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SLACK TAKE-UP APPARATUS

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FIG. 2

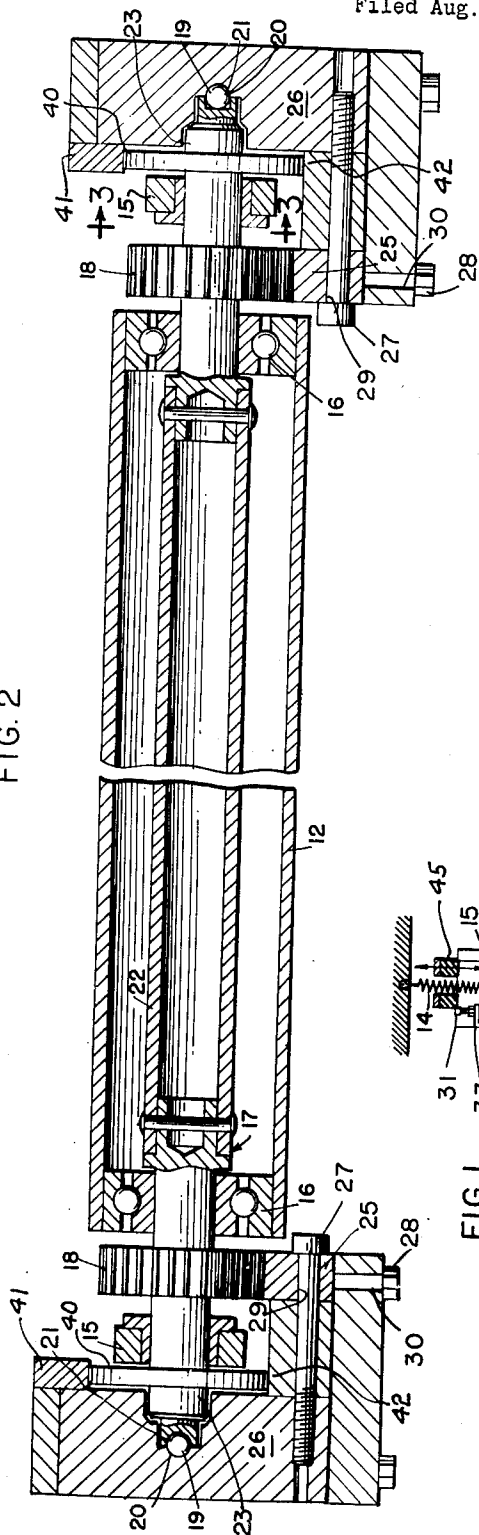


FIG. 3

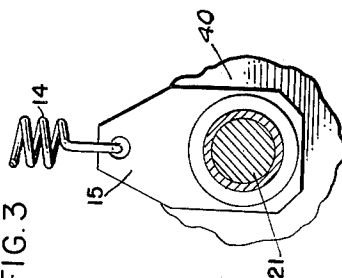
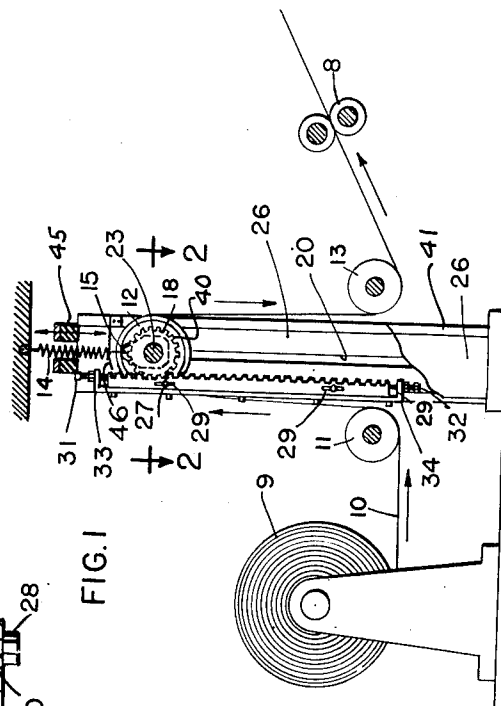


FIG. 1



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SLACK TAKE-UP APPARATUS

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6 Claims. (Cl. 242-75)

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This invention relates to slack takeup apparatus, and more particularly to apparatus for taking up slack in webs.

In some processes in which a web is advanced continuously from a heavy supply roll, it is essential to have a slack takeup device to prevent jerks on the web. Many slack takeup devices are known, but there have been none which are both highly sensitive and simple and inexpensive in construction.

An object of the invention is to provide new and improved slack takeup apparatus.

A further object of the invention is to provide new and improved apparatus for taking up slack in webs.

Another object of the invention is to provide new and improved slack takeup apparatus for a web having minimum inertia to variations in tension of the web.

A slack takeup apparatus illustrating certain features of the invention may include a pair of fixed web-guiding elements and a roll for engaging the portion of the web between said elements. There also may be provided a shaft mounting the roll rotatably, means urging the shaft away from said elements, pinions mounted on the ends of the shaft, fixed racks for guiding the pinions, and antifriction means holding the pinions in mesh with the racks and preventing longitudinal movement of the shaft.

A complete understanding of the invention may be obtained from the following detailed description of an apparatus forming a specific embodiment thereof, when read in conjunction with the appended drawings, in which

Fig. 1 is a front elevation of an apparatus forming one embodiment of the invention with portions thereof broken away;

Fig. 2 is a fragmentary, horizontal section taken along line 2-2 of Fig. 1, and

Fig. 3 is a fragmentary, vertical section taken along line 3-3 of Fig. 2.

Referring now in detail to the drawings, driven advancing rolls 8 advance a web 10 from a lightly braked supply roll 9 over rolls 11, 12 and 13 to or through a processing device (not shown). The rolls 11 and 13 rotate on fixed axes, and the roll 12 normally is urged to a position offset from the rolls 11 and 13 by light, easily extending springs 14 to provide a reserve of web between the supply roll 9 and the advancing rolls 8. The upper ends of the springs are fixed, and the lower ends of the springs are secured to collars 15. The roll 12 is mounted on bearings 16 mounted on a shaft 17, and balls 19 fit into

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grooves 20 in upright guideways 26 and sockets 21 formed in the ends of the shaft. The shaft 17 is light in weight and includes a hollow tube 22 connecting end pieces 23. Each of racks 25 meshing with the pinions 18 are fastened adjustably to the guideways 26 by cap screws 27 and 28 projecting through elongated slots 29 and 30, respectively. Adjustment screws 31 and 32 threaded through flanges 33 and 34 on the guides 21 may be manipulated to adjust the racks relative to the guides after the screws 27 and 28 are loosened. Rollers 40 mounted rotatably on the shaft by ball bearings, roll freely along guide tracks 41 or guide tracks 42. The rollers 40 and the guide tracks 41 and 42 keep the pinions 18 in such mesh with the racks 25 that there is a minimum of friction between the pinions and the racks and there is no backlash in the mesh of the pinions and racks. A stop 45 composed of resilient material such as rubber, neoprene (polymerized chloroprene) or the like is fixed in the path of the roll 12 at the upper extremity of travel thereof, and leaf springs 46 are designed to engage the end pieces 23 before the roll 12 engages the stop 45 to prevent hard impact between the light roll 12 and the stop. The springs 46 normally hold the roll out of engagement with the stop 45 to facilitate stringing up operations.

Operation

The rolls 8 advance the web 10 continuously from the supply roll 9, and the supply roll floats up and down whenever the tension on the portion of the web between the rolls 8 and the supply roll varies slightly, thereby making the tension more uniform and preventing stocks on the web. As the roll 12 is moved vertically along the guides 26, the pinions 18 roll along the racks 25, the pinions and the racks prevent cocking of the roll 12, and the balls 19 roll in the grooves 20 in the guides to prevent axial movement of the shaft.

There is a minimum of friction between the balls 19 and the guides 21 and the end pieces 23, between the collars 15 and the end pieces, and between the rollers 40 and the tracks 41 and 42, and the pinions roll freely along the racks with a minimum of resistance therebetween. Consequently, very little force is required to move the roll 12 and the elements supporting it up and down in the guides 21, and the roll 12 and the elements movable therewith are as light in weight as possible so that there is very little inertia to movement thereof. The springs 14 are just

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strong enough to promptly lift the roll 12 to its uppermost position when there is no tension on the web. As a result, the roll 12 is responsive to slight variations in tension on the web to give up and to take up web.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. A slack takeup device, which comprises a pair of rolls rotatable on fixed, parallel axes, a pair of opposed frames positioned between said rolls and extending perpendicularly thereto, each frame being provided with a groove extending therealong, a shaft having ball seats in the ends thereof, balls seated in said seats and in said grooves, a pair of pinions fixed to the shaft near the ends thereof, a pair of racks meshing with the pinions extending along the frames, individually adjustable means mounting the racks on the frames, a roll mounted rotatably on the shaft, guideways extending along the frames, rollers mounted on the shaft and fitting into the guideways, and means urging the shaft along the frames away from said first-mentioned rolls.

2. A slack takeup device, which comprises a roll, a shaft provided with ball seats in the ends thereof, antifriction means mounting the roll on the shaft, collars mounted rotatably on the end portions of the shaft, pinions keyed to the end portions of the shaft, a pair of uprights having grooves extending therealong, a pair of balls mounted in the sockets in the ends of the shaft and in the grooves in the uprights, a pair of racks extending parallel to the grooves and meshing with the pinions, adjustment screws for moving the racks along the uprights, and releasable means for fixing the racks to the uprights.

3. A slack takeup device, which comprises a pair of guiding rolls mounted on fixed axes, a floating roll for engaging the portion of the web between said first-mentioned rolls, a shaft mounting the floating roll rotatably, means urging the shaft away from said first-mentioned rolls, pinions mounted on the ends of the shaft, fixed racks for guiding the pinions, channel-like guideways positioned transversely with respect to the shaft, antifriction rollers on the shaft in the guideways for holding the pinions in mesh with the racks, and antifriction means for preventing longitudinal movement of the shaft.

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4. A slack takeup device, which comprises a pair of rolls rotatable on fixed, parallel axes, a pair of opposed frames positioned between said rolls and extending perpendicularly thereto, each frame being provided with a groove extending therealong, a shaft having ball seats in the ends thereof, balls seated in said seats and in said grooves, a pair of pinions fixed to the shaft near the ends thereof, a pair of racks meshing with the pinions extending along the frames, individually adjustable means mounting the racks on the frames, a roll mounted rotatably on the shaft, and means urging the shaft along the frames away from said first-mentioned rolls.

5. A slack takeup device, which comprises a pair of rolls rotatable on fixed, parallel axes, a pair of opposed frames positioned between said rolls and extending perpendicularly thereto, each frame being provided with a groove extending therealong, a shaft having ball seats in the ends thereof, balls seated in said seats and in said grooves, guide rails mounted on the frames in positions extending parallel to the grooves, antifriction rollers mounted on the shaft designed to roll along the guideways, a pair of pinions fixed to the shaft near the ends thereof, a pair of racks meshing with the pinions extending along the frames, a roll mounted rotatably on the shaft, and means urging the shaft along the frames away from said first-mentioned rolls.

6. A slack takeup device, which comprises a roll, a shaft provided with ball seats in the ends thereof, antifriction means mounting the roll on the shaft, collars mounted rotatably on the end portions of the shaft, pinions keyed to the end portions of the shaft, a pair of guideways, antifriction means mounted on the shaft and in the guideways, a pair of racks extending parallel to the grooves and meshing with the pinions, means for fixing the racks to the guideways, a resilient stop mounted at one end of the guideways in the path of the roll, and shock-absorbing means for engaging the shaft prior to engagement of the roll with the stop.

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