Sept. 23, 1969 N. S. VALENTINE 3,468,532

APPARATUS FOR FEEDING LAUNDERED SHEETS

Filed Sept. 22, 1967 5 Sheets-Sheet 1

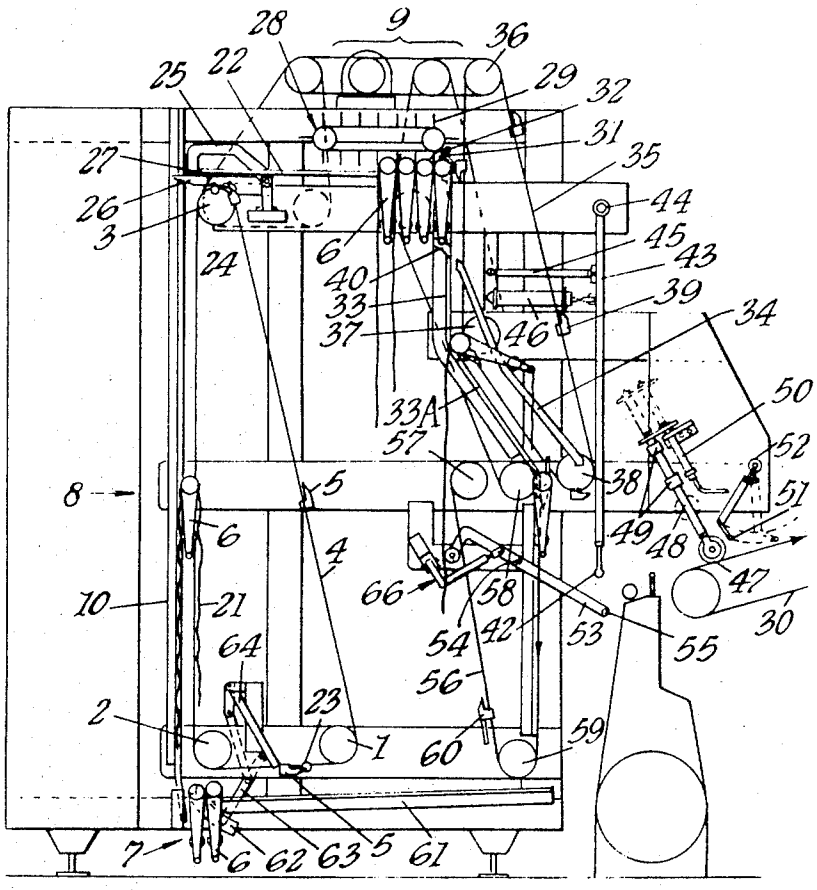


Fig. 1.

APPARATUS FOR FEEDING LAUNDERED SHEETS

Filed Sept. 22, 1967 5 Sheets-Sheet 2

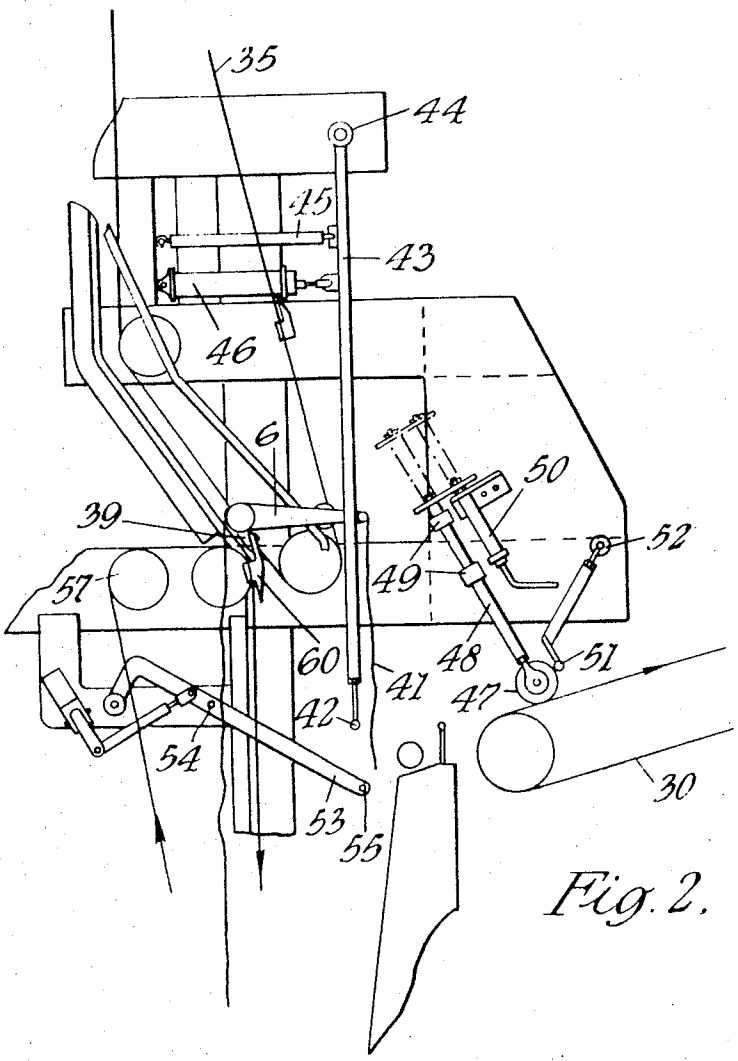


Fig. 2.

APPARATUS FOR FEEDING LAUNDERED SHEETS

Filed Sept. 22, 1967 5 Sheets-Sheet 3

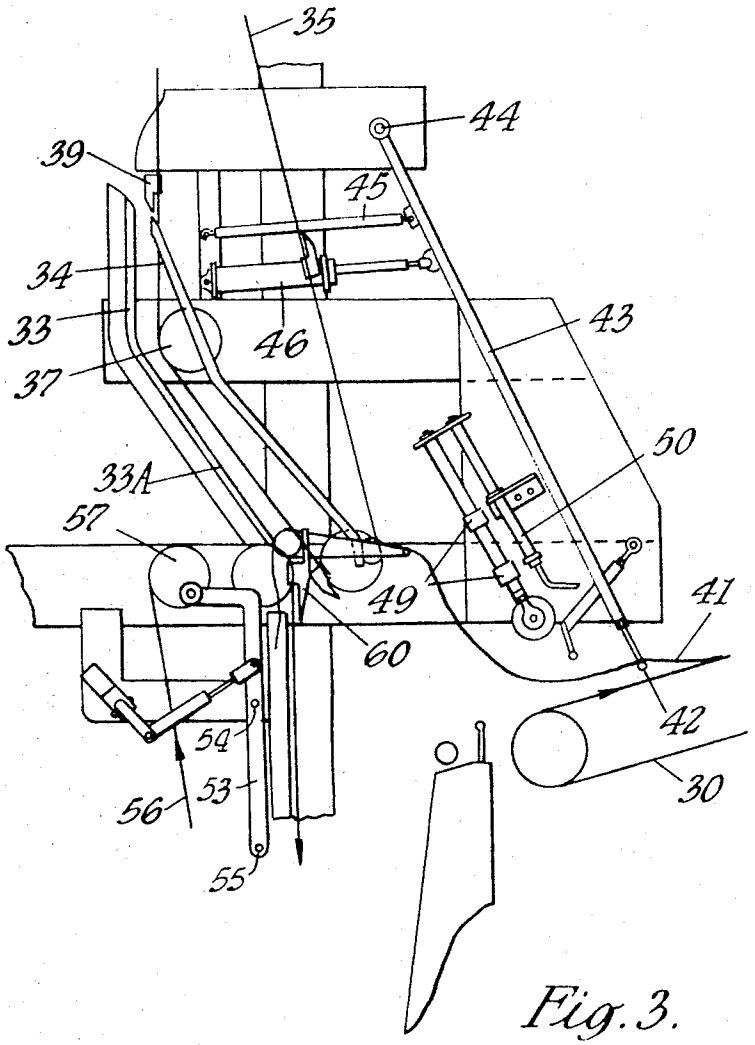


Fig. 3.

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APPARATUS FOR FEEDING LAUNDERED SHEETS

Filed Sept. 22, 1967 5 Sheets-Sheet 4

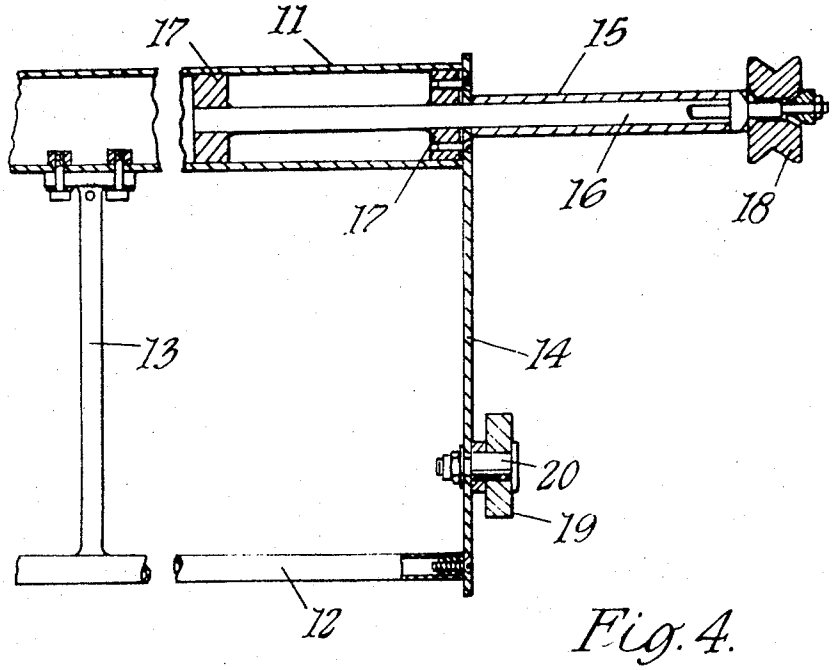


Fig. 4.

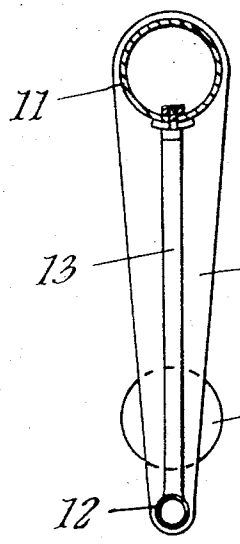


Fig. 5.

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APPARATUS FOR FEEDING LAUNDERED SHEETS

Filed Sept. 22, 1967 5 Sheets-Sheet 5

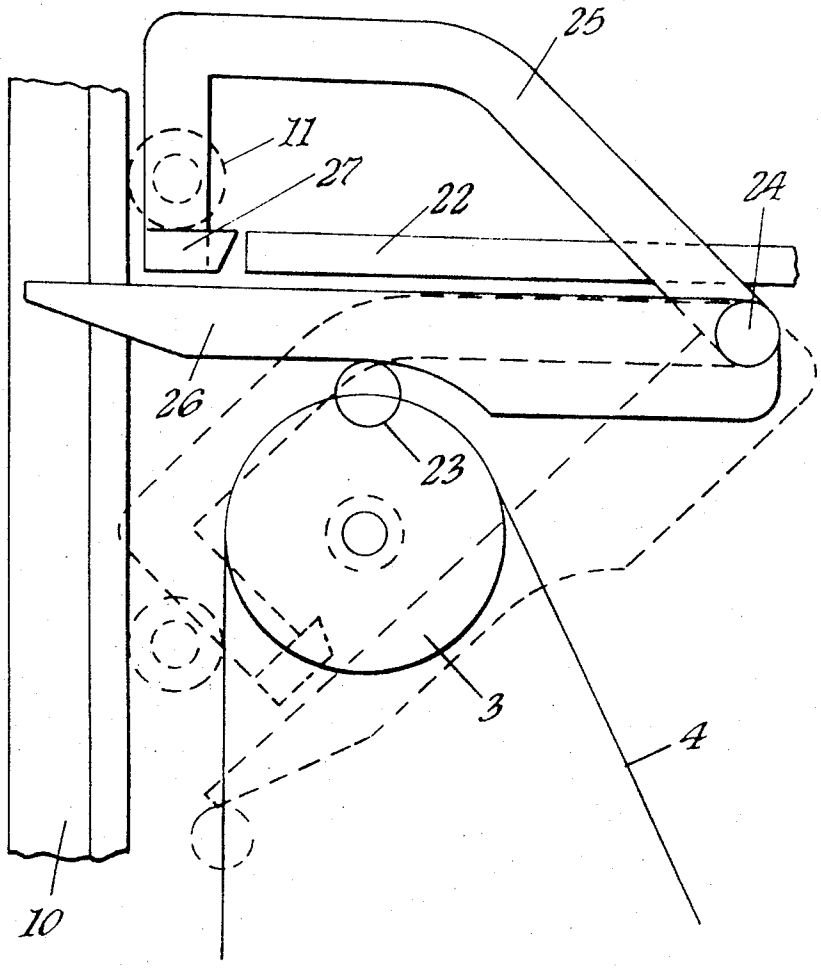


Fig. 6.

United States Patent Office 3,468,532 Patented Sept. 23, 1969

3,468,532

APPARATUS FOR FEEDING LAUNDERED SHEETS

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U.S. Cl. 271—69 9 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for feeding laundered sheets to an endless callander feed band passing around spaced apart rollers, said apparatus comprising a plurality of sheet carriers, means for raising each sheet carrier upwardly to a sheet loading station with the sheet carrier defining upper and lower edges extending in a direction parallel to the axes of the said rollers, means for conveying each sheet carrier from the sheet loading station to a level above the callander feed band, and means for lowering the sheet carrier towards the callander feed band and for causing the sheet carrier to assume a setting in which one of the aforesaid edges is positioned forwardly of the other edge so as to space apart the leading and trailing ends of the sheet, and means for sweeping the leading end of the sheet on the callander feed band, including a loaded sheet carrier storage station at which the loaded sheet carriers can queue prior to being lowered towards said callander feed band.

This invention relates to apparatus for feeding laundered sheets to callander feed bands.

It is an object of the present invention to provide apparatus whereby sheets may be draped over rising sheet carriers; whereby the loaded sheet carriers are thereafter conveyed to an upper storage point at a level above the callander feed bands; whereby the loaded sheet carriers thereafter descend in a regulated manner towards the callander feed bands in a manner causing the leading and trailing ends of the sheet to move apart such that only the leading end thereof is readily available for feeding onto the callander feed bands; and whereby after a sheet has been removed from its sheet carrier and crossed onto the callander feed band, the empty sheet carrier is returned to a storage station pending further use.

With a sheet feeding apparatus constructed to operate in this manner the rate at which the laundered sheets are draped across the rising sheet carriers need not be in strict synchronism with the rate at which the laundered sheets are fed to the callander feed bands since any temporary excess of the former over the latter, due to the laundered sheets being delivered in batches to the machine, is accommodated by the loaded sheet carriers (queuing) at the aforesaid upper storage position pending their regulated descent towards the callander feed bands.

According to the present invention, the apparatus for feeding laundered sheets to an endless callander feed band passing around spaced apart rollers, comprises a plurality of sheet carriers, each sheet carrier including a pair of spaced apart bars extending in a direction parallel to the axes of said rollers, means for raising each sheet carrier upwardly to a sheet loading station in which one of said bars is above the other bar and in which a sheet is draped over the upper bar such that the leading and trailing edges of the sheet extend downwardly past the bottom bar, means for conveying each sheet carrier from the sheet loading station to an upper level such that the lowermost edge of leading face of the sheet carried by the sheet carrier is above the callander feed band, means lowering the sheet carrier from said upper level towards the callander feed band and for causing the bars to move relatively to each other so as to space apart the leading and trailing ends of the sheet, means for sweeping the leading end of the sheet onto the callander feed band such that the sheet is removed from the sheet carrier by the callander feed band, and means for returning the empty sheet carrier to a start position at a level below the sheet loading station.

To ensure that each loaded sheet carrier shall, when descending towards the callander feed band, cause the leading and trailing ends of the sheet to move apart, the apparatus includes means for causing the bottom bar of the descending sheet carrier to move forwardly and upwardly relatively to its upper bar during said descent.

In order that the invention shall be clearly understood a construction thereof will now be described with reference to the accompanying schematic drawings wherein—

FIGURE 1 is a side elevation showing some of the principal mechanical components of the apparatus and with a loaded sheet carrier in the process of descending towards the callander feed band;

FIGURE 2 is a view of part of FIGURE 1 showing a loaded sheet carrier in a setting just prior to the leading edge of the sheet being fed onto the callander feed band;

FIGURE 3 is a view similar to FIGURE 2 but showing the leading edge of the sheet being fed onto the callander feed band;

FIGURE 4 is a view, partly in cross-section, of one end of a sheet carrier;

FIGURE 5 is an end view, partly in cross-section, of a sheet carrier; and

FIGURE 6 is a detail view of the means used to receive the rising sheet carriers and transfer them to the aforesaid upper storage position.

Sheet loading station

As will be seen from FIGURE 1 the apparatus includes chain wheels **1**, **2**, **3**, over which pass an endless chain **4**, these being duplicated on each side of the machine.

Each chain **4** carries a plurality of uniformly spaced apart chain-carried blocks **5** that serve to move empty sheet carriers **6** from a lower storage station indicated generally at **7** to a sheet loading station indicated generally at **8**, and to thereafter raise the loaded sheet carrier **6** to an upper level for transfer to the upper storage position indicated generally at **9**.

As each block **5** passes the lower storage station **7**, a sheet carrier **6** is raised, by means described hereinafter, from the lower storage station to a level and setting where it can be engaged by the sheet carrier block **5** as it commences to rise upwardly along the path spanned by the chain **4** between the chain wheels **2** and **3**.

Vertical guide rods **10** co-operate with the block **5** and the vertical run of the chain **4** to constrain the carrier **6** to rise in a vertical plane between the guide rods **10** and the chain **4**.

Referring now to FIGURES 4 and 5 it will be seen that each sheet carrier **6** comprises an upper bar **11** and a lower bar **12**, these bars being of tubular construction. The two bars are in parallel and spaced apart relationship and are interconnected by spacer rods **13** and end plates **14**. Extending co-axially with each end of the upper bar **11** is an extension tube **15** housing a rod **16**. Each rod **16** is rigidly braced at its inner end by bush members **17** that are rigid with the rod **16** and are a sliding fit in the bar **11**, the outer bush member **17** being secured by screws to the end plate **14**. At its other end each rod **16** carries an upper roller **18** running on bearings.

Each plate **14** carries a lower roller **19** rotating on a stub shaft **20** secured to the end plate **14** at a point intermediate the bars **11** and **12**.

Returning now to FIGURE 1, each chain-carried block **5**, as it rises upwardly parallel with the guide rods **10**,

will engage under the extension tube 15 of the sheet carrier 6, there being, as already stated, a chain 4 and chain wheels 1, 2, 3 on each side of the machine.

As each sheet carrier 6 and associated chain-carried blocks 5 reach the sheet loading station 8, they operate a microswitch (not shown) to stop the motion of the chains 4. One or two operators then drape a sheet 21 over the upper bar 11 of the sheet carrier 6, the lower bar 12 hanging in pendulum fashion below the upper bar 11. When the sheet 21 has been suitably draped over the upper bar 11 of the sheet carrier 6, the operator restarts the chain 4 manually and the loaded sheet carrier 6 commences its upward journey towards the chain wheel 3.

Transferring loaded sheet carriers from chain 4 to arms or rails 22 feeding sheet carriers 6 to the upper storage station 9

Trailing behind each chain-carried block 5 is a roller 23, as can be seen from the lower run of the chain 4 in FIGURE 1 and the vertical run of the chain 4 in FIGURE 6.

A pair of spaced parallel arms or rails 22 serve to convey the sheet carriers 6 towards the upper storage station 9. Pivoted at 24, below the rails 22 and on each side of the apparatus are a pair of arms 25, 26, the upper arm 25 being rigidly coupled to the lower arm 26 such that they are capable of moving in unison about the pivotal axis 24 from a lower setting indicated in broken lines to an upper setting indicated in full lines.

In the lower setting each lower arm 26 is of such length and is in such a plane that it extends into the path of motion of the rollers 23 of the chains 4, but not into the path of motion of the blocks 5 and the sheet carriers 6 thereon, the blocks 5 and sheet carriers 6 thus being capable of moving to a setting above the lower arm 26.

Each upper arm 25 is of an inverted U-shape and is positioned in a plane spaced outwardly of the plane of the upper rollers 18 of a sheet carrier 6, there being, as already stated, two upper arms 25 so that there will be one arm 25 for each of the two upper rollers 18 of a sheet carrier 6.

Each upper arm 25 carries at its free extremity a transverse carrier supporting bar 27, and the upper arm 25 and the transverse carrier supporting bars 27 are so designed that when the arms 25, 26 are in their lowermost setting as indicated in broken lines in FIGURE 6, the transverse carrier supporting bars 27 are positioned slightly in front of and slightly below the upper rollers 18 of the sheet-carriers 6.

As the rising rollers 23 strike the underface of the lower arms 26, the arms 26 and therefore the upper arms 25, are caused to rise upwardly to the position illustrated in full lines with the result that the transverse carrier supporting bars 27 move towards and under the upper rollers 18 of the sheet carrier 6 so as to lift the sheet carrier 6 off the chain carried blocks 5 and raise the sheet carriers 6 to a level at which the rollers 18 are above the level of rails 22.

The arms for rails 22 and the transverse carrier supporting bars 27 are so inclined that the loaded sheet carrier 6 moves from the bars 27 to the arms or rails 22 by gravity and thence along the arms or rails 22 to the upper storage station by gravity.

Upper storage station

Positioned above the arms or rails 22 is a carrier spacing device 28 comprising an endless drive chain carrying a plurality of pivoted vanes 29, the vanes 29 serving to space the sheet carriers 6 apart in an orderly manner prior to being released for descent towards the callander feed band 30. At the exit end of the carrier spacing device 28 is a sheet carrier stop 31 rockable about an axis 32, the stop 31 preventing the leading sheet carrier 6 from being released from the upper storage station until the stop 31 is rocked to a carrier releasing setting.

Spacing leading and trailing edges of the sheets apart

Below the storage station 9 are guide tracks 33, 34, serving to guide each sheet carrier 6 from the storage station 9 to the callander feed band 30. The track 33 initially extends vertically downwards for part of its length and then slopes forwardly and downwardly as at 33A. The track 34 is spaced forwardly of the track 33 and extends forwardly and downwardly in parallel, or substantially parallel, relationship with the portion 33A of the track 33.

Associated with the tracks 33, 34 are a pair of endless chains 35, there being a chain 35 for each side of the apparatus. Each chain 35 passes around chain wheels 36, 37, 38 and carries a plurality of spaced chain dogs 39. The chain wheels 36, 37 are so positioned that the chain length extending between them conveys the dogs 39 along a path in close proximity to and parallel with, the vertical run of the guide tracks 33. The chain wheels 37, 38 are so positioned that the chain length extending between them conveys the dogs 39 along a path in close proximity to and parallel with, the portion 33A of the track 33.

The speed of the chains 35 is controlled by a geared motor and as the chain dogs 39 pass the sheet carrier stop 31, they rock the sheet carrier stop about its pivotal axis 32 in a manner raising the stop 31 and permitting the carrier spacing device 28 to move all the assembled sheet carriers 6 forwardly by one position and so cause the leading sheet carrier 6 to be deposited on a pair of descending dogs 39. As the chain dogs 39 move away from the stop 31, the stop 31 rocks downwardly to a setting blocking further forward motion of the sheet carriers away from the storage station.

As the loaded sheet carrier 6 is lowered by the descending dogs 39, the lower rollers 19 of the sheet carrier roll over cam surfaces 40 that guide said lower rollers 19 on to the tracks 34, the upper rollers 18 rolling against the guide tracks 33. It will be noted from FIGURES 1 to 3 that the guide tracks 33, 34 are so spaced apart that the engagement of the rollers 18 and 19 therewith causes the lower end of the sheet carrier to swing forwardly and upwardly relatively to the upper rollers 18 of the sheet carrier 6, to cause the spacer rods 13 and end plates 14 thereof to extend horizontally, or substantially horizontally. In this manner the upper and lower bars 11, 12 of the sheet carrier 6 are caused to move the leading and trailing edges of the sheet thereon to a spaced apart condition and so ensure that only the leading edge of the sheet will be presented to the callander feed band.

Transferring sheet from sheet carrier to callander feed band

As is illustrated in FIGURE 1 the descending sheet carrier 6 is at a setting intermediate the ends of the portion 33A of the guide track 33. If a sheet is in the process of being conveyed by the callander feed band, then a suitably positioned microswitch (not shown) serves to stop the motion of the chains 35 and so hold the sheet carrier 6 at a setting such as is illustrated in FIGURE 1 until such time as the callander feed band is free to accept a further sheet.

In FIGURE 2 the sheet carrier 6 is illustrated as being at the delivery end of the guide tracks 33, 34 and at this setting the leading edge 41 of the sheet is so positioned that it is draped over a transfer bar 42 carried by a pair of arms 43 pivoted about an upper axis 44. Tension springs 45 couple the upper end of the arms 43 to the frame of the apparatus in a manner biassing the arms 43 to a vertical setting as illustrated in FIGURES 1 and 2. Pneumatic cylinders 46 also couple the arms 43 to the frame of the apparatus, these cylinders 46 being capable of swinging the arms forwardly, as illustrated in FIGURE 3, to a setting in which the transfer bar 42 sweeps the leading edge 41 of the sheet on to the callander feed band 30.

Associated with the callander feed band **30** is a dolly roller **47** mounted on a pair of arms **48** extending substantially normal to the callander feed band **30** and slidable in guides **49**.

Pneumatic means **50** is coupled to the arms **48** such that the arms **48** can be caused to slide in the guides **49**. As the transfer bar **42** sweeps forwardly to present the leading edge of the sheet **6** to the callander feed band **30**, the pneumatic means **50** is operated to cause the dolly roller **47** to move away from the callender feed band in a manner permitting the transfer bar **42** to pass under the dolly roller **47**.

Positioned forwardly of the dolly roller **47** is a smoothing bar **51** pivoted at **52**. As shown in FIGURE 3 the smoothing bar **51** is spaced from the callander feed band, but after the transfer bar **42** has swept forwardly to present the leading edge of the sheet to the callander feed band **30**, the smoothing bar **51** rocks downwardly about its pivotal axis **52** to press the leading edge of the sheet against the callander feed band **30** and so establish frictional engagement of the sheet with the callander feed band in a manner causing the leading edge of the sheet to be carried forwardly to the first rolls of the callander feed band.

Thereafter the transfer bar **42** is swung back to the setting illustrated in FIGURES 1 and 2 on de-energisation of the pneumatic cylinders **46**. Thereafter the dolly roller **47** is caused to descend into engagement with the sheet on the callander feed band **30**.

Below the transfer far **42** are a pair of arms **53** mounted on a pivotal axis **54**. The free ends of the arms **53** are interconnected by a bar **55**. Link means indicated generally at **66** is coupled to the arms **53** such that the arms can be swung temporarily clockwise from a setting illustrated in FIGURES 1 and 2 to a lower setting illustrated in FIGURE 3. Bar **55** is normally in position shown in FIGURES 1 and 2. When sheet carrier **6** descends from storage position **9** carrier **6** rotates through approximately 90 degrees separating the leading edge of sheet from trailing edge. This allows the two edges to pass either side of bar **55**. When the leading edge is transferred to the feedbands air pistons rotate bar **55** to a position approximately vertical below pivot **54** to allow the sheet carrier **6** to be passed downwardly to a lower storage position as described hereinafter.

Bar **55** carries trailing edge of the sheet from the feed bands of the callander and clear of sheet carrier **6** as it returns down chain **56** to carrier storage rail **61**.

When carrier **6** has passed below bar **55**, bar **55** is returned to the waiting position as shown in FIGURES 1 and 2.

Conveying empty sheet carriers to lower storage station

Below the guide tracks **33**, **34** are a pair of endless chains **56** positioned one on each side of the apparatus. Each endless chain **56** passes over three chain wheels **57**, **58**, **59**. The chains **56** carry spaced chain dogs **60** and the chain wheels **58**, **59** are so positioned that the chain span between them carries the dogs **60** vertically downwardly from a setting in which they accept an empty sheet carrier from the dogs **39** on the chains **35**, to the lower chain wheels **59** where as the dogs **60** pass around the chain wheels **59**, the sheet carrier thereon is discharged on to a downwardly inclined storage rail **61** on which the upper rollers **18** of the sheet carrier **6** can run.

As the lower rollers **19** of the sheet carriers **6** leave the upper guide track **34**, the sheet carrier **6** swings downwardly about its upper rollers **18** so that the bar **12** thereof is once more suspended in pendulum fashion below the upper bar **11**, and the sheet carrier is carried downwardly in this condition by the dogs **60** on the chains **56**.

Lower storage station

As shown in FIGURE 1 the empty sheet carriers that pass down the inclined storage rail **61** queue up at the lower storage station **7**.

At the lower storage station there are a pair of lifting arms **62**, one for each side of the apparatus. Each lifting arm **62** is rigid with an arm **63** pivoted at its upper end to the framework of the apparatus. A further pivoted arm **64**, also pivoted to the framework of the apparatus, is linked to the arm **63** such that movement of the arm **64** results in movement of the arm **63**. As rollers **23**, carried by the chains **4** move along the span between the chain wheels **1** and **2**, they strike against the arms **64** to rock the arm **64** clockwise and so cause a corresponding clockwise movement of the arms **63**. In their lowermost setting, the lifting arms **62** are so positioned that the upper rollers **18** of the leading sheet carrier **6** rests thereon. As the arms **63** are raised, the lifting arms **62** are raised in a corresponding manner to bring the sheet carrier **6** thereon to a level on which the chain-carried block **5** can come up below it as they pass round the chain wheels and so remove the sheet carrier **6** from the lifting arms **62**.

Having now described one particular embodiment of the present invention it will be appreciated that many modifications may be made thereto as may fall within the scope of the appended claims.

I claim:

1. Apparatus for feeding laundered sheets to an endless callander feed band passing around spaced apart rollers, said apparatus comprising a plurality of sheet carriers, each sheet carrier including a pair of spaced apart bars extending in a direction parallel to the axes of the said rollers, means for raising each sheet carrier upwardly to a sheet loading station in which one of the said bars is above the other bar and in which a sheet may be draped over the upper bar such that the leading and trailing edges of the sheet extends downwardly past the bottom bar, means for conveying each sheet carrier from the sheet loading station to an upper level such that the lowermost edge of the leading edge of the sheet carried by the sheet carrier is above the callander feed band, means lowering the sheet carrier from said upper level towards the callander feed band and for causing the bars to move relatively to each other so as to space apart the leading and trailing ends of the sheet, means for sweeping the leading end of the sheet on to the callander feed band such that the sheet is removed from the sheet carrier by the callander feed band, and means for returning the empty sheet carrier to a start position at a level below the sheet loading station.

2. Apparatus for feeding laundered sheets to an endless callander feed band passing around spaced apart rollers, said apparatus comprising a plurality of sheet carriers, including a pair of spaced apart bars extending in a direction parallel to the axes of the said rollers, means for raising each sheet carrier upwardly to a sheet loading station in which one of said bars is above the other bar and in which a sheet is draped over the upper bar such that the leading edge of the sheet extends downwardly past the bottom bar, means for conveying each sheet carrier from a sheet loading station to an upper level such that the lowermost edge of the leading end of the sheet carried by the sheet carrier is above the callander feed band, means for lowering the sheet carrier from said upper level towards the callander feed band and for causing the bars to move relatively to each other so as to space apart the leading and trailing ends of the sheet, and means for sweeping the leading end of the sheet on to the callander feed band.

3. Apparatus for feeding laundered sheets to an endless callander feed band passing around spaced apart rollers, said apparatus comprising a plurality of sheet carriers, means for raising each sheet carrier upwardly to a sheet loading station with the sheet carrier defining upper and lower edges extending in a direction parallel to the axes of the said rollers, means for conveying each sheet carrier from the sheet loading station to a level above the callander feed band, and means for lowering the sheet carrier towards the callander feed band and for causing the sheet carrier to assume a setting in which one of the afore-

said edges is positioned forwardly of the other edge so as to space apart the leading and trailing ends of the sheet, and means for sweeping the leading end of the sheet on to the callander feed band, including a loaded sheet carrier storage station at which the loaded sheet carriers can queue prior to being lowered towards said callander feed band.

4. Apparatus claimed in claim 3 and wherein said level is such that the lowermost edge of the leading part of the sheet is above the callander feed band.

5. Apparatus as claimed in claim 3 and including an endless chain above said storage station, said chain carrying a plurality of vanes adapted to extend downwardly between adjacent loaded sheet carriers to space said sheet carriers apart in an orderly manner and to feed them towards the exit end of the storage station.

6. Apparatus as claimed in claim 3 and wherein the sheet carrier includes, on each of its two sides, upper and lower rollers, there being guide tracks on the apparatus for each of said rollers, said tracks extending downwardly towards the callander feed band, said tracks and rollers cooperating to cause a sheet carrier, as it moves downwardly towards the callander feed band, to be disposed in plane inclined to the vertical.

7. Apparatus as claimed in claim 3 including a stop-motion to prevent a loaded sheet carrier from being lowered towards the callander feed band while a sheet is already on the callander feed band.

8. Apparatus as claimed in claim 3 and wherein the sheet carriers are carried upwardly to and past the loading station by chain carried blocks.

9. Apparatus as claimed in claim 3 and wherein the loaded sheet carriers are lowered towards the callander feed band by chain carried dogs.

References Cited

UNITED STATES PATENTS

1,948,239	2/1934	Redd	38—2
3,349,928	10/1967	Howard	198—85

FOREIGN PATENTS

859,223	12/1952	Germany.

RICHARD E. AEGERTER, Primary Examiner