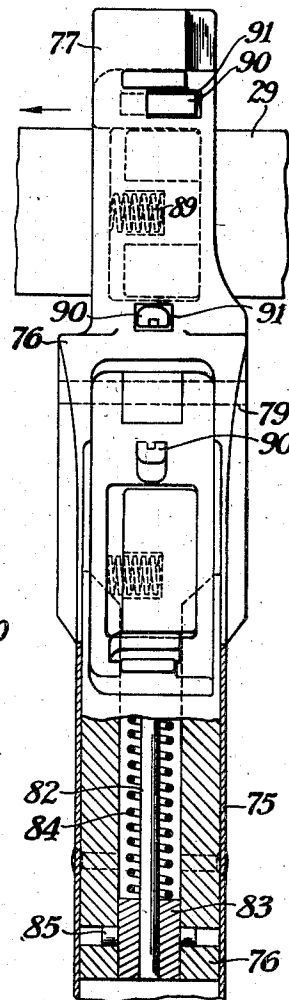
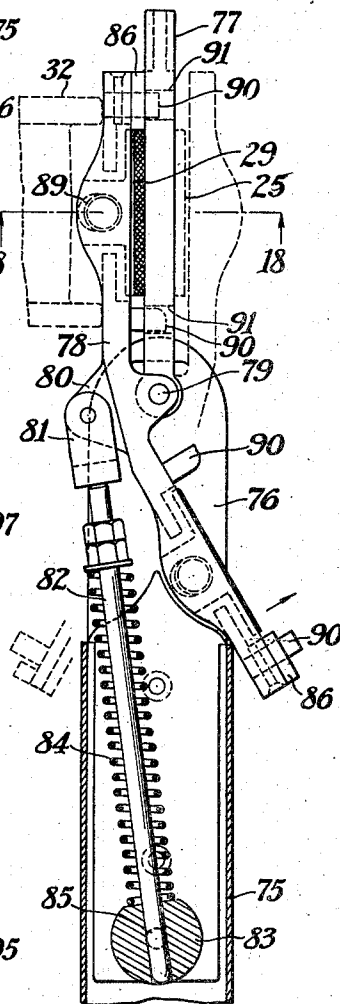
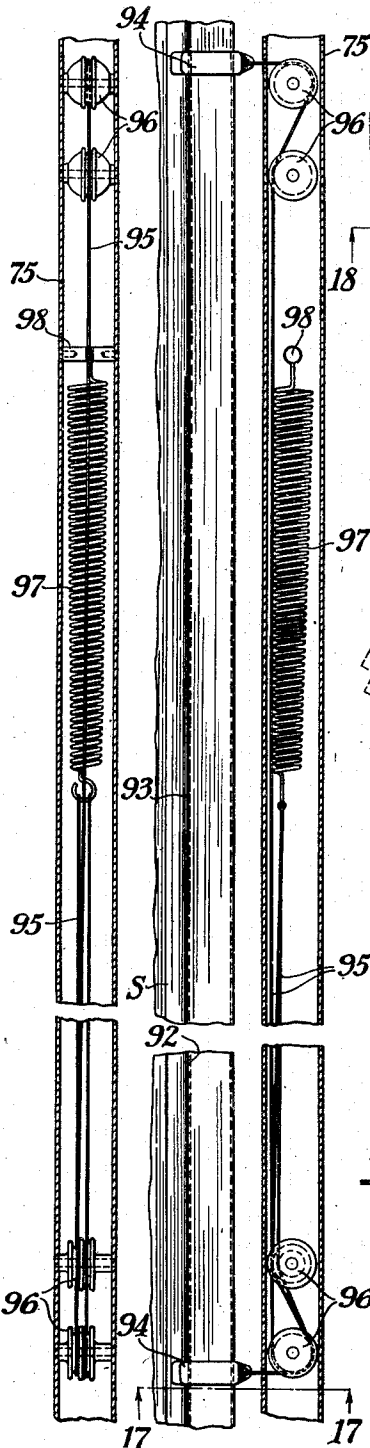
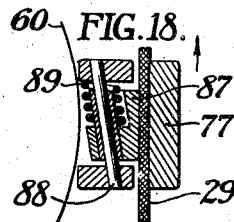
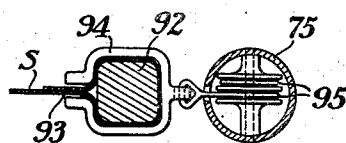


FIG. 17.



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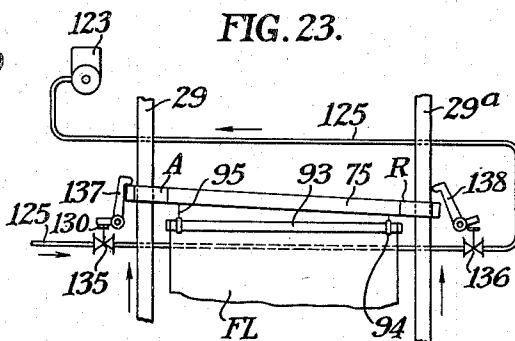
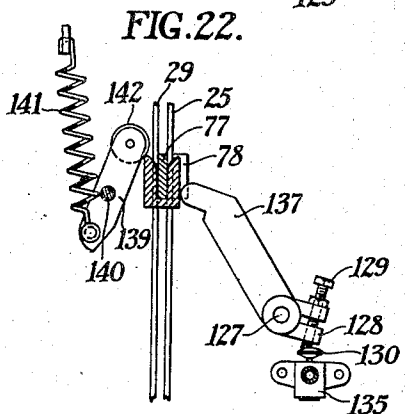
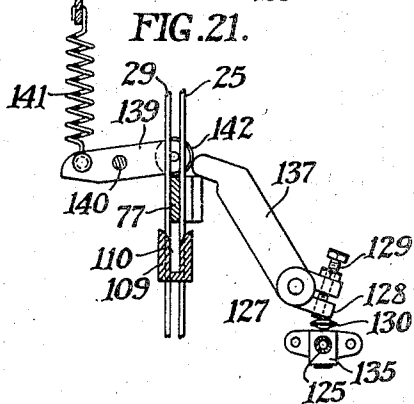
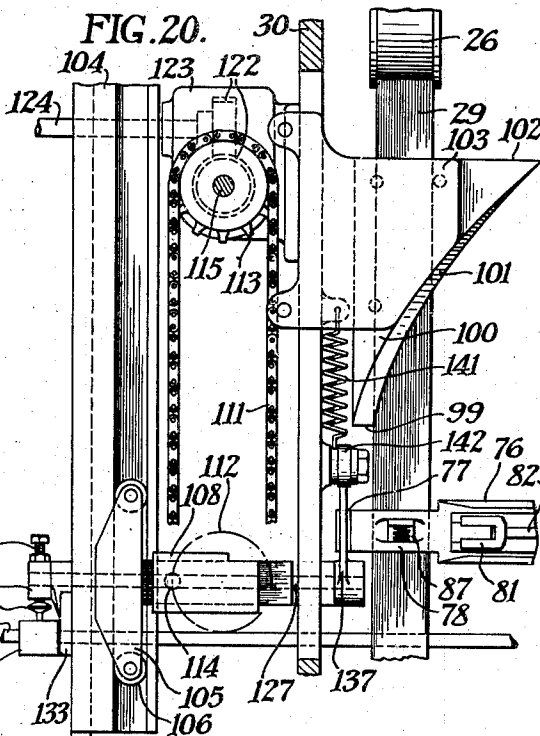
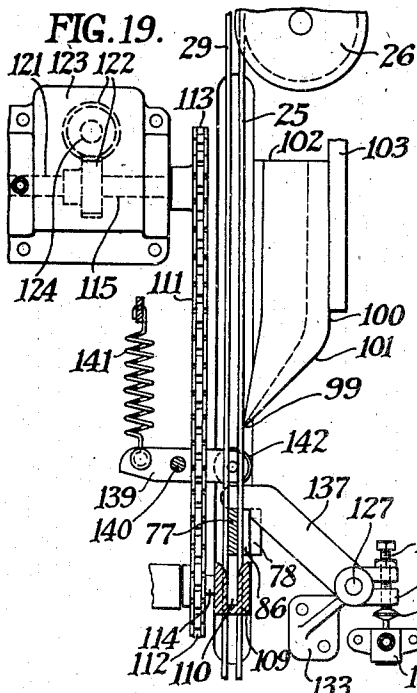
J. G. JONES ET AL

2,253,076

STRIP MATERIAL TAKE-UP

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6 Sheets-Sheet 5



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2,253,076

STRIP MATERIAL TAKE-UP

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Application October 28, 1939, Serial No. 301,855

20 Claims. (Cl. 271-2.1)

This invention relates to machines for handling strip material, and more particularly to takeup and transfer mechanisms whereby a continuous strip of flexible material such as film, paper or fabric may be moved into and through various sections of a machine for treating such a strip, such as coating, drying, inspecting, etc.

In machines and apparatus of the class described, it is usually required that the strip of material be kept moving continuously through a coating station, a drying chamber, calendar rolls or other treating apparatus. Material in such strip form is usually fed into the machine from a supply roll and is "wound up" or removed on another roll. When the supply roll is exhausted, some time is required to remove the core thereof and substitute a new supply roll of material, therefore a surplus must be arranged within the machine near the input end that may be drawn on during the change-over to a full or new roll. Conversely, means must be provided for "taking up" the strip near the output end, building up a surplus that may be drawn out when a new "winding" core is placed to receive it and the full roll is removed. In either case there is no interruption to the movement of the strip through the various treating stages.

It is an object of this invention to provide a construction applicable to either an input (supply) end of a coater, dryer, etc., or to the output (winding) end thereof, which will be positive in action, readily adjustable, and of comparatively simple design. It is a further object to provide also an automatic "threading" device which will eliminate the tedious and difficult method of manually guiding the incoming end of a strip of material over the various rolls and spools in successive sections of a machine. The threading device in the present invention is also provided with means whereby the incoming end of the strip may be transferred automatically from one section of a machine to another, without attention from an operator, to advance the strip from a drying section to a "take-up" section, for instance. Other objects and advantages of the invention will appear from the following specification, when read with reference to the accompanying drawings, in which like reference characters designate like parts throughout, and in which:

Fig. 1 is a diagrammatic longitudinal elevation of a take-up and wind-up section of a strip material handling machine constructed in ac-

cordance with a preferred embodiment of our invention;

Fig. 2 is a part of a similar view, wholly diagrammatic, of a modified form of the apparatus shown in Fig. 1 and illustrative of another embodiment of our invention;

Fig. 3 is a larger-scale exterior elevation of the take-up mechanism;

Fig. 4 is a transverse sectional elevation on line 4-4 of Fig. 3;

Fig. 5 is a partial exterior view, showing part of the machine which would appear if Fig. 3 were extended toward the right;

Figs. 6 and 7 are fragmentary portions of Fig. 4, enlarged;

Fig. 8 is a portion, in top plan, of one side of the take-up section, taken on line 8-8 of Figs. 3 and 4;

Fig. 9 is an enlarged fragmentary section of a guide roller and its mounting;

Fig. 10 is an elevation, partly in section, showing a portion of the area covered by Fig. 5, and enlarged;

Fig. 11 is an elevation looking from the right side of Fig. 10;

Fig. 12 is a plan in section, on line 12-12 of Fig. 10;

Figs. 13 and 14 are fragmentary axial sections of the strip transfer device or lead bar;

Figs. 15 and 16 are plan and elevation views of the clamping jaws at one end of the lead bar;

Fig. 17 is a section on 17-17 of Fig. 14;

Fig. 18 is a detail in section on line 18-18 of Fig. 15;

Figs. 19 and 20 are views similar to Figs. 10 and 11, respectively, showing a modification of the transfer mechanism;

Figs. 21 and 22 are views of a detail shown in Fig. 19, the parts being in two different positions; and Fig. 23 is a diagrammatic cross section of the transfer mechanism showing the condition of the parts prior to the equalizing action.

In the machine illustrated herewith there are spaced side frames between which the web, or strip S of film, paper or fabric may be moved for threading by means of endless belts, the latter being guided and driven on flanged pulleys or rollers within and close to the side frames. A plurality of rollers support the strip material in a long path, the material being looped as at L about the rollers. A transfer device or "lead-bar" of particular design, as hereinafter described, is adapted to grip these belts and to

travel with them through the machine and to lead the advancing end of the strip material through approximately the path followed by the belts. The belts within a drying or air section of the machine, (not illustrated) may follow the conventional series of loops, and when these belts, indicated at 25 in Fig. 1, emerge from the dryer they may pass over idler pulleys 26 and a driven pulley cluster 27 and then return to the dryer at 28. It is to be understood that these belts are endless, and are identical on opposite sides of the machine.

In the take-up section of the machine, illustrated diagrammatically in Fig. 1, endless belts 29 and 29a adjacent the side frames 30 are moved by a drive cluster 31 and travel continuously over a series of idler pulleys 32 on the bottom rails of the frames 30 and over others, 32a near the lower edges of elevators 33. The latter are adapted to be moved by vertical feed screws 34 from an upper position as in Fig. 1 to a lowered position near the bottom of the machine as in Fig. 3.

In Fig. 1 the elevator 33 is shown in its upper position, but on the take-up or final section of the machine which is illustrated herewith the elevator is normally at the lower limit of its travel as in Fig. 3, and is only raised when a new length of strip material is to be "threaded" through by means of the lead-bar.

The elevator 33 is power operated by a motor 35, which, through reduction gearing 36, shafts 37 and 38, miter gears 39 and a transverse shaft 40 will turn feed screws 34 on both sides of the machine in unison, thereby also maintaining the elevator level during its movement. Limit switches 150 and 151 at the upper and lower extremes respectively of the elevator movement are adapted to be operated when contacted by the elevator and will thereby stop motor 35 whenever the elevator is raised or lowered beyond a predetermined point.

When the elevators 33 are in the upper position the upper runs of belts 29 and 29a pass over flanged idlers 32b, arranged in pairs near the tops of the elevators, and also over idlers 32c on the top rails of the machine frames 30. Centered on these pairs of idlers are two series of freely revoluble rollers, adapted to carry the strip material S, one set 41 being pintled in the upper rails of the machine frames 30 and the other series 42 being revoluble in brackets 43 that project inwardly from a floating roll frame or take-up members 44 co-extensive with the elevator 33. This floating frame is partially counter-balanced by weights 45, so that it has only a moderate downward pull on the loops L of the strip material. The weights are made in sections as shown in Figs. 3 and 4 so as to be variable, and are attached to the floating frame 44 by chains or cables 46 that run over sheaves 47 on the top frame rails 30 and are anchored to the frame 44 at 48. (Figs. 6 and 7.) Vertical guide members 49 of channel section (Fig. 8) restrict any tendency of the weights 45 to oscillate, and these guides also provide vertical rails 49a on which guide wheels 50 may run, to restrain the floating frames 44 against longitudinal movement.

In order to assure absolutely parallel and coincident vertical travel of the take-up member 44, shafts 51 are carried in suitable bearings on said member and are provided at their extremities with pinions 52 that mesh with vertical racks 53 extending between the upper and lower rails

of the frames 30. Transverse shafts 54 connect the shafts 51 through miter gears 55. When the machine is assembled, the frame 44 is carefully leveled and the racks 53 are adjusted to the gears 52 and are then firmly attached to the upright end members of the machine frames 30 (Fig. 8). Thereafter, any vertical movement of the take-up member 44 will result in an even and uniform pull on all the loops L of strip material and will not tend to crowd the strip material to one side or the other.

In Fig. 2 is shown, diagrammatically, a modified form of take-up in which the elevator is divided into a number of short sections 56 and corresponding take-up members 57. Each of these short elevators would, in such case, be operated by its individual feed screw (not shown) with separate controls, so that the operator could provide for taking up any quantity of the strip required, by lowering one or more of the short elevator sections.

During the downward movement of the elevator 33 the endless belts 29 and 29a are also drawn into loops. The relative movement of idlers 32a with respect to idlers 32 on the bottom rail of frame 30 compensates for the relative movement of idlers 32b and 32c, therefore the tension of the belts is undisturbed in any position of the elevator.

As above mentioned, the elevator 33 is normally at the bottom of its travel as in Fig. 3. The take-up member 44 is supported on short loops of the strip material, and is held up by the tension of the strip near its uppermost limit of movement. Means, later to be described, are provided whereby an increasing tension on the strip slows its movement and a decreasing tension speeds it up, so that long loops L will be drawn down for a take-up reserve only if the feed mechanism which is pulling the strip along is stopped.

When the strip has entirely filled the wind-up roll and it becomes necessary to change over to a new core, the operator stops the winding mechanism. The strip continues to be fed in by the mechanism on the "un-winding" or input end. Immediately, the floating take-up 44 overcomes the weights 45 and moves downwardly, drawing out the loops L to provide a surplus of strip material which must be taken up after the end which the operator has cut off is attached to the new core. The time required to draw out all the loops and permit the frame 44 to reach the elevator (which is already down) is more than sufficient to permit the operator to attach the strip to the new core.

The strip material is fed into the take-up section and out to the winding core over "suction arches" 58 and 59 respectively, which are driven through shafts 64 and cross shafts 63 by motors 65. Belts 62 drive the arch rolls 61 while the belts 29 and 29a run over pulleys 60. These suction arches are fully shown and described in the patent to J. G. Jones, No. 1,560,579, dated Nov. 10, 1925.

The strip material S which is brought into the take-up section in a manner later to be described, after traversing the suction arch 29 is led over a tension roll 67 and thence to the windup stand 69. Two or more core spindles 70 and 71 are arranged to be separately driven by means not shown, so that when one is nearly full the suction arch 59 may be stopped as previously described, permitting the floating frame 44 to draw out the loops L from the incoming strip S while the full roll of material on spindle 70

is removed and the cut-off end of the strip is attached to the empty core at 71. During normal winding the speed of suction arch 59 is varied by automatic means in accordance with the position of take-up frame 44. In the present instance a "carbon pile" type of rheostat 155 (Fig. 3) is mounted on the machine frame 30 and its plunger 156 is arranged to be actuated by a lever 157 whenever the frame 44, nearing the top of its travel, lifts a pad 158. The carbon pile device then reduces the current fed to motor 65 and the arch 59 slows down. Immediately the frame 44 drops and begins to draw out loops L. When the frame drops a predetermined amount, the pad 158 having followed it and the lever 157 having permitted the plunger of the device 155 to emerge again, the amount of current through motor 65 is increased and the arch 59 speeds up, thus raising the frame 44 through the increased tension on the strip. A fine degree of control is maintained by the use of the carbon pile rheostat, so that a state of balance is achieved in which the frame 44 fluctuates but a fraction of an inch during normal operation, as long as the input of material continues at a uniform rate.

Manual control for the motor 65 is also provided, but is not shown in detail in the drawings.

The mechanism whereby the incoming end of the strip is fed through the take-up section and along to the wind-up core is illustrated in Figs. 10 to 18. As previously described, the belts 29 travel in unison close to the inside of the frames 30 and are endless. Similar belts in a drying section or in any other auxiliary strip treating division of a machine may be arranged in like manner. To advance the "lead" end of a strip a "lead-bar" is provided to which the end of the strip is attached, and this bar has grippers which clamp it to the traveling belts. Means are arranged at the input end of each machine section for disconnecting the lead bar or unclamping it from one set of belts and clamping it onto the succeeding belt, all without any attention from the operator, so that the strip S may progress uninterruptedly through the entire machine.

The lead bar is constructed of a tubular member 75, in the ends of which are fastened slotted castings 76. Each of the latter (Figs. 15 and 16), has a terminal tongue 77 located on the center line of the tube 75 and flat on both sides. A duplex clamp member or jaw 78 is pivoted at 79 and is adapted to be flipped to the position shown in full lines in Fig. 15, where the belt 29 is held between the part 77 and one end of the member 78, from the position indicated in broken lines, where the belt 25 coming from another section of the machine is held between the tongue 77 and the other end of member 78.

An ear 80 on the back of clamp 78 is pivotally connected with a clevis 81 on the outer end of a push rod 82. The free end of the push rod is guided in a block 83, trunnioned at 85 in the casting 76. A spring 84 based on the block 83 constantly presses the clevis 81 toward the ear 80 and thus forces one end of the clamp 78 toward belt 29. The clamp may be disengaged and swung about the pivot 79 by mechanism later to be described, and when the neutral point of this movement has been reached, i. e., when both ends of the clamp are "winged out" at a right angle to the axis of the tube 75, a very slight further movement permits the spring 84 to snap the other

end of the clamp toward the belt, as in the broken lines, Fig. 15.

The clamp jaws 78 do not themselves actually grip the belt, but are positively brought to a stop by a block 86 that contacts the tongue 77, and which is of such a thickness that the faces of the jaws are held about $\frac{1}{4}$ inch from the belt surface. The actual gripping is accomplished by a pressure pad 87 which is slidably mounted on an inclined pin 88 (Fig. 18) and is urged along the pin by a spring 89. The purpose of the inclined mounting is to compensate for inequalities, humps or thicker spots in the belts, and to permit a slight slippage of the lead bar as these conditions occur, and to assure that the two clamp members on opposite ends of tube 75 will grip the belts with equal force. Lugs 90 on the inner faces of jaws 78 enter mating apertures 91 in the tongue 77 and establish a "frame" outside of both edges of belts 29 so that the lead bar cannot move transversely of the machine.

The lead bar 75 itself does not engage the incoming end of the strip material S, but carries an auxiliary "stick" 92, preferably of wood, and substantially square in cross section, around which the operator wraps the starting end of the strip as at 93 in Fig. 17. Square retaining members 94 with open ends are then slipped over the wrapped end 93 to retain its grip on the stick 92. From the retainers 94 cables 95 extend within the tube 75 and pass over sheaves 96, the inner ends of the cables being attached to a spring 97 anchored at 98. The arrangement of the cables is such that any pull of the strip S on the stick 92, whether or not it is uniform through its entire width, will be equalized and will result in a uniform stress on each of the belts 29, or, conversely, any inequalities in the resistance met by the lead bar in passing over the pulleys will not result in a distorted or angular stress on the strip, but will permit the latter to be pulled straight through the machine without tending to become cramped or wrinkled.

The stick-and-cable arrangement has another and important function, viz., to permit the strip of material S to follow the path around the rollers 41 and 42, while the lead-bar 75 travels a different path with belts 29 and 29a, over idlers 32, 32a and 32b. As these paths are not coincident, some flexible compensation must be provided, and the spring 97 accomplishes this purpose, permitting the stick 92 to move from and toward the bar 75 at each turn around the rolls and pulleys.

With the jaws 78 closed correspondingly on both ends of the lead bar 75, and the pressure pads 89 gripping the belts 29 and 29a, the lead bar moves with the belt and the back faces of the jaws 78 as indicated in Fig. 15 ride over the flanges of the idler pulleys 32c and 32b, while the stick 92 trails slightly behind and carries the strip material F over the rolls 41 and 42. In succession, the bar 75 and the stick 92 pass over the suction arch 59, thence to the wind-up station at 70 or 71.

The manner in which the transfer of the lead bar 75 and stick 92 from belts 29 to belts 29 is accomplished is best shown in Figs. 10, 11 and 12, and will now be described. Assume that the lead bar is clamped to belts 25 and has progressed past the lower idlers 26 that are adjacent the driven pulleys 27 (Figs. 1 and 5). It will be noted that above these idlers the belts 25 and 29 are parallel for a short distance and are close together, be-

ing spaced slightly more than the thickness of the tongue 77.

Practically touching the belt 25 is the sharp lower edge 99 of a cam member 100 (Fig. 10) that has an inwardly curved edge 101 terminating in a flat top 102, and supported on a fixed bracket 103. If now the lead stick can continue to move with the belts 29 and the edge 99 enters between the closed jaws 78 and the belts 25 (cams 100 are duplicated on opposite sides of the machine), the jaws 78 will be swung past the neutral point and the springs 84 will snap the jaws to the other extreme of their movement, causing the pads 87 to grip the belts 29 and travel therewith. Obviously, however, the moment the jaws 78 are pried away from the belts 25 by the points 99 of the cams 100, they will lose their grip on the belts and the lead bar would fall unless otherwise supported. Therefore, mechanism is provided which will catch, hold, and move the lead bar during the time the jaws 78 are being reversed by the cam 100. As considerable power is required to reverse the clamp jaws 78 against the pressure of spring 84, the mechanism for forcing the lead bar against and past the cam 100 must be positive and rugged. Similar mechanism is employed between any two adjacent treating sections of the machine where the carrying belts return. The mechanism above mentioned is constructed as follows:

Suitably supported on the frame 30 are parallel grooved bars 104 (Fig. 11), between which a carrier member 105 is guided in a vertical path by rollers 106. Extending toward the belt 25 from this carrier is a stake 107 on which is mounted a hollow rectangular "lifter" member 108, so as to be slidable toward or away from the belt. A portion 109 of the lifter has its top removed, so that a channel-shaped pocket 110 protrudes, as clearly shown in Fig. 10, adapted to engage the tongue 77.

Adjacent the lifter member 108 is a chain 111, running over sprockets 112 and 113, the latter being driven intermittently. A pin 114 connects the chain with the lifter member 108. If now the chain is moved as indicated by the arrows in Fig. 11, the lifter 108 will travel in and up, and then out and down, and the carrier 105 also will move up and down as permitted by the guide rollers 106, during one complete circuit of the chain 111.

The sprocket 113 is on a shaft 115 that is arranged to be so driven that the chain 111 will make one complete cycle and then stop, that is, the pin 114 will start from the position shown in Fig. 11, pass around the lower sprocket 112 and up the inner run of the chain, over the sprocket 113 and then will stop on its downward movement with the outer run of the chain, at the point where it started. The lifter member 108, by reason of its connection to the chain by pin 114, must describe a path having the form of the chain, whereas the carrier 105 is confined to a vertical path by the rollers 106 in the grooved bars 104. Therefore the lifter first moves down, then inwardly, then up to engage the lead bar. The pocket 110 receives the end of the lead bar tongue 77, and just as the cam edge 99 pries the jaw 78 and pressure pad 87 away from the belt 25, the tongue 77 is caught in the pocket 110 and the lead bar is moved upwardly. As it moves, the cam 100 reverses the jaw clamp 78 as previously described, and the opposite end of the clamp snaps onto belt 29, pinching the latter between the tongue 77 and the pressure pad 87. Simul-

taneously, the lifter 108 is retracted by the movement of pin 114 over the top of sprocket 113, and the lead stick then progresses on belts 29, up over suction arch 58, carrying with it the strip by means of the stick 92. The strip material meets the suction arch rolls 61 while the belts 29 and the lead bar are above it. The pin 114 and the lifter 108 then return to their starting points and stop.

The intermittent movement of the chain 111 as above described is accomplished in the following manner: The shaft 64 that drives the suction arch 58 is connected through miter gears 116 and spur gears 116a with a horizontal shaft 117 (Fig. 5), that extends to the drive cluster of pulleys 27 and drives the latter through gears 118. Shaft 117, through chains 119 and 120, positively and constantly drives a shaft 121 concentric with shaft 115, and through spiral bevel gears 122 in a casing 123 drives a cross shaft 124 which is similarly connected to a shaft and chain assembly like 115 and 111 on the opposite side of the machine, and not shown in the drawings. A clutch and detent in casing 123 are arranged to engage the shaft 115 upon the momentary application of compressed air and to stop the shaft at a predetermined point, viz., at the end of one cycle of the chain 111. As this is a commercial device of wide application and in common use, it is not illustrated in detail. An air line 125 provides air to the clutch device and the admission of air is controlled to actuate the device through a stop-clock 126, in accordance with the position of the lead bar.

A shaft 127 supported in brackets 133 on the frame 30 has at its outer end a presser arm 128 provided with an adjustable set-screw 129 that contacts and depresses the button 130 when the shaft is turned a few degrees in the direction indicated in Fig. 10. To depress the button 130 at the correct time, an arm 131 on the inner end of shaft 127 is of such a length that as the tongue 77 of the lead bar 75 strikes it, the arm will move from the lower position to the upper position (Fig. 10) and will hold the button 130 depressed only as long as the tongue 77 is passing the end of the arm 131. A spring within the cock 126 immediately thereafter elevates the button 130 and closes the cock, restoring the arm 131 to the lower position. This single "shot" of air is all that is required to release the mechanism in casing 123 whereby the chain 111 is removed through one complete cycle.

In Figs. 19 to 23 mechanism is shown in which means are provided for levelling or squaring the lead-bar 75 if it should become misaligned or biased because of irregular or unequalized action of the belts 29 on opposite sides of the machine or because of any slippage of one end of the bar on the belts.

The principal difference between the arrangement previously described and that shown diagrammatically in Fig. 23 is that in the latter there are two air cocks, 135 and 136, in a single air line, each cock operable by an arm adapted to be moved by one end of the lead bar. If one end of the bar is in advance of the other, as indicated at A, one air cock, for instance 135, will be opened but as the second cock 136 cannot be opened to operate the clutch device until the other end R of the bar "catches up" to it (the first end being held by means to be described) it is obvious that the bar will be leveled before it can be caught up by the lifter 108.

Referring to Figs. 19 and 20, it will be seen

that the mechanism here illustrated is similar to Figs. 10 and 11, and identical parts in all these figures have corresponding reference numerals. The arm 137 however extends somewhat further over the tongue 77, and is in contact with a lever 139, pivoted at 140, and urged in a clockwise direction about the pivot by a spring 141. A suitable stop, not shown, prevents the spring 141 from moving the lever further than its position in Fig. 19.

When the end of the bar 75 that is in the lead (the left end in Fig. 23) strikes the arm 137, it causes the button 130 to be depressed by the arm 128 and thus opens the air cock 135, but air cannot flow to the clutch device 123 because cock 136 is still closed. The tongue 77 strikes the roller 142 and swings the arm 137, against the resistance of spring 141, to the position of Fig. 21. At this point the resistance of spring 141 overcomes the grip of pad 87, and the belt 29 slips, the belt 29a on the opposite side of the machine meanwhile continuing to carry the end R of the bar 75 along. This end of the bar (the tongue 77) raises the arm 138 and air cock 136 is operated, permitting air to flow to the clutch device 123. The latter then drives the chain 111 and the lifters 108 immediately engage both tongues 77 and the bar 75, now level, is carried upwardly. As the bar 75 and the lifters 108 move further, the arms 137 and 138 and the lever 139 are pushed aside to the positions shown in Fig. 22, and return to their normal positions as soon as the bar and lifter have passed them.

When the end of a "run" of strip material is reached, or when it is desired to withdraw all of the strip so that the machine may be cleaned, adjusted or inspected, the "tail end" of the strip enters the taking section and passes off from one after the other of the rollers 41 and 42. Eventually the frame 44, having no more loops of the strip material to support it, sinks to the bottom of its travel and comes to rest on the top of the elevator 33. A gravity-operated brake, not shown in the drawings, prevents the frame 44 from dropping too rapidly. When the frame 44 nears its lower limit a lug on the frame strikes a switch 160, thereby closing a circuit which starts motor 35. The latter immediately raises the elevator 33 and the take-up frame 44 to the upper limit, ready for threading a new strip around the rollers 41 and 42 when the lead bar is introduced or transferred to the take-up section. When the elevator has completed its upward travel, the switch 150 is contacted and the circuit through motor 35 is broken. The elevator remains in the upper position on the feed screws 34.

The lead bar 75 then follows around the rollers 41 and 42, carrying the new strip of material with it, the lead bar being removed by the operator when it has emerged at the wind-up station. After the lead bar passes suction arch 59 it strikes a switch (not shown), which closes a reversing circuit of motor 35 and the elevator is again lowered, while the frame 44 remains suspended on the loops L of the strip and is controlled thereafter by the carbon-pile rheostat 155 acting on the drive of the suction arch 59 (motor 65) as before described. The elevator remains stopped at the bottom of its downward movement after it has contacted switch 151, which breaks the reversing circuit of motor 35.

From the foregoing it will be seen that the machine illustrated herewith enables a strip of material which may be continuously produced

or furnished to the machine, to be delivered to any number of winding rolls in succession without stopping or interrupting the source of supply. It is also possible for the operator to stop the machine and splice or cement the end of a new incoming strip to the end of an outgoing strip, as for instance when there are several small rolls fed in and it is desired to have only one large roll at the output end. Also, provision is made for maintaining the strip material parallel to the side frames of the machine and preventing it from creeping toward one side or the other, so that interruptions to the output are reduced or entirely eliminated. It is possible to modify the various elements of the machine, both as to design and sequence of operation, without departing from the scope of the invention as it is set forth in the following claims.

We claim:

20 1. A machine for handling strip material having, in combination, a frame, an elevator movable in the frame, a floating take-up member adapted to be lifted by the elevator and to descend by gravity, transverse rollers on the take-up member and on the frame to receive the strip, and means for maintaining the take-up member normal to the frame.

25 2. A machine for handling strip material having, in combination, a frame, an elevator movable in the frame, a series of transverse rollers mounted on the frame, a floating take-up member, adapted to be lifted by the elevator, rollers mounted thereon in staggered relation to the rollers on the frame, a driving mechanism for operating the elevator, and means for maintaining the take-up member and the elevator normal to the frame.

30 3. A machine for handling strip material having, in combination, a frame, rollers mounted on the frame and arranged transversely thereof to receive a strip of material, an elevator substantially co-extensive with said frame, mechanism for elevating and lowering the elevator, a floating take-up member normally supported by the strip material and adapted to be lifted by the elevator when the latter is elevated, rollers on the take-up member in staggered relation to the rollers on the frame, and counter-weights lighter than the take-up member, so that the latter will move downwardly by gravity when the elevator is in a lowered position whereby the rollers on the take-up member may draw down loops from a strip of material passing through the take-up.

35 4. A machine for handling strip material, having, in combination, a frame, rollers mounted thereon and arranged transversely thereof to receive a strip of material, an elevator substantially co-extensive with said frame, mechanism for raising and lowering the elevator, a take-up member adapted to be lifted by the elevator when the latter is elevated, rollers on the take-up member in staggered relation to the rollers on the frame, counter-weights for the take-up member so arranged that the latter may move downwardly independently of the elevator and may follow the elevator downward by gravity, and means for maintaining the take-up member level throughout its movements.

40 5. A machine for handling strip material having a frame provided with spaced upper and lower members, a series of idler pulleys mounted on each of said members, rollers revoluble in the upper member of the frame and located between

successive pairs of said idler pulleys, an elevator, raising and lowering mechanism for the elevator, idler pulleys on the elevator, a floating take-up member adapted to be lifted by the elevator and to be lowered by gravity, a series of rollers on the take-up member grouped in a manner similar to those on the frame, belts adapted to pass over the idler pulleys, a leader bar adapted to grip the belts to lead strip material over the rollers, and means for driving said belts.

6. A machine for handling strip material having a frame, belt pulleys and rollers mounted on said frame, an elevator, belt pulleys mounted on the elevator, operating mechanism for the elevator, a floating take-up member adapted to be raised by the elevator, rollers carried by said member, belts adapted to run on said belt pulleys, a leader bar having means for carrying one end of a strip of material, said leader bar also being provided with gripping jaws to engage said belts, whereby the strip of material may be led around the film rolls, and means for disengaging the jaws from the belts.

7. A machine for handling strip material, having, in combination, a frame, a plurality of rollers mounted on the frame, an elevator mounted to move relative to the frame, a floating take-up member, positioned to be engaged and moved by the elevator, a plurality of rollers carried by the take-up member, means for threading strip material about the rollers in a series of loops including a leader bar adapted to be attached to the strip material and including belts for supporting and moving the leader bar, and means for guiding the belts through a path approximately adjacent to the path of strip material passing over said rollers regardless of the position of the rollers carried by the take-up member relative to the rollers carried by the frame.

8. A machine for handling strip material, having, in combination, a frame, a plurality of rollers supported by the frame, an elevator mounted to move relative to the frame, a floating take-up member, positioned to be engaged and moved by the elevator, a plurality of rollers carried by the take-up member, means for threading strip material about the rollers in a series of loops including a leader bar adapted to be attached to the strip material and including belts for supporting and moving the leader bar, said belts having a fixed length, a plurality of pulleys arranged in one set for guiding the belts through substantially the same path as the path of the strip material passing over said rollers, and a plurality of pulleys arranged in a second set for supporting portions of the belts, said pulleys being so arranged that the belts may be supported in all positions of said elevator.

9. A machine for handling strip material, having in combination, a frame, a plurality of rollers supported by the frame, an elevator mounted to move relative to the frame, a floating take-up member, a plurality of rollers carried by the take-up member, means for threading strip material about the rollers in a series of loops including a leader bar adapted to be attached to the strip material and including belts for supporting and moving the leader bar, said belts having a fixed length, a plurality of pulleys arranged in one set for guiding the belts through substantially the same path as the path of the strip material passing over said rollers, and a plurality of pulleys arranged in a second set, some mounted on a fixed support and others supported on said

elevator for supporting said belts in all positions of said elevator.

10. A machine for handling strip material, having, in combination, a frame, a plurality of rollers supported by the frame, an elevator mounted to move relative to the frame, a floating take-up member, a plurality of rollers carried by the take-up member, means for threading strip material about the rollers in a series of loops including a leader bar adapted to be attached to the strip material and including belts for supporting and moving the leader bar, said belts having a fixed length, a plurality of pulleys arranged in one set for guiding the belts through substantially the same path as the path of the strip material passing over said rollers, and a plurality of pulleys arranged in a second set, some mounted on said elevator and others mounted on said frame, said belts being arranged in a plurality of loops over said pulleys, whereby movement of the elevator to shorten the loops of strip material passing over the rollers may also shorten the belt loops lying close to the path of the strip material and lengthen the loop of the belts passing over the second set of pulleys whereby said belts may be properly guided in all positions of the elevator.

11. A machine for handling strip material, having, in combination, a frame, a plurality of rollers supported by the frame, an elevator mounted to move relative to the frame, a floating take-up member, a plurality of rollers carried on the take-up member, means for threading strip material about the rollers in a series of loops including a leader bar adapted to be attached to the strip material and including belts for supporting and moving the leader bar, and guiding pulleys for the belts arranged in two sets, one set lying substantially adjacent the path of the looped strip material passing over the rollers, some of the pulleys being revolvably carried by the frame and others being revolvably carried by the elevator, the other set also comprising pulleys carried revolvably by the frame and others carried by the elevator, whereby lengthening the belt passing over one set of pulleys automatically shortens the belt passing over the other set of pulleys.

12. A machine for handling strip material, having, in combination, a frame, a plurality of rollers carried on the frame, an elevator mounted to move relative to the frame, a floating take-up member, a plurality of rollers carried on the take-up member, means for threading strip material about the rollers in a series of loops including a leader bar adapted to be attached to the strip material and including belts for supporting and moving the leader bar, guiding pulleys for the belts arranged in two groups, one group of pulleys guiding the belts through paths adjacent the path of the strip material, the other group guiding the belts through paths removed from the path of the strip material, each group of pulleys including pulleys mounted on the elevator and pulleys mounted on the frame about which the belts are looped whereby movement of the elevator causes one set of loops to increase in length as the second set of loops decreases in length, and power means for shifting the elevator relative to the frame.

13. A machine for handling strip material, having in combination, a frame, a plurality of rollers supported by the frame, an elevator mounted to move relative to the frame, a floating take-up member, a plurality of rollers supported

on the take-up member, means for threading strip material about the rollers in a series of loops including a leader bar adapted to be attached to the strip material and including belts for supporting and moving the leader bar, guiding pulleys for the belts arranged in two groups, one group of pulleys guiding the belts through paths adjacent the path of the strip material, the other group guiding the belts through paths removed from the path of the strip material, each group of pulleys including pulleys mounted on the elevator and pulleys mounted on the frame about which the belts are looped whereby movement of the elevator causes one set of loops to increase in length as the second set of loops decreases in length, power operated screws carried by the frame and nuts on the elevator engaging the screws whereby said elevator may be moved on the frame to vary the lengths of the loops of strip material supported by the rollers.

14. A machine for handling strip material having, in combination, a frame, a plurality of rollers on the frame for guiding strip material, an elevator mounted to move relative to the frame, power mechanism for the elevator, a floating take-up above the elevator and having a set of rollers to receive and to guide strip material looped about the rollers in the frame and the rollers on the floating take-up, pulleys on the elevator and on the frame to receive driving belts, counter-weights for the floating take-up, means on the take-up for maintaining the latter normal to the frame in any position, and means for holding a portion of the strip material against movement.

15. A machine for handling strip material, having, in combination, a frame, driving belts adjacent to said frame, a plurality of rollers on the frame adapted to guide strip material, pulleys adapted to receive the driving belts, an elevator movable relative to the frame, said elevator also having pulleys to receive said belts, means for positively raising or lowering the elevator, a floating take-up adapted to be raised by the elevator and to be lowered by gravity, said take-up having a series of rollers to receive strip material, and means for holding a portion of the strip material against movement, whereby the floating take-up may draw strip material into loops as it descends after the elevator has been lowered.

16. A machine for handling strip material having, in combination, a frame, driving belts adjacent said frame, rollers on the frame adapted to guide strip material, pulleys adapted to receive said driving belts, a floating take-up having rollers to receive the strip material, said take-up being normally supported by loops of strip material passing over the rollers thereon, means for holding a portion of the strip material against movement at the output end of the frame, and an elevator having power-driven mechanism whereby said elevator may raise the take-up to normal position.

17. A machine for handling strip material having in combination, a frame, a plurality of rollers on the frame adapted to receive loops of strip material, a floating take-up, similar rollers mounted on the take-up to receive strip material, whereby said material normally supports the take-up, an elevator adapted to lift the take-up to normal position, a series of pulleys and driving belts therefor, one group of said pulleys

being mounted on the frame and another group mounted on the elevator, a lead bar for threading the strip material about the rollers, means on the lead bar for gripping the driving belts and the end of the strip material, means for transferring the lead bar from a preceding section of the machine to the take-up section, and means for stopping and holding one portion of the strip material, whereby the latter may be drawn into loops by the floating take-up when the elevator is in a lowered position.

18. A machine for handling strip material having, in combination, a frame, a plurality of rollers mounted on the frame adapted to receive loops of strip material, a floating take-up member, similar rollers mounted on the take-up member in staggered relation to the rollers on the frame, means for maintaining the take-up member normal to the frame, a power driven elevator adapted to lift the take-up member, driving belts parallel with the frame, driving and driven pulleys for said belts on the frame and on the elevator respectively, a lead bar for threading strip material about the rollers and having means for gripping said material and said belts, means for transferring the lead bar from one section of the machine to an adjacent section, and means for stopping and holding one portion of the strip material, whereby the latter is drawn into loops by the floating take-up when the elevator is in a lowered position.

19. A machine for handling strip material having, in combination, a frame, a power driven elevator movable in the frame, a floating counterweighted take-up member adapted to be raised by the elevator and to be lowered by gravity, rollers on the take-up and on the frame, said rollers being arranged to receive strip material, belt pulleys, carried by the frame and the elevator, driving belts arranged on the pulleys, a leader bar for introducing one end of the strip material into the machine including a compensating member whereby the strip material may follow a path about the rollers as the leader bar follows a path about the pulleys, means on the leader bar for gripping said belts, means for disengaging the leader bar from said belts and for causing the gripping means to engage belts on another portion of the machine, and means for holding a portion of the strip material against movement whereby said floating take-up may move to take up strip material.

20. A machine for handling strip material having, in combination, a parallel side frames, a series of idler pulleys mounted on said frames and arranged in pairs on one portion of the frames and singly on another portion thereof, a power-driven elevator substantially co-extensive with the frames, idler pulleys on said elevator, one set of said idler pulleys being arranged in pairs and another set arranged singly, a set of driven pulleys, endless belts carried by the driven pulleys and the idlers, a floating take-up frame above the elevator, rollers for strip material on said frame, said rollers being centered on the pairs of pulleys on the elevator, a second set of rollers centered on the pairs of pulleys on the frame, and means for controlling the movement of the floating take-up frame in accordance with the speed of the strip material passing over said rollers.

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