

- [54] **APPARATUS AND METHOD FOR HANDLING A WEB**
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- [22] Filed: **May 30, 1972**
- [21] Appl. No.: **257,958**

**Related U.S. Application Data**

- [62] Division of Ser. No. 99,885, Dec. 21, 1970, Pat. No. 3,702,086.
- [52] U.S. Cl. .... 226/91, 226/113
- [51] Int. Cl. .... B65h 17/42
- [58] Field of Search ..... 226/90, 91, 92, 118, 226/119, 189, 113, 114; 83/102-107

[56] **References Cited**

**UNITED STATES PATENTS**

- |           |        |                 |         |
|-----------|--------|-----------------|---------|
| 1,941,597 | 1/1934 | Cavagnaro ..... | 226/114 |
| 3,583,619 | 6/1971 | Sheherd .....   | 226/113 |

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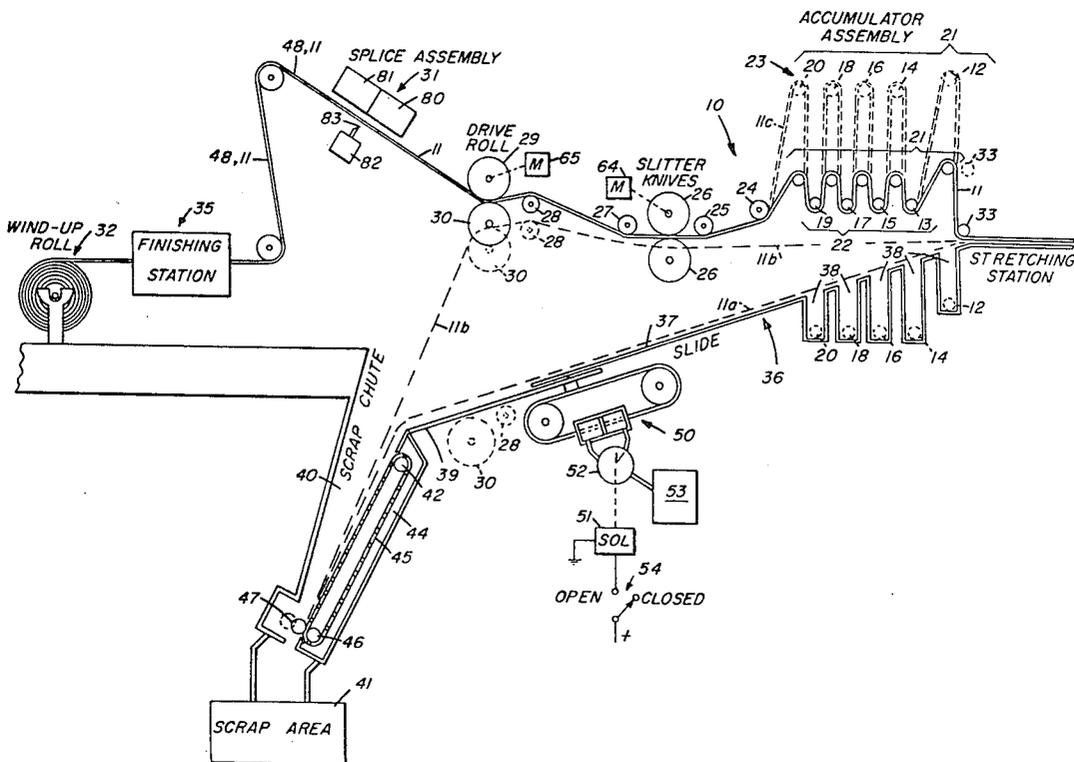
[57] **ABSTRACT**

Apparatus and method for handling a plastic web dur-

ing the manufacture thereof wherein after the web exits from a stretching station a slide is provided for diverting defective web material downward to a scrap handling area. When satisfactory material is thereafter produced the web may be automatically threaded into an accumulator assembly for take-up of the web so that the downstream end of the web may be stopped to permit the defective web material to be severed from the satisfactory web material. After being severed from the defective material the satisfactory material is spliced onto a web that has been previously threaded through to the finishing end of the apparatus where a wind-up roll is positioned for storage of the satisfactory web material.

The accumulator assembly comprises first and second sets of rollers wherein the first set is stationary and the second set is movable and positionable below the path of the defective web portion. The second set is movable from its lower position where it is nestable in recesses formed in the slide to allow the defective web to pass thereover, to a raised position where it is above the first set. The movement of the second set of rollers between the rollers of the first set is utilized to thread the web in a serpentine path between the rollers of the accumulator assembly.

**11 Claims, 4 Drawing Figures**



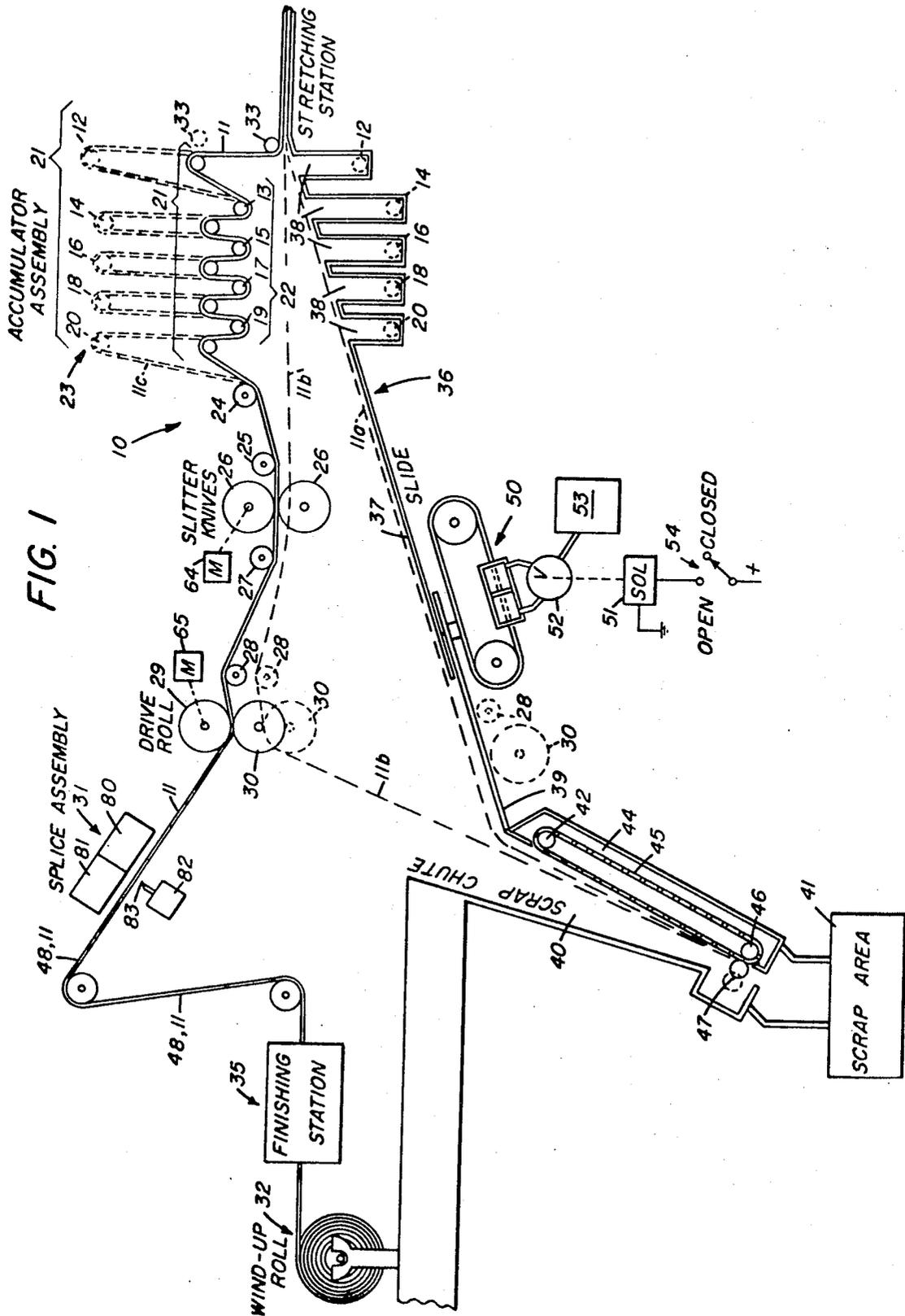


FIG. 2

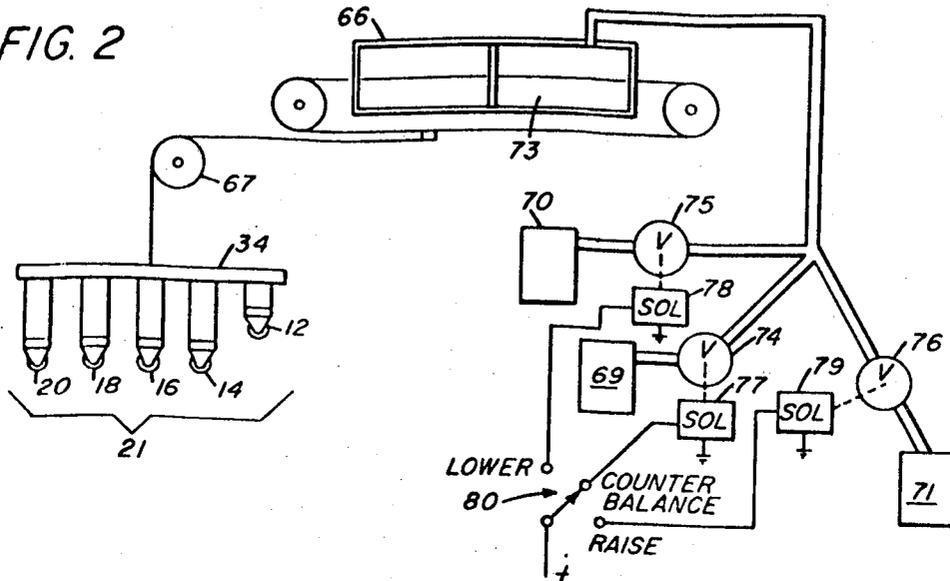


FIG. 3

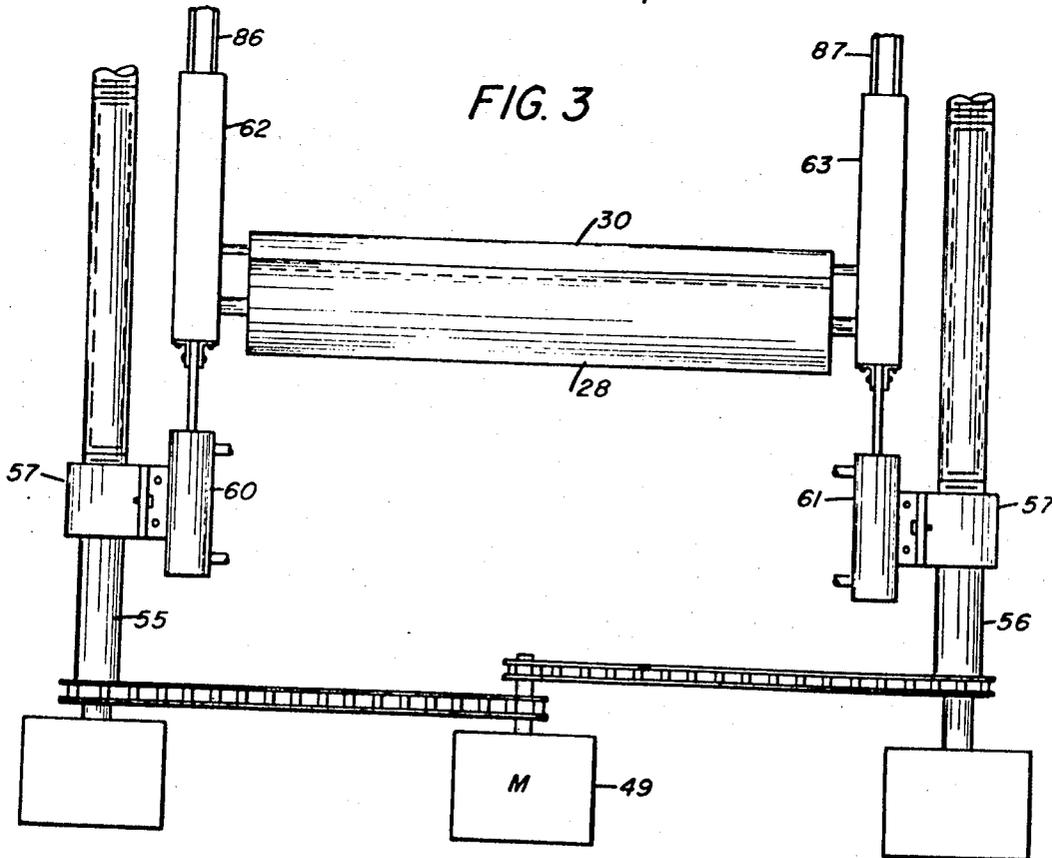
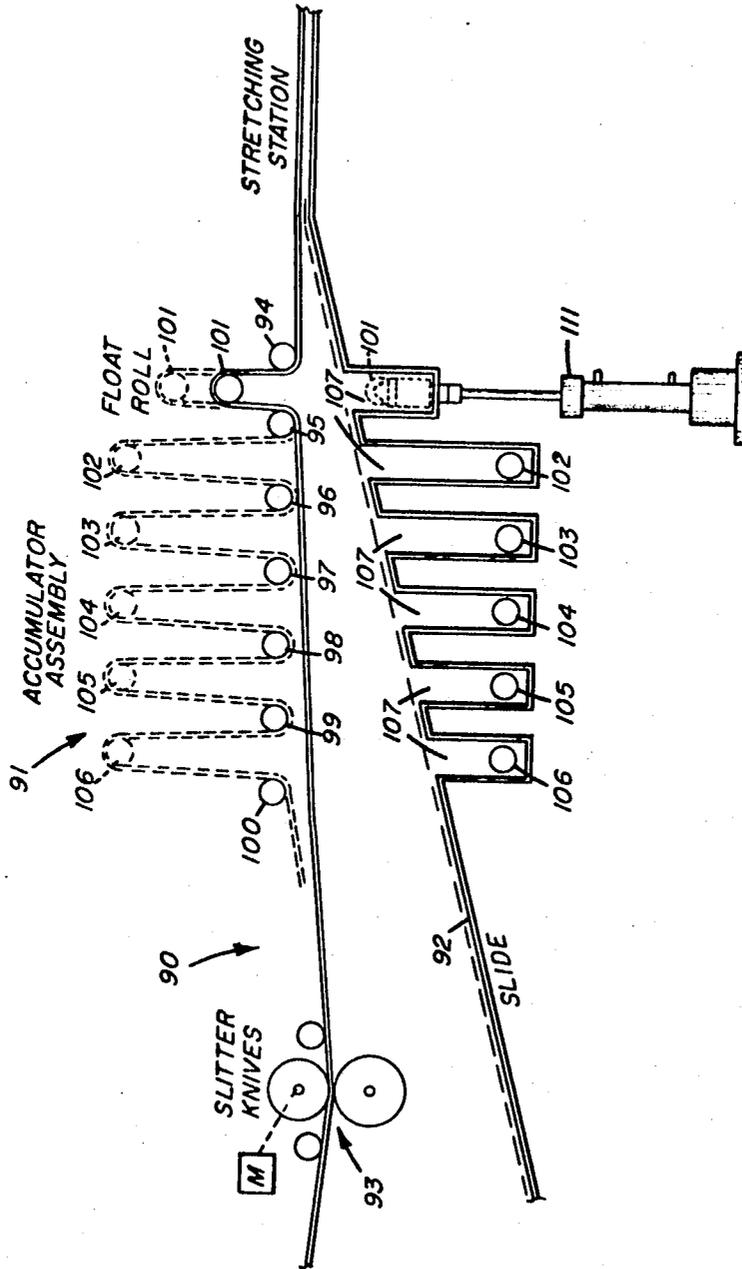


FIG. 4



## APPARATUS AND METHOD FOR HANDLING A WEB

This is a divisional application of application Ser. No. 99,885 filed on Dec. 21, 1970, and now U.S. Pat. No. 3,702,086.

### BACKGROUND OF THE INVENTION

This invention relates to an apparatus and method for handling a web. More particularly this invention relates to an apparatus and method for handling a web wherein the web includes a defective portion that is required to be removed therefrom.

### DESCRIPTION OF THE PRIOR ART

In the past in the manufacture of webs such as of polyethylene, polypropylene, polyvinyl chloride or polyethylene terephthalate, the web is produced by casting the molten plastic onto a casting roll and thereafter subjecting the cast material to various stretching operations so as to thin and widen the web while enhancing its strength through orientation of the molecules.

After being stretched the web is slit to the desired width by rotary slitters and threaded over rollers to the finishing end of the apparatus where it undergoes various physical treatments, well known in the art, before being wound upon a windup roll for storage.

While this operation works quite satisfactorily a problem arises when a defect is formed in the web particularly during the casting and stretching operations.

The formation of a defect presents a problem because it is desired to have only satisfactory material wound upon a storage roll and thus the defective web portion must be severed from the satisfactory web material before the defect reaches the wind-up roll. The formation of defective material is particularly a problem during the machine's start-up period. When machines of this type are shut down for cleaning or repairs and then started up again one can expect to form thousands of feet of defective material before satisfactory material begins to be produced. In a start-up operation the web exiting from the stretching station is of extremely poor quality and is generally discontinuous and non-uniform. In the past, provision was made for handling the defective web by having the operator take hold of the front of the web as it exited from the stretching station and hand carry the web to a room at the side of the machine where the web was allowed to accumulate until satisfactory web material was being produced. Thereafter, the operator would sever the satisfactory material from the defective material, manually thread the web about guide rollers and through a pair of rotary slitter knives to a splicing unit, and splice the web to a leader web that previously had been threaded through to the finishing end of the machine. Since the casting operation is required to be continuous, the web of satisfactory material must be continuously advanced. In order to perform the splicing step where the web end is required to be held stationary, a procedure was utilized wherein a huge loop in the web adjacent the end to be spliced was allowed to develop in order to store the material continuously exiting from the stretching station. Once the splice was made the loop was gradually eliminated by running the finishing end of the machine at a higher speed than that of the web exiting from the stretching station.

The above recited manner of handling the web is acceptable at relatively slow web speeds but at the higher speeds that manufacturers are capable of achieving today the handling of the moving web by the operator while it is advancing at these high speeds requires him to assume a high risk of injury. During start-up for example, the web material may be in the form of spear-like thickened sections which when moving at the high machine speeds used today could impale the operator.

It will be appreciated that development of an apparatus and method for handling a defective web at high web speeds with only minimum risk of injury to the operator represents a significant advance in the art. It is, therefore, an object of this invention to provide an improved method and apparatus for handling a rapidly advancing web for removal of defective material therefrom.

### SUMMARY OF THE INVENTION

In accordance with the present invention there is provided an improved method for handling an advancing web having a defective portion to be removed therefrom which includes the steps of advancing the defective portion of the web towards a scrap handling area so that the web is advanced in a direct path between first and second web guide means; threading the web about said first and second means by relatively moving said second means from a position below said first means to a position above said first means so as to form an accumulator assembly; substantially slowing the advancing speed of the portion of the web directly downstream of the accumulator assembly relative to the advancing speed of the portion of the web directly upstream of the assembly so as to produce an excess of web material in the assembly; accumulating the excess material; removing the defective portion of the web from satisfactory-web material located upstream of the defective portion; and advancing the satisfactory web material to a web receiving means located downstream of the assembly for further operation upon the satisfactory web material.

There is also provided an improved apparatus for handling a web having a defective portion to be removed therefrom which apparatus includes first means for guiding a web; second means for guiding a web wherein said second means is cooperable with said first means to form an accumulator assembly; means located downstream of said assembly for receiving satisfactory web material; means for guiding a defective portion of the web towards a scrap handling area so that the defective web portion is advanced in a direct path above the second means and below the first means; means for substantially slowing the advancing speed of the portion of the web downstream of the assembly relative to the advancing speed of the portion of the web upstream of the assembly so as to produce an excess of web material in the assembly; and means for urging the relative movement of the first and second means so as to thread the web in a serpentine path about the first and second means and to accumulate the excess web material so as to facilitate the removal of the defective web portion from satisfactory web material located upstream of the defective-web portion.

There is further provided a method for handling an advancing web having a defective portion to be removed therefrom which method includes the steps of guiding the web in a satisfactory-web path towards a

web-receiving station so that the web is contacted on one surface by at least one generally vertically movable roller; severing the web at a point intermediate the receiving station and the movable roller to form an upstream defective-web portion and a downstream web portion; guiding the defective-web portion over defective-web guide means so that the defective portion is advanced towards a scrap handling area along a defective-web path that is located generally below the satisfactory-web path; and lowering the movable roller to a position generally below the defective-web guide means to permit the defective-web portion to be guided by the defective-web guide means.

There is still further provided an apparatus for handling an advancing web having a defective portion to be removed therefrom, which apparatus includes satisfactory-web guide means for guiding said web in a satisfactory-web path, said guide means including at least one generally vertically movable roller that is adapted to contact a surface of said web during the guiding of said web in said satisfactory-web path; means located downstream of said movable roller for receiving satisfactory web material; means located intermediate the movable roller and the receiving means for severing the web into an upstream defective-web portion and a downstream web portion; defective-web guide means for guiding said upstream web portion in a defective-web path toward a scrap handling area, said defective-web path being located generally below said satisfactory web path; and means for lowering said movable roller to a position generally below said defective-web guide means to permit said upstream web portion to be guided by said defective-web guide means.

The subject matter which is regarded as my invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. The invention, however, as to its organization and operation, together with further objects and advantages will best be understood by reference to the following description, taken in conjunction with the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic elevation view of an apparatus forming one embodiment of the invention showing in phantom the various positions which the elements of the apparatus may assume in their different operative positions.

FIG. 2 is a diagram representing controls for the accumulator assembly of the apparatus shown in FIG. 1.

FIG. 3 is a diagram representing one means for raising and lowering the movable rollers located downstream of the accumulator assembly in FIG. 1.

FIG. 4 is a view similar to that of FIG. 1 but showing a portion of another apparatus which apparatus comprises an alternate embodiment of the invention.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings wherein like numbers refer to similar parts there is shown in FIG. 1 a web handling apparatus 10.

Apparatus 10 will first be described as functioning in its normal running mode of operation wherein the material exiting from the stretching station is satisfactory and is guided through pairs of rotary slitters where it is cut to the desired width and treated before being wound on a roll for storage. After describing the han-

dling of the web in its normal running mode the apparatus will be described in relation to the handling of defective web material.

Apparatus 10 is situated directly downstream of a conventional stretching station which may be either a tentering station, drafting station or combination tentering and drafting station. As the web 11 exits from the stretching station it is guided by a take-off roller 33 that leads the web to an accumulator assembly 23. Assembly 23 is comprised of web guide rollers 12-20, which cause the web to be guided through the assembly in a serpentine path. Rollers 12-20 are divided into two sets, 21 and 22. The first set of rollers 21 is comprised of rollers 12, 14, 16, 18 and 20. Rollers 21 are all attached to a frame 34 (FIG. 2) to enable them to be vertically moved in unison. Rollers 14, 16, 18 and 20 are attached to the frame in such manner that they are radially spaced with their respective axes being parallel and in the same horizontal plane. Roller 12 is attached to the frame so as to always be above the other rollers of the first set. The second set of rollers 22 is comprised of stationary rollers 13, 15, 17 and 19. These rollers are also maintained in radially spaced relationship such that their respective axes are parallel and in a horizontal plane. Rollers 22 are in offset relationship from rollers 21 to allow rollers 21 to be raised from a position below rollers 22 to a position above rollers 22 without interference.

Downstream of the accumulator assembly 23 the web is threaded beneath idle guide rollers 24 and 25 and then between conventional pairs of rotary slitter knives 26 which are driven by a conventional speed controllable motor 64. Slitter knives 26 are positioned inward of each side edge of the web for cutting the web to the desired width. It will be appreciated that provision may be made for diverting the edging that is being removed from the sides of the web to a conventional edging scrap handling unit (not shown). As the web 11 exits from the slitters it is threaded beneath an idle guide roll 27 and over an idle guide roll 28 to nip rolls 29, 30. Upper roll 29 is a drive roll and is attached to a conventional drive such as a speed controllable motor 65. Lower roll 30 is vertically movable and is adapted to cooperate with roll 29 to form a nip for driving web 11. After web 11 exits from the nip it is passed through a suitable splice assembly 31 which during the normal running operation does not have any effect upon the web. The web is thereafter directed through the finishing end of the apparatus which includes web guide and drive rollers and one or more treatment or finishing stations 35 that are conventional and do not form a part of this invention. At the end of the apparatus 10 is a driven wind-up roll 32 upon which the satisfactory web material is wound for storage.

The description of the apparatus 10 in the handling of a defective web is as follows.

Basically, the function of the apparatus in this mode is to guide defective material to a scrap handling area and when satisfactory material begins to be produced to self thread the web into the accumulator assembly so that the web may be accumulated to permit splicing of the satisfactory material to a web which has been previously threaded through the finishing end of the apparatus. After the splice has been completed the apparatus will be completely threaded with satisfactory web material and ready to function in its normal mode as described above.

Before start of the casting operation rollers 21 are lowered as shown in phantom in FIG. 1 to their lowermost position where they are allowed to nest in a slide or chute 36. Slide 36 includes a generally smooth inclined top surface 37 that allows the defective web to be guided thereover. The surface 37 is interrupted at specific points wherein recesses 38 are provided in the slide so that each of the rollers 21 has a corresponding recess 38 into which it may nest.

At the downstream end of the slide 36 there is positioned a pneumatically controlled slide baffle 39. Slide baffle 39 forms an extension of surface 37 but is movable from its extended position to a retracted position to allow rolls 28 and 30 to be lowered below baffle 39. With rolls 28 and 30 in their nesting positions below baffle 39, baffle 39 may be returned to its extended position to allow the defective web material to be passed thereover. At the downstream end of slide baffle 39 a scrap chute 40 is provided for guiding the defective web material to a scrap handling area 41. Scrap handling area 41 preferably includes a conventional scrap chopper. The chute 40 includes a chamber 44 which is connected to suitable means for maintaining a partial vacuum in the chamber. The chamber 44 includes a vacuum belt 45 which is an endless belt of fine mesh conveyor chain that is mounted at its upstream end on a drive roll 42 and at its downstream end on an idle roll 46. The vacuum in the chamber is utilized to attract and advance the web toward the vacuum belt 45 so that the web may be positively guided into the nip formed by idle roll 46 and a drive roll 47. Drive roll 47 includes a suitable conventional control for moving it towards and away from roll 46 to allow the web to be fed therebetween. When rolls 46 and 47 are in nip relationship with the web the driving of roll 47 will force the web to be fed into the scrap handling area 41.

Prior to start-up, feed roll 47 is moved into its separated position (shown in phantom) to allow the thickened defective web material to be initially threaded between the rolls 46, 47. A leader web 48 is manually threaded through the finishing end of the machine with one end attached to the wind-up roll 32 and the other held in the splice assembly 31. The take-off roll 33 is raised to the position shown in phantom in FIG. 1 so as not to obstruct the defective material, and the various other rolls are lowered to their respective nesting positions.

During start-up, defective material 11a exits from the stretching station and is guided along slide surface 37 in a direct path above rollers 21, 28 and 30. The web 11a then enters the scrap chute 40 wherein the vacuum belt 45 serves to guide the web between the spaced apart feed rollers 46, 47. After material initially enters the fed rollers they may be brought into nip position to feed the material into the scrap handling area 41. Should web material thereafter again become discontinuous the rollers may similarly be separated and brought together to ensure proper threading of the web material between them.

Eventually, the material exiting from the stretching station will become satisfactory full width continuous web and the operator may then prepare for the splicing operation. Slide baffle 39 is then retracted to uncover rollers 28 and 30. To move baffle 39 to its closed and open positions a conventional double acting cable-actuating air cylinder 50 is employed. Cylinder 50 is controlled by a solenoid 51 which actuates valve 52 to

divert air under pressure from source 53 to either of the chambers in the cylinder. The particular chamber that is fed at any one time is dependent upon the position of a switch 54. By closing switch 54 to the "open" position baffle 39 will be retracted so as to allow rolls 28 and 30 to be raised. If desired, baffle 39 may be slidably connected by suitable conventional means to the underside of slide 36.

To move rolls 28 and 30 in the vertical direction a motor 49 (FIG. 3) is employed. Motor 49 is of the conventional type that employs a sprocket drive to rotate a pair of vertical threaded shafts 55, 56 each of which has positioned thereon a translatable threaded collar 57 so that rotation of the shafts causes the collar to move in the vertical direction. Rigidly attached to each of the collars 57 are air cylinders 60, 61. Air cylinders 60, 61 have their piston rods rigidly connected to journal bearings 62, 63, respectively. Bearings 62, 63 are positioned at the ends of rollers 28 and 30, and the rollers are suitably journaled within the bearings. Guide-ways 86, 87 are provided so that the bearings 62, 63 may be positively guided as they are lowered and raised.

When motor 49 is activated to drive threaded shafts 55, 56 in the direction required for raising collars 57, cylinders 60, 61 and rollers 28, 30 will also be raised. When roller 30 has reached a position (shown in phantom in FIG. 1) slightly below roller 29 a suitable limit switch (not shown) may be employed to shut off the electrical power to motor 49 so that further upward movement of the collars will cease. In addition to the limit switch suitable stops may be employed to ensure that the collars cannot travel any higher.

As rollers 28 and 30 are raised they come into contact with the web and alter the shape thereof to the path denoted as 11b in FIG. 1. Since the web at this time is slightly wider than the distances between the slitter knives 26, the web will distort as it is raised between them. It should be appreciated that at this point the web is not threaded into the slitter knives but is merely being passed between them.

When the roller 30 reaches the raised position shown in phantom the take-off roll 33 is lowered to its lowermost position by activating a conventional motor (not shown). The operator also activates the drive motor 65 which drives roll 29. The web, however, will not be driven by roll 29 at this point since roll 30 has not yet been moved into nip relationship with roll 29. After motor 65 is activated the first set of accumulator rolls 21 are raised from their nesting position into contact with the web.

With particular reference to FIG. 2, the controls for raising and lowering the rollers 21 include a conventional single-acting cable-actuating air cylinder 66 the cable of which is connected to frame 34 over a pulley 67. One chamber 73 of cylinder 66 is adapted to receive compressed air under three different pressures. One of these pressures from source 69 is sufficient to just counterbalance the total weight of frame 34 and its associated rollers 21. A second pressure from source 70 is less than the first pressure so that an under balance is created and gravity will cause rollers 21 to be lowered. A third pressure from source 71 is sufficient to support the rollers 21 in the normal running mode of operation. This latter pressure must be sufficient not only to counterbalance the weight of frame 34 and rollers 21 but also to counterbalance the downwardly di-

rected force caused by the tensioned web on the rollers 21. One preferred means for supplying the various pressures is to have each of the compressed air sources 69, 70 and 71 be in communication with its own control valve 74, 75, 76 respectively. Valves 74, 75 and 76 are each controlled by a solenoid 77, 78 and 79 respectively and the solenoids are in turn controlled by an electrical circuit having a three position switch 80, wherein the position of the switch determines which solenoid will be activated.

To raise rolls 21 into the web 11b, switch 80 is positioned in the "RAISE" position to activate solenoid 79 so that valve 76 is actuated to establish communication between source 71 and chamber 73. Since the air pressure from source 71 when introduced into chamber 73 is sufficient to overcome the weight of the frame 34 and rollers 21, the cable cylinder will cause rollers 21 to rise. Rollers 21 will rise into the web until a position is reached wherein the force of the tensioned web on the rollers 21 and the weight of the rollers 21 are sufficient to offset the air pressure in the cylinder 73. When this position is reached rollers 21 are positioned above rollers 22 and the web is threaded through the accumulator assembly 23 in a serpentine path. The operator then activates the air cylinders 60, 61 (FIG. 3) to advance roller 30 into the nip position so that roller 29 will be in driving relationship with the web. With roller 29 driving the web, the tension in the web increases and rolls 21 will lower into the same position which they assume during the normal running mode of operation. It will be appreciated that the web at this point of the operation will follow generally the same path as that in the normal running mode with the exception that after exiting from the nip formed by rolls 29 and 30, it will be diverted downward to the scrap handling area. The slitter knives 26 are then started by activating the slitter's drive motor 64. In addition, the conventional edging scrap handling unit (not shown) is also started. The web is then introduced into the slitter knives by forming two transverse cuts, one through each side edge of the web, at points upstream of the slitters 26 so that the portion of the web directly upstream of the cuts will lie flat and self-feed into the slitter knives. The use of transverse cuts to cause the web to self-feed are conventional and they may be made by the operator with a cutting tool although it is preferred to employ the apparatus described in application Ser. No. 69,202 filed Sept. 3, 1970 and assigned to the assignee of this application.

The web exiting from the slitters 26 is satisfactory product and this product may be spliced onto the leader web 48 which has been threaded previously through the finishing end of the apparatus. To perform the splice the drive roll 29, slitter knives 26 and feed rolls 46, 47 are stopped so that the web is held stationary between the nips of roller pairs 29, 30 and 46, 47. Since the web is continuously being supplied from the stretching station to the accumulator assembly 23, but is not being allowed to exit therefrom, a slack in the web develops, and this causes accumulator rolls 21 to rise. The operator, while the web 11c is thus being accumulated, severs the defective web portion from the satisfactory web portion by cutting the web at a point between the two nipped roller pairs. The tail end of the satisfactory portion is then fed into the splice assembly 31 for attachment to the leader 48. It should be appreciated that some satisfactory material is being diverted

to the scrap handling area but all of such material can be considered to be a part of the defective web portion.

The splice assembly 31 includes a first vacuum board 80 for holding the tail of the satisfactory web portion stationary during the splice operation. A second vacuum board 81 is similarly used for holding the upstream end of the leader web 48 stationary during the splice operation. Each of the vacuum boards 80, 81 has associated therewith a conventional vacuum source (not shown) which is independently controlled for applying or removing vacuum from the board. A reciprocable cutting head 82 having a cutting blade 83 is used to cut the webs into "butt" position for the splice. With the web ends cut into abutting relationship splicing tape may be applied to join the two webs.

After the splice is completed the satisfactory web material will be connected to the wind-up 32. Vacuum is then removed from the splice boards 80 and 81 and the drives operative during the normal running mode are actuated. To move the web from its accumulating path 11c to its normal running path 11 the wind-up roll 32, drive roll 29 and slitter knives 26 are controlled through conventional means so that they run at a higher speed than that of the web entering the accumulator 23. The increased tension in the web causes the rolls 21 to descend to their normal running position 11.

When the normal running position is reached the conventional speed controls adjust the drives so that the speed of the web exiting from the accumulator is equal to that of its entering speed and the rolls 21 maintain their normal running position. It will be appreciated by those skilled in the art that having the rolls follow the serpentine path through the accumulator 23 during the normal running mode has the advantage of assuring that sufficient tension is placed on the web as it enters the slitters 26. In addition, the rolls 21 being responsive to the tension in the web function as float rolls and thereby serve to keep the tension in the web constant.

Another advantage of the described apparatus is that when a defect occurs upstream of the take-off roll 33 during the normal running mode the apparatus is capable of diverting the defective material to the scrap handling area 41 so that none of the defective material is wound upon the wind-up roll 32. Should such a defect occur the wind-up drive is stopped and vacuum applied to the vacuum board 81. The cutting blade 83 is then advanced toward the web to sever the downstream satisfactory web material from the upstream defective web material. The tail of the defective web material is allowed to fall into the scrap chute, and the feed rolls 46 and 47 are utilized to advance the web into the scrap handling area 41. At about the same time the take-off roll 33 is raised and the slide baffle 39 is retracted to its open position so that rolls 28 and 30 may be lowered to their nesting positions. When the rolls 28 and 30 have reached their nesting position the slide baffle is closed. Rolls 21 are also lowered to the nesting position in recesses 38 by throwing switch 80 (FIG. 2) to the "Lower" position so that solenoid 78 is activated and valve 75 actuated to supply an under balance air pressure to chamber 73 from source 70. With an air pressure in chamber 73 that is less than that which is sufficient to support the rolls 21 and frame 34, the rolls 21 will descend into their respective recesses 38. When the above operations have been performed and with the rolls in their respective nesting positions the defec-

tive web material will follow the path 11a. When satisfactory material again begins to be produced the procedure for setting-up the web for the splicing operation is similar to that discussed with reference to start-up except that in this instance the leader web 48 is actually the downstream satisfactory material.

In the alternate embodiment of FIG. 4 a modified form of the apparatus 10 is shown. In this embodiment the apparatus 90 includes an accumulator assembly 91, a slide 92, slitter knives 93 and a downstream portion (not shown) which may be the same as that shown in FIG. 1. The accumulator 91 includes a plurality of spaced apart stationary rollers 94, 95, 96, 97, 98, 99 and 100. Cooperating with the stationary rollers are a plurality of vertically movable rollers 101, 102, 103, 104, 105 and 106. The movable rollers are offset from the stationary rollers so that they may be moved between the stationary rollers when they are raised from a nesting position in recesses 107 formed in slide 92 to an accumulating position shown in phantom. The major difference between this embodiment and that shown in FIG. 1 is that movable roller 101 is a float roll and is movable independently of rollers 102-106. Rollers 102-106 are movable in unison by an apparatus similar to that shown in FIG. 2. Roller 101 is attached to an air cylinder 111 and is raised by introducing into the air cylinder 111 air pressure sufficient to counterbalance the weight of the roller plus that of the desired tension in the web.

The operation of apparatus 90 is similar to that of the embodiment shown in FIGS. 1-3 except that in the normal running mode the rollers 102-106 are not in contact with the web but are lowered to their nesting positions to thereby leave float roll 101 as the sole roller in tension control of the web 11.

The advantage of having only one roll in tension control of the web is that friction on the web is reduced to a minimum. Another advantage is that one roller, having less inertia than five rollers, will be more responsive to tension variations in the web during the normal running mode.

Other modifications of the invention are possible, for example, most or all of the operation could be made automatic by the use of conventional techniques. One manner of automating the operation could be the use of a conventional electric eye defect detector in the stretching station which is adapted to detect discontinuities in the web. Should a defect be detected in the stretching station during the normal running mode a signal may be generated which through conventional relays and contacts will stop the finishing end of the apparatus and reciprocate the cutting head to sever the downstream satisfactory material from the upstream defective web portion. In addition to cutting of the web, the signal may be used to activate the mechanisms for lowering the movable rollers to their nesting positions so that the defective web portion may be guided down the slide surface 37, 92.

While the preferred embodiments have been described showing the web being guided vertically above the movable rollers and vertically below the stationary rollers it will be appreciated that the upper rollers could be made the movable rollers. In addition, if the web were to be guided in a direct vertical path between the sets of rollers the rollers could be assembled so as to lie in a generally vertical plane to each side of the web.

Another modification which may be employed is to lower the movable rollers into the upper portion of the recesses so that the highest portion of the rollers lie generally flush with the slide surface. This allows the rollers to be utilized in guiding of the web along the defective-web path.

The invention has been described in detail with particular reference to a preferred embodiment thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

I claim:

1. An apparatus for handling an advancing web having a defective portion to be removed therefrom, which apparatus comprises:

first means for guiding the web;

second means for guiding the web, said second means being relatively movable from a position generally below and spaced from said first means to a position generally above and spaced from said first means so as to form therewith a web accumulator assembly wherein said web may be threaded through said assembly in a generally serpentine path;

means located downstream of said accumulator assembly for receiving satisfactory-web material;

means for guiding a defective portion of the web towards a scrap handling area so that said defective-web portion is advanced in a direct path above said second means and below said first means;

means for at least substantially slowing the advancing speed of the portion of the web downstream of said accumulator assembly relative to the advancing speed of the portion of the web upstream of said accumulator assembly so as to produce an excess of web material in said accumulator assembly; and means for

a. urging the relative movement of said second means while in guiding relation with said advancing web from a position wherein said second means is positioned generally below said first means to a position wherein said second means is positioned generally above said first means so as to cause said web to be threaded about said first and second means in said generally serpentine path, and for

b. urging the relative movement of said second means generally above and away from said first means while said first and second means are guiding said advancing web in said serpentine path and while said downstream web portion is relatively slowed to thereby accumulate said excess of web material whereby the accumulation of said excess web material and the relative slowing of said downstream web portion facilitate the removal of the defective web portion from satisfactory web material located upstream of said defective web portion so that only satisfactory web material may be advanced to said receiving means.

2. The invention according to claim 1 wherein said slowing means comprises a pair of spaced rollers with a nip opening therebetween for nipping said web.

3. The invention according to claim 1 wherein said receiving means comprises a wind-up roll.

4. The invention according to claim 1 wherein said defective web portion guiding means comprises a slide

and said slide includes recesses for receiving said second means in nesting relationship so as to allow said defective web portion to be advanced along said slide and above said second means.

5. The invention according to claim 1, said first means comprising a first set of rollers that are spaced apart in a generally horizontal direction and said second means comprising a second set of rollers that are also spaced apart in a generally horizontal direction in offset relationship relative to the rollers of said first set so as to allow the rollers of said second set to be relatively moved in a generally vertical direction between the rollers of said first set.

6. The invention according to claim 1 wherein said defective web portion guiding means is adapted to receive said second means so as to allow said defective web portion to be advanced above said defective portion guiding means and above said second means.

7. The invention according to claim 6 wherein said defective portion guiding means comprises a slide.

8. The invention according to claim 1 wherein said slide includes recesses for receiving said second means.

9. The invention according to claim 7 wherein said slide includes a movable slide portion and means for moving said movable slide portion into operative position to guide said defective portion and into retracted position to provide access to areas beneath said movable slide portion.

10. The invention according to claim 9 wherein said slowing means includes a movable first roller located downstream of said accumulator assembly and means for lowering said movable first roller from a web contacting position to a nesting position that is below said movable slide portion.

11. The invention according to claim 10 wherein said slowing means further includes a second roller adapted to be positioned in nip forming relationship with said movable first roller when said movable first roller is placed into said web contacting position.

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