

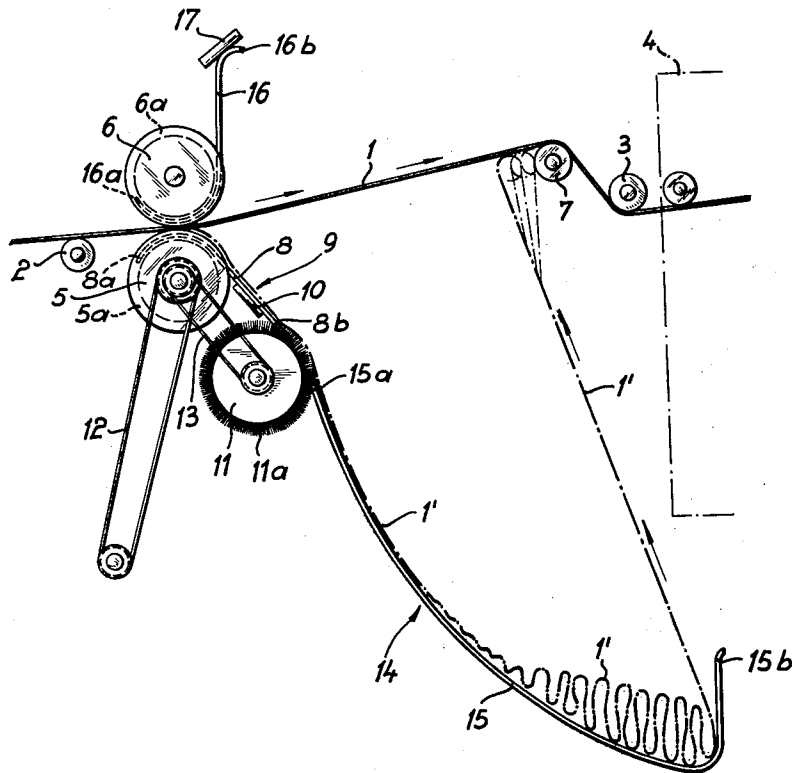
Feb. 19, 1963

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3,078,023

SHEET-FEEDING MECHANISM

Filed July 27, 1959



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3,078,023

SHEET-FEEDING MECHANISM

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Filed July 27, 1959, Ser. No. 829,910
Claims priority, application Germany Feb. 11, 1959
5 Claims. (Cl. 226-118)

The invention relates to a sheet-feeding mechanism and, in particular, to an attachment for machines handling strips of textile or similar pliant goods, designed to achieve a continuous feed of goods to the machine from a roll or the like. The term "machine" is to be understood as denoting any machinery and equipment, or combinations thereof, employed for washing, bleaching, mercerizing, dyeing, printing, steaming, moistening or drying, pressing or embossing, glazing and/or similar operations. In all these cases, the problem is to allow the continuous equipment to operate without interruption when the strip of goods running off a supply roll or the like terminates and the empty roll is to be replaced by a full one wound with a new strip of goods.

Ingenious devices exist that automatically perform not only the said change of rolls but also an operation of attaching the leading end of the new strip of goods to the trailing end of the previous strip of goods. Naturally, however, such devices are very complicated and hence fairly costly and apt to breakdown, and occupy considerable space. The invention relates not to devices of this kind, but rather to a simple, reliable and compact attachment, capable of subsequent installation, if desired, in the path of goods from the roll to the machine, and this without requiring alteration of the normal intermittent procedure of changing rolls. By the usual known procedure, the nearly empty roll is brought to a stop, the trailing end of the previous strip of goods is completely unwound, the leading end of a new strip of goods is sewn thereto, the empty roll is removed from its trestle, the full roll bearing the new strip of goods is set in place, and the new roll is set in rotation. During virtually the entire duration of this change of rolls, the feed of goods to the continuous machine is interrupted. As a rule, the machine must be stopped during this period, which may lead to various sources of trouble. The length of time that the portion of goods then in the machine remains there is increased, thus exposing it excessively to aggressive chemicals in a bleaching apparatus, for example, or drying it excessively in a drying apparatus.

To avoid this delicate situation, slack storage means in the form of loops with suspended dancer rollers or the like have been interposed between the supply roll and the machine. Apart from the fact that such storage devices are extremely bulky, they keep the moving strip of goods under constant tension due to the weight of the rollers or the like. Such strip tension is often quite disadvantageous, particularly for sensitive textile materials.

The object of the invention is to provide, in place of the expensive and imperfectly satisfactory known storage means, a device serving the same purpose but, by favorable contrast to such known means, operating only at the time of roll changing, and delivering the strip of goods to the machine in tensionless condition. For this purpose, according to the invention, there are provided, between guide rollers arranged at suitable distance from each other between the roll of goods and the machine, a rubber feed roller preferably cooperating with a similar counterroller, sheet-guiding means such as slide rods extending obliquely beneath the rubber roller and outside the normal path of the goods, the rods advantageously having their upper ends bent in circular arcs to engage matching annular grooves in the rubber roller while their lower extremities form a flat side grill; a brush roller adjoins the

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slide grill near the upper end of an oblique chute consisting of slightly curved rods turned up at their lower ends, the bottom ends of the slide rods and the top ends of the chute rods extend between the bristles of the brush roller. The rods of the slide and the chute may optionally be united into continuous rods, forming an oblique grill between the rods of which the bristles of the brush roller enter. The rubber roller may be driven at variable speed, and the brush roller runs at a preassigned speed ratio to the rubber roller.

In normal operation, the strip of goods fed to the preceding guide roller from the supply roll passes directly from the said guide roller over the rubber roller to the following guide roller, and this without tension, provided the rubber roller, by suitable regulation of its drive, is given a circumferential speed equivalent to the normal linear speed of the strip of goods. But when the strip of goods has unwound from the roll almost completely, the rubber roller is made to revolve faster. In unit time, it will then pull more goods off the supply roll than will run into the machine. Consequently, a loop of slack will be formed which will drop down the slide onto the bristles of the brush roller, the latter revolving at a speed suitably increased over that of the rubber roller. The brush roller accordingly propels the growing loop of goods downward on the adjoining chute, where the strip piles up accordion-fashion ahead of the turned-up ends of the rods forming the chute, thus creating a tensionless reservoir of goods. The machine runs on undisturbed and unaffected by this process.

At the proper moment, the roll is brought to a stop, the trailing end of the strip of goods is unwound, and the end is sewn to the leading end of a new strip of goods. Then the empty roll is replaced by the full roll bearing the new strip of goods. During these operations, the rubber roller has been stopped, so that the machine is merely withdrawing goods from the reservoir created in the manner previously described. As soon as the full roll has been brought into operative condition, the drive of the rubber roller is started up again at the normal speed of that roller.

Immediately ahead of the last guide roller, in the direction of motion of the strip of goods, there may be provided a width guide which is preferably retractable downward out of the normal path of the goods. If the stored goods, in piling up against the bottom of the aforesaid chute, have become folded to any extent, the width guide will smooth the folds out again. If the rubber roller cooperates with a counterroller, and the strip of goods passes between the rubber roller and the counterroller on its way from the preceding guide roller, the counterroller will prevent any folding of the strip of goods upon the rubber roller, both during normal feed to the machine and during the accumulation of slack.

So long as the strip of goods is fed to the machine by the normal route (first guide roller, rubber roller, second guide roller), the device according to the invention requires no supervision or attention. Now if the machine is to be suddenly stopped for any reason, and no attendant is at hand to stop the drive of the rubber roller, an undesired pile of goods will form in the aforementioned manner. Then it may happen that the loop of slack will shoot upward, and not go down the slide to the brush roller as intended. The rising loop of goods might be picked up by the counterroller, against the normal direction of feed, in which case it would pile up in a disorderly manner at the gap between counterroller and rubber roller, readily leading to serious damage to the goods and interference with operation. To exclude this adverse possibility effectively, deflector rods extending upward beyond the counterroller are provided, their circularly bent lower ends engaging annular grooves in the counterroller. These

deflector rods will throw back any loop of slack shooting upward, so that it will go down the slide to the brush roller which will securely pick it up and propel it down the adjoining chute.

The device according to the invention will now be more fully described with reference to the accompanying drawing, the sole FIGURE of which is a side-elevational view of an attachment embodying the present improvement but it should be understood that this is given by way of illustration and not of limitation and that many changes in the details may be made without departing from the spirit of the invention.

In the drawing, a sheet of pliant goods 1, for example a strip of fabric, runs over suitably spaced guide rollers 2 and 3, which may be arranged in pairs, from a supply roll (not shown) towards a continuous machine 4 indicated by dot-dash lines, of the sort initially specified. Between guide rollers 2 and 3 there are a pair of rubber feed rollers 5 and 6 which, however, may alternatively be covered with some elastically yielding material other than rubber, with the strip of material 1 passing between them, and a width guide 7 which is preferably retractable downward out of the normal path of the strip from guide roller 2 to rubber roller 5 and guide roller 3.

Obliquely beneath the rubber roller 5, having annular grooves 5a in its periphery, there are guide rods 8, consisting for example of 8-millimeter steel rounds and forming a flat, oblique slide grill designated as a whole by the numeral 9. The slide rods 8, with upper ends 8a engaging the annular grooves 5a of roller 5 by circular bends held in the grooves by the overlying strip of goods 1 and counterroller 6, rest on a supporting rail 10 with their lower ends 8b extending between the bristles 11a of a brush roller 11 adjoining the slide 9. The rubber roller 5 is driven at variable speed by a transmission 12, and normally runs at a circumferential speed equivalent to the requisite rate of feed of the strip of goods 1 to the machine 4. The brush roller 11 is driven by a drive 13 dependent on the drive 12 of the rubber roller 5 in a preassigned speed ratio to the latter.

The slide 9 and the circumferential sector of the brush roller 11, constituting an extension thereof, form an oblique surface extending downward in a flat grill designated as a whole by the numeral 14. This consists of gently curved slide rods 15 whose upper ends 15a extend between the bristles 11a of the brush roller 11 and whose lower ends 15b are bent upward. The slide rods 15 may advantageously be of the same material as the slide rods 8, for example 8-millimeter steel rounds.

If, just before the strip of goods 1 is about to unroll completely from the roll of goods, the speed of roller 5 is increased, a reservoir of slack 1' will gradually be created on the chute 14 in the manner previously described. The reservoir of slack is indicated as a dot-dash line in the drawing.

The counterroller 6 has annular grooves 6a like the grooves 5a, but preferably offset therefrom by half a groove separation in axial direction. The annular grooves 6a are engaged by the lower ends 16a of deflector rods 16 extending upward behind the counterroller 6 and attached by their upper ends 16b to a supporting rail 17 or the like.

I claim:

1. The combination, with a machine for continuously treating a strip of flexible sheet material fed thereto along a transport path, of mechanism for accumulating a portion of said strip and subsequently feeding it to said machine, said mechanism including main feed means positioned along said path and operable at a rate in excess of the normal feed rate of said machine for deflecting a portion of said strip downwardly, guide means inclined generally downwardly from said main feed means for accumulating the downwardly deflected portion of said strip, said guide means having an upwardly extending terminal portion remote from said main feed means for directing the accumulated portion of said strip upwardly

toward said transport path, and a rotary brush offset from said transport path and positioned below said guide means, said brush extending through said guide means into peripheral contact with said deflected portion while being rotated with a peripheral speed in excess of that of said main feed means for facilitating displacement of said deflected portion downward along said guide means.

2. The combination, with a machine for continuously treating a strip of flexible material fed thereto along a transport path, of mechanism for accumulating a portion of said strip and subsequently feeding it to said machine, said mechanism including a pair of feed rollers positioned along said path and extending transversely to said strip on opposite sides thereof, said rollers being operable at a rate in excess of the normal feed rate of said machine for deflecting a portion of said strip downwardly, guide means inclined generally downwardly from said feed rollers for accumulating the downwardly deflected portion of said strip, said guide means having an upwardly extending terminal portion remote from said feed rollers for directing the accumulated portion of said strip upwardly toward said transport path, and a rotary brush offset from said transport path and positioned below said guide means, said brush extending through said guide means into peripheral contact with said deflected portion while being rotated with a peripheral speed in excess of that of said feed rollers for facilitating displacement of said deflected portion downward along said guide means.

3. The combination, with a machine for continuously treating a strip of flexible material fed thereto along a substantially horizontal transport path, of mechanism for accumulating a portion of said strip and subsequently feeding it to said machine, said mechanism including an upper and a lower feed roller positioned along said path and extending transversely to said strip on opposite sides thereof, said rollers being operable at a rate in excess of the normal feed rate of said machine for deflecting a portion of said strip downwardly, said lower feed roller being provided with a plurality of axially spaced annular peripheral grooves, guide means inclined generally downwardly from said feed rollers for accumulating the downwardly deflected portion of said strip, said guide means including a plurality of substantially parallel rods with curved upper ends lying in respective grooves of said lower roller and having an upwardly extending terminal portion remote from said feed rollers for directing the accumulated portion of said strip upwardly toward said transport path, and auxiliary feed means offset from said transport path and positioned along said guide means in frictional contact with said deflected portion, said auxiliary feed means being operable at a rate in excess of that of said feed rollers for facilitating displacement of said deflected portion downward along said guide means, said upper feed roller being provided with a plurality of axially spaced annular peripheral grooves, said mechanism further comprising a plurality of substantially parallel upstanding deflector rods having curved lower ends lying in respective grooves of said upper roller, the grooves of said upper roller being offset axially from the grooves of said lower roller.

4. The combination, with a machine for continuously treating a strip of flexible material fed thereto along a substantially horizontal transport path, of mechanism for accumulating a portion of said strip and subsequently feeding it to said machine, said mechanism including an upper and a lower feed roller positioned along said path and extending transversely to said strip on opposite sides thereof, said rollers being operable at a rate in excess of the normal feed rate of said machine for deflecting a portion of said strip downwardly, said lower feed roller being provided with a plurality of axially spaced annular peripheral grooves, guide means inclined generally downwardly from said feed rollers for accumulating the downwardly deflected portion of said strip, said guide means including a plurality of substantially parallel rods with

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curved upper ends lying in respective grooves of said lower roller and having an upwardly extending terminal portion remote from said feed rollers for directing the accumulated portion of said strip upwardly toward said transport path, and a rotary brush offset from said transport path and positioned below said guide means, said brush extending through said guide means into peripheral contact with said deflected portion while being rotated with a peripheral speed in excess of that of said feed rollers for facilitating displacement of said deflected portion downward along said guide means.

5. The combination, with a machine for continuously treating a strip of flexible material fed thereto along a transport path, of mechanism for accumulating a portion of said strip and subsequently feeding it to said machine, said mechanism including a pair of feed rollers positioned along said path and extending transversely to said strip on opposite sides thereof, said rollers being operable at a rate in excess of the normal feed rate of said machine for deflecting a portion of said strip downwardly, guide means inclined generally downwardly from said feed rollers for accumulating the downwardly deflected portion of said strip, said guide means having an upwardly extend-

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ing terminal portion remote from said feed rollers for directing the accumulated portion of said strip upwardly toward said transport path, at least one supplemental roller disposed along said transport path and directly above a portion of said guide means rearwardly of said terminal portion for taking up said accumulated portion of said strip, said supplemental roller and said feed rollers defining said transport path in an inoperative condition of said mechanism, and a rotary brush offset from said transport path and positioned below said guide means, said brush extending through said guide means into peripheral contact with said deflected portion while being rotated with a peripheral speed in excess of that of said feed rollers for facilitating displacement of said deflected portion downward along said guide means.

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