Aug. 25, 1964 D. D. MAZZOLLA 3,145,491

FLATWORK FEEDING AND SMOOTHING ATTACHMENT FOR IRONER

Filed Feb. 26, 1962 3 Sheets-Sheet 1

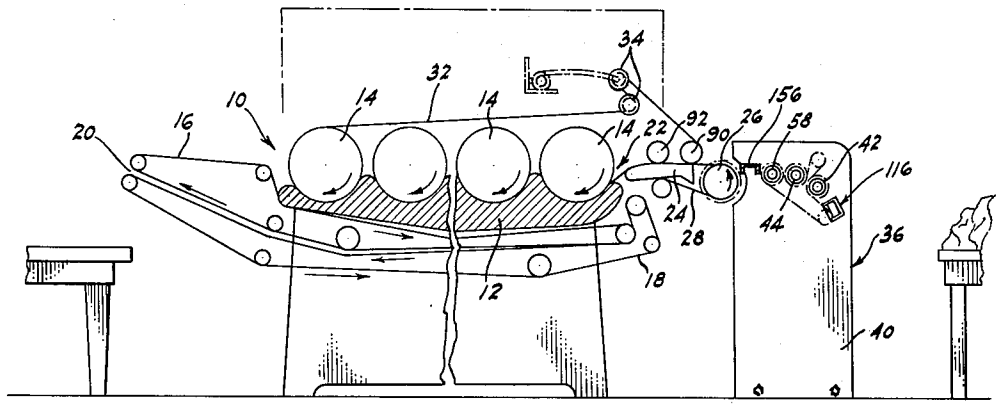


Fig. 1

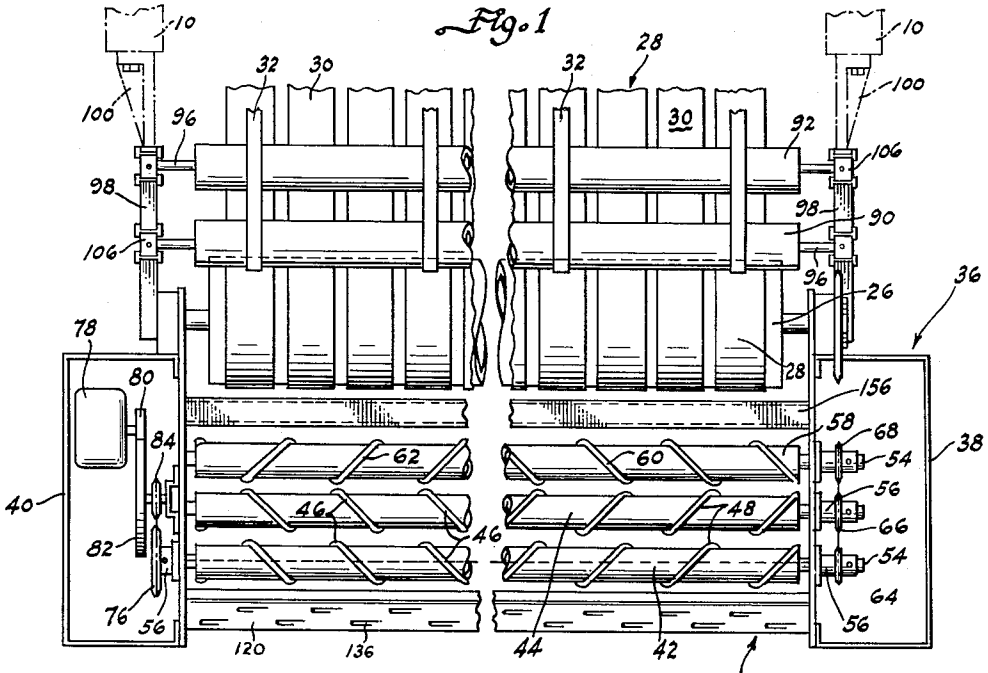


Fig. 2

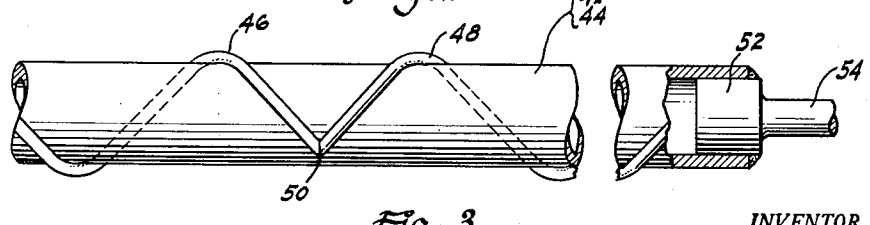


Fig. 3

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Filed Feb. 26, 1962 3 Sheets-Sheet 2

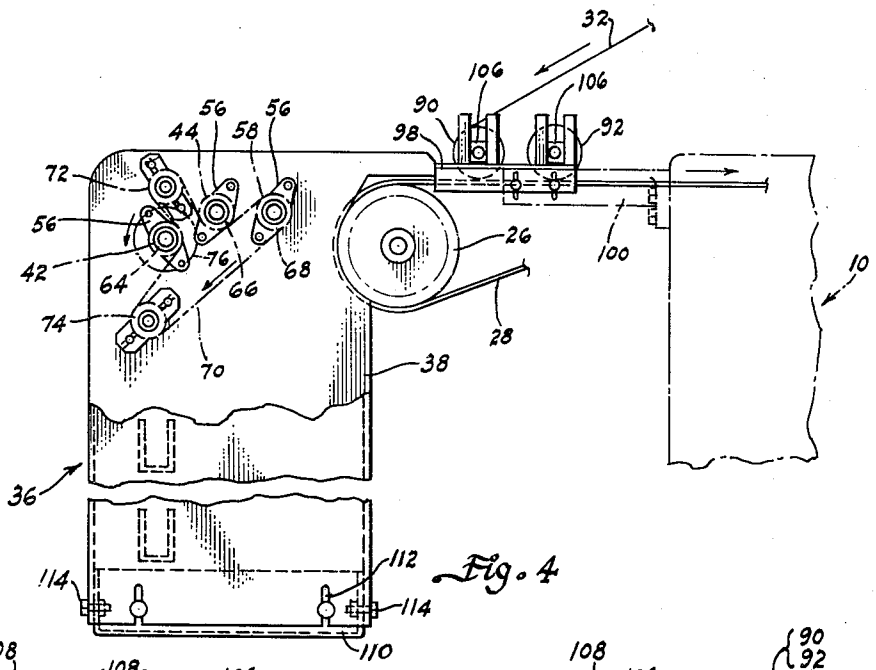


Fig. 4

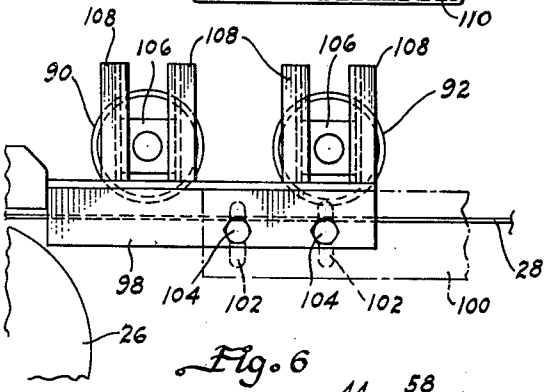


Fig. 6

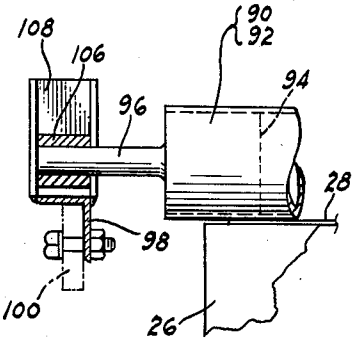


Fig. 7

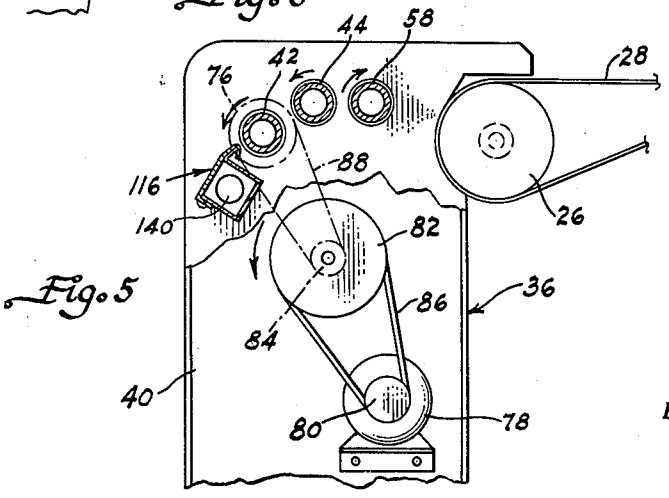


Fig. 5

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FLATWORK FEEDING AND SMOOTHING ATTACHMENT FOR IRONER

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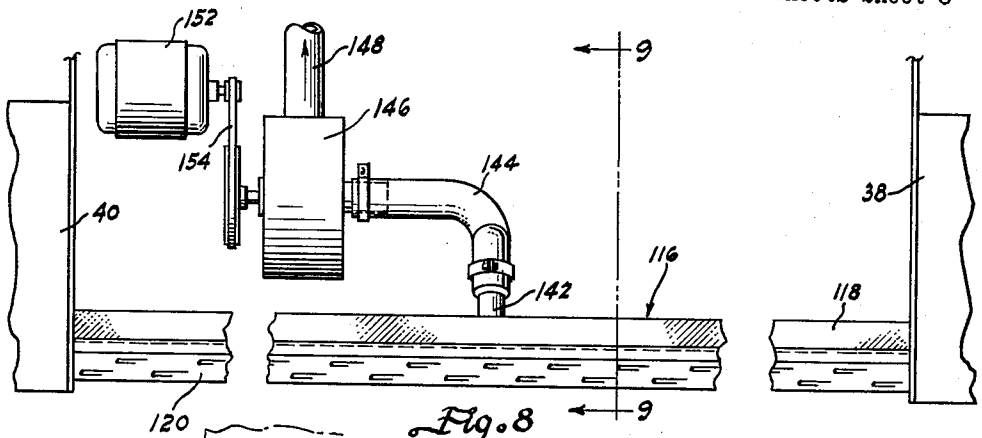


Fig. 8

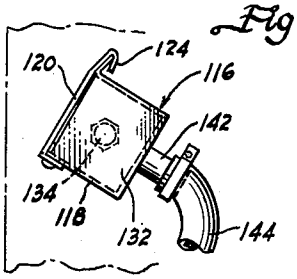


Fig. 9

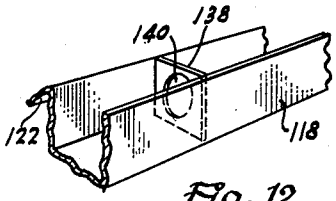


Fig. 12

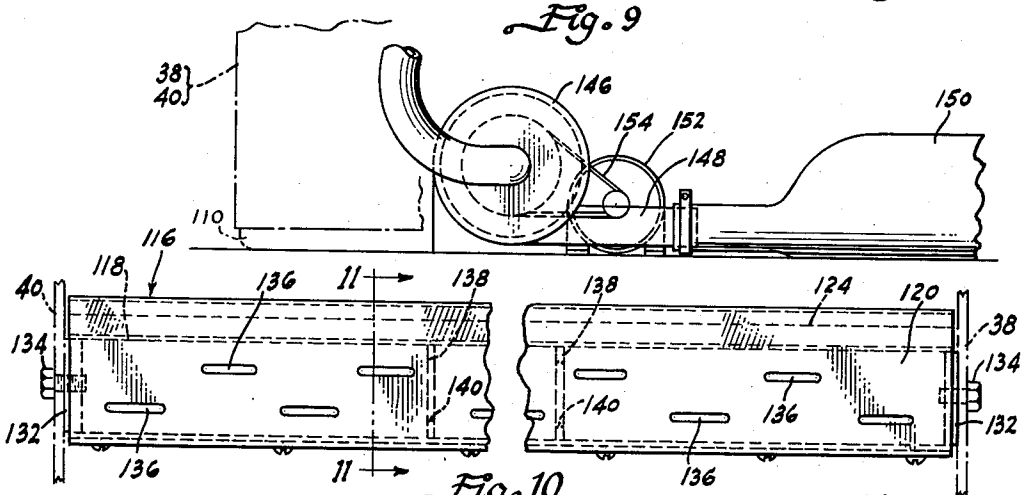


Fig. 10

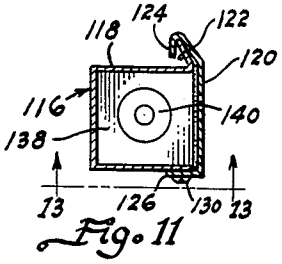


Fig. 11

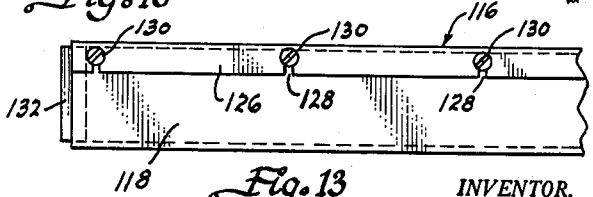


Fig. 13

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United States Patent Office 3,145,491 Patented Aug. 25, 1964

3,145,491

FLATWORK FEEDING AND SMOOTHING ATTACHMENT FOR IRONER

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Filed Feb. 26, 1962, Ser. No. 175,545
12 Claims. (Cl. 38—143)

This invention relates to improvements in feeding and smoothing mechanism attachable to industrial or institutional type ironers or ironing machines, such as those used in commercial laundries, laundry departments of institutions, and the like and constitutes a continuation-in-part of my application, Serial No. 784,629 filed January 2, 1959, which is a continuation-in-part of my application, Serial No. 707,521, filed January 7, 1958, now both abandoned.

Industrial and institutional type ironers are of relatively large size and usually have a stationary ironing surface relative to which a plurality of parallel ironing rollers rotate in a manner to supplement each other and provide an ironing surface of substantial area. Usually, the flatwork pieces are substantially dry after they have passed through a single course of ironers, especially of large capacity, but there are certain ironers in which the flatwork pieces, after they have passed beyond the ironing surface and ironing rolls, return through the ironing machine toward the entrance end thereof and then again are reversed in their path of movement so as to be discharged at the exit end of the machine which is opposite the entrance end. Arrangements of this type are employed in ironers of smaller capacity than the larger ones referred to above, especially for purposes of permitting the flatwork pieces to become thoroughly dried by the time they are discharged from the exit end of the ironer.

In the operation of conventional industrial, commercial, and institutional laundries, the flatwork pieces are washed and rinsed, subjected to centrifugal extractors to endeavor to remove as much of the moisture from the washed pieces as possible, sometimes are treated in rotating conditioning drums in an effort to further dry the pieces and also untangle and fluff them to a limited extent, and then the pieces which are still in a damp condition, are dumped upon a sorting table, into a hopper-type cart or the like for purposes of subsequently being shaken out, and flatly folded for subsequent movement to the entrance end of the ironer so that they may be fed conveniently to the ironer.

Usually, it is necessary to utilize the services of about six operators to service the flatwork pieces from the time they are dumped upon the sorting table until they are fed to the entrance end of the ironer. Of these operators, one pair first manually separate the pieces from each other and pass them along to another pairs of operators who manually shake out the pieces and fold them into a number of wide folds, after which they are placed upon long narrow tables from which a third pair of operators who are stationed adjacent the entrance end of the ironing machine, pick up the uppermost edge of the folded pieces and feed the leading edge of the thus shaken-out pieces, one by one, to the entrance of the ironer.

The entrance end of most ironers of the type referred to are provided with a feed apron upon which the leading end of a piece of flatwork is placed for moving said end into engagement with the foremost ironing roll. After the leading end of the flatwork piece is engaged by such ironing roll, the action of the ironer will pull the flatwork piece into the ironer for its entire length and move the same therethrough. However, after the leading end of a flatwork piece has been engaged by the foremost ironing roll, it is still necessary for the two operators who are feeding the ironer respectively to engage opposite edges of the flatwork piece and pull said edges away from each other

while allowing the edges to slip through the operator's fingers longitudinally in the direction of feed to the ironer, so as to smooth the flatwork piece especially in a transverse direction, while the frictional engagement of the flatwork piece with the fingers of the operators will tend to stretch and smooth the flatwork piece in the direction of its movement into the ironer. Thus, it will be seen that particularly the pair of operators who are directly feeding the ironer must engage an individual flatwork piece until the trailing end thereof has moved into the ironer before it is possible for them to engage the next flatwork piece and feed the leading edge thereof to the ironer. Accordingly even though an ironer is operating at a relatively high rate of speed, such as of the order of seventy feet per minute or the like, for example, there usually are substantial spaces between successive flatwork pieces while moving through the ironer. Thus, the production rate under such circumstances is unsatisfactory, especially when viewed in the light of the fact that usually about six operators are required to effect preliminary conditioning of the flatwork pieces incident to the same being fed to the ironer and then actually feeding the same to the ironer. Hence, a relatively high cost of manual labor results in this form of feeding flatwork ironers.

Attempts have been made thus far to devise feeding and straightening apparatus for use with flatwork ironers, either as an attachment or otherwise, and such apparatus usually has been positioned adjacent the entrance end of the ironing machine. For one reason or another however, these previous attempts have been unsatisfactory either from the standpoint of the machines being relatively complex, unduly expensive, occupying an excessive amount of space, or that they do not afford the desired degree of improved results from an economic standpoint to warrant wide spread use thereof.

It is the principal object of the present invention to provide a compact and relatively simple flatwork feeding and smoothing attachment, in comparison with those presently available, which may be attached to conventional ironers or ironing machines of various types adjacent the entrance thereof and with a minimum amount of transformation or adjustment of the normal structure of the machine, the nature of such feeding and smoothing attachment being such that it is only necessary to separate the individual pieces of flatwork as received from the extractor, stretch and straighten only the leading edge of such separated pieces for introduction thereof to the entrance feed apron or belt of the ironing machine, following which the operation of the feeding and smoothing attachment automatically straightens the remainder of the flatwork pieces, in both transverse and longitudinal directions, whereby the operators who feed the leading edge of such flatwork pieces to the ironer need only quickly drape the remaining or trailing portions of the flatwork pieces over the attachment and then reach for the next piece of flatwork to straighten and stretch the leading edge thereof and have it in readiness for feeding to the entrance end of the ironer as soon as the trailing end of the preceding flatwork piece has passed over the attachment. As a result of this, it is unnecessary to otherwise pre-condition the work as previously has been necessary, at least to the extent of shaking and preliminarily folding the flatwork pieces into wide folds and stacking the same upon a temporary storage table from which they are removed by the operators directly feeding the ironer. Accordingly, considering the fact that only one or, at most, two operators are required to partially separate and untangle the pieces from a sorting table so that the pieces may be engaged by the two operators directly feeding the ironer, as few as three and no more than four attendants are required to effect the entire pre-condition and feeding of an in-

dustrial ironer, as distinguished from the six attendants or operators used or required with the operations now commonly in use. Further, by use of the present invention, the ironer also will be loaded to fuller capacity because of the elimination of any substantial space between the trailing end of one piece of flatwork and the leading end of the next successive piece of flatwork passing through the ironer, thereby materially increasing the production rate of the ironer.

Another object of the invention is to provide a feeding and smoothing attachment which is composed of relatively simple, rugged and durable mechanism principally comprising a plurality of rolls provided with spiral projections which are curled around the individual rolls in oppositely spiralling directions from an intermediate location upon the rolls, whereby such spiral projections are moved, in accordance with the principles of the invention, to engage the lower surface of a piece of flatwork and spread the same transversely while the flatwork is moving in a longitudinal direction into the ironer, such transverse spreading being effected by such spiral projections upon the rolls while the flatwork piece is placed under tension longitudinally between the leading end thereof and the portion, including the trailing end, which is draped over the aforementioned spreading rolls, such longitudinal tension being effected by vacuum means which offer compound advantages in that such means not only stretch the flatwork pieces longitudinally but a substantial amount of any free lint occurring upon the flatwork pieces is removed by such suction and, in addition, a noticeable amount of pre-drying of the flatwork pieces is affected by such vacuum means. All of these advantageous results are produced by the vacuum means while offering no impedance especially to the longitudinal feed rate of the flatwork pieces to the ironer and, in addition, the vacuum means holds the flatwork pieces taut, while being engaged by the spiral-surfaced rollers for transverse spreading, whereby such transverse spreading is rendered much more effective than if no drag, for example, were placed upon the flatwork pieces as is produced by the vacuum means.

A further object of the invention is to provide friction means preferably arranged between the spiral-surfaced rollers and the leading end of the feed apron of the ironer, such friction means functioning especially to engage the trailing end of a flatwork piece, after it has passed the vacuum means and has completed its engagement with the spiral-surfaced rollers, so as to insure as much as possible that the trailing end will remain stretched especially in a longitudinal direction before passing into the ironer.

Still another object of the invention is to provide one or more finger or nip rolls which directly engage the upper surfaces of the feed apron or belts of the ironer so as to facilitate the introduction of the leading end of a piece of flatwork to the ironer with greater efficiency than heretofore with ironers having no nip rolls and, as an added advantage, such finger or nip rolls are formed either from aluminum tubing, or covered with aluminum foil or the like, whereby a heat reflecting surface is afforded and, due to the close proximity of such finger rolls to the heated ironing rolls of the ironer and especially the outermost ironing roll, such finger rolls absorb a certain amount of said heat and also reflect the same upon the flatwork pieces as they pass beneath the finger and nip rolls, such rolls also physically transferring heat to the flatwork pieces by direct engagement therewith so as to effect a definite and noticeable amount of predrying of the flatwork pieces prior to their engagement by the ironing rolls of the ironer, thereby resulting in a recognizable saving in heat which must be furnished to the ironer.

A still further object of the invention is to provide driving mechanism for the feeding and smoothing rolls which is simple and relatively inexpensive as well as being capable of ready access for lubrication, repair and adjustment when required, independent power means such as an electric motor also being included in the driving mechanism, whereby the feeding and smoothing attachment comprising the present invention is independent of the ironer as far as its source of power is concerned, with the exception of the fact that the feeder belt or apron of the ironer drives the finger or nip rolls comprising a part of the present invention. The driving mechanism for the feeding and smoothing mechanism preferably is protected by functional and attractive casings which provide safety for the operators.

Details of the foregoing objects and of the invention, as well as other objects thereof, are set forth in the following specification and are illustrated in the accompanying drawings comprising a part thereof.

In the drawings:

FIG. 1 is a somewhat diagrammatic side elevation of an exemplary ironing machine relative to the entrance end of which a flatwork feeding and smoothing attachment embodying the principles of the present invention is illustrated, the ironer being broken away in the middle to foreshorten the same.

FIG. 2 is a fragmentary and foreshortened plan view, on a larger scale than used in FIG. 1, and illustrating details of the flatwork feeding and smoothing attachment in associated relationship with a fragmentarily illustrated portion of the feed apron of the ironer shown in FIG. 1.

FIG. 3 is a fragmentary and foreshortened elevation of one of the spiral-surfaced rolls utilized in the feeding and smoothing attachment shown in FIGS. 1 and 2, a portion of said roll being shown in longitudinal section to illustrate details of construction.

FIG. 4 is a side elevation, partly broken away, of one end of the flatwork feeding and smoothing attachment embodying the principles of the present invention and shown connected to a fragmentarily illustrated portion of the feed end of an ironing machine.

FIG. 5 is a fragmentarily illustrated side elevation of the opposite end of the flatwork feeding and smoothing attachment of the present invention and illustrating certain details of the driving mechanism.

FIGS. 6 and 7 respectively are fragmentary side elevations and partially sectioned views showing details of the supporting means for the finger or nip rolls.

FIG. 8 is a fragmentarily illustrated plan view, broken away to foreshorten the same, and illustrating the vacuum means comprising a part of the flatwork feeding and smoothing attachment comprising the present invention.

FIG. 9 is a fragmentarily illustrated side elevation taken on the line 9—9 of FIG. 8 and showing certain details of the vacuum means otherwise shown in FIG. 8.

FIG. 10 is a front elevation, broken away intermediately of the ends thereof to foreshorten the same, of the vacuum chest or member comprising part of the vacuum means otherwise illustrated in FIGS. 8 and 9.

FIG. 11 is a sectional elevation taken on the line 11—11 of FIG. 10.

FIG. 12 is a fragmentary perspective view of baffle means in the vacuum chest shown in FIGS. 8 through 11, said chest being illustrated with the front cover thereof removed.

FIG. 13 is a fragmentary bottom plan view of the vacuum chest illustrated in FIGS. 8 through 11 and especially illustrating means for securing the front cover to the vacuum chest.

Referring to FIG. 1 particularly, in which the flatwork feeding and smoothing attachment is shown, in exemplary manner, mounted adjacent the entrance end of a typical industrial or commercial flatwork ironer 10, it will be seen that said ironer comprises a hollow steam chest 12 having concavities in the upper surface thereof within which conventional ironing rolls 14 are rotatably mounted, whereby the exterior surfaces thereof are disposed closely adjacent the concave surfaces in

the top of the steam chest 12 so as to move a piece of flatwork over such smooth concave ironing surfaces of the stream chest to insure complete ironing of the flatwork piece for both smoothing the piece as well as drying it. In this particular view, a feed belt 16 receives the leading end of a flatwork piece after it has been ironed and reverses the direction of movement of the same so as to carry the ironed piece of flatwork back under the steam chest 12, thereby further drying the flatwork. Upon reaching the entrance end of the ironer, another feed belt 18 receives the piece of flatwork and carries the same back toward the opposite end of the ironer, where the flatwork piece is discharged from the exit 20.

Also positioned stationarily adjacent the entrance 22 of the ironer is a guide plate 24 extending transversely across the ironer and disposed in longitudinally spaced relationship to the drive roll 26 for the feed apron 28 which, as illustrated particularly in FIG. 2, comprises a series of similar feed belts 30. The drive roll 26 is driven in a direction to move the upper course of the feed apron 28 toward the entrance 22 of the ironer. To facilitate particularly the stripping of the leading edge of the flatwork pieces from the ironer rolls 14, a series of tapes 32 extend around the lower surfaces of the ironing rolls 14 and also around suitable tensioning pulleys or spools 34.

The flatwork feeding and smoothing attachment comprising the present invention is generally designated 36. Essentially, it comprises a pair of housings or casings 38 and 40 which is supported by the bases thereof upon the same floor which supports the ironer 10. Extending between the inner faces of the casings 38 and 40 are a plurality of preferably similar spiral-surfaced spreading rolls 42 and 44, both of which have similar pairs of spiral members 46 and 48 curved about the exterior surfaces thereof and rigidly fixed thereto such as by welding, soldering, or otherwise. Especially from FIGS. 2 and 3, it will be seen that the spiral members 46 and 48 are reversely twisted from a location upon the rolls intermediately of the ends thereof and preferably from the mid-point of the rolls, whereby the inner ends of the spiral members 46 and 48 connect at said mid-point of the rolls to form a smooth point 50.

For ease of construction, lightness of weight, and saving of expense, the rolls 42 and 44 may be formed from suitable tubular stock and a plug 52 is fitted into each of the opposite ends of the tubes, as shown in vertical section in the right-hand end of FIG. 3, such plug terminating at its outer end in a stub shaft 54, which shafts, on the opposite ends of each roll, serve as supporting means for the rolls in that said ends are rotatably mounted within anti-friction bearings 56, or the like, which are connected to the inner walls of the casings 38 and 40.

Another spiral-surfaced roll 58 extends between the inner walls of casings 38 and 40 similarly to the rolls 42 and 44, the principal difference between the latter and roll 58 being that the spiral members 60 and 62 on roll 58 are curved around the roll in directions reverse to that in which the spiral members 46 and 48 are curved around the rolls 42 and 44. The purpose of this will be described hereinafter.

Referring to FIG. 4, it will be seen that the upper portion of the outer wall of housing 38 has been broken away to expose the interior surface of the inner wall thereof which supports the bearings 56 directly and effectively. The stub shafts 54 of each of the rolls 42, 44 and 58 extend through the bearings and project beyond the inner ends thereof so as to permit sprocket gears 64, 66 and 68 to be mounted within the housing 38 upon the terminal ends of the shafts 54 and a sprocket chain 70 extends around said sprocket gears as shown in FIG. 4 and also around an adjustable idler sprocket gear 72 and another adjustable idler sprocket gear 74, these adjustable sprocket gears being preferably for purposes of tensioning the sprocket chains 70.

Mounted upon the stub shaft at the opposite end of roll 42 from that to which sprocket gear 64 is connected, is another sprocket gear 76 which rotates counter-clockwise as viewed in FIG. 4, whereby the same will drive the sprocket gear 64 on the opposite end of said roll in the same direction and thereby move the sprocket chain 70 in the direction of the arrows, as a result of which the spiral-surfaced roll 58 will be moved clockwise as viewed in FIG. 4, whereas the spiral-surfaced rolls 42 and 44 will be rotated in a counter-clockwise direction as viewed in FIG. 4. As a result of this, the upper surfaces of the rolls 42 and 44 will rotate in directions away from the entrance of the ironer, while the upper surface of roll 58 will move toward the entrance end of the ironer. This results in the flatwork pieces, when extending across the upper surfaces of the rolls and being stretched transversely thereover, will be tensioned longitudinally in the direction of the feed of the flatwork pieces to the entrance of the ironer.

Whereas the lead of the spiral members 46 and 48 on rolls 42 and 44, as well as the spiral members 60 and 62 on roll 58 preferably is substantially the same, though in opposite directions on opposite halves of said rolls, it is to be understood that the lead of the spiral members on the various rolls may be varied to suit specific conditions. Similarly, while the diameters of all of said rolls 42, 44 and 58 preferably are substantially the same, said diameters also may be varied within reasonable limits to suit specific conditions, as desired. Still further, the rotational speeds of said spiral-surfaced rolls preferaby is the same but, the speed of any individual roll may be varied relative to the speed of the other rolls, if desired, especially to suit certain specific conditions.

The power for driving the spiral-surfaced spreading and smoothing rolls 42, 44 and 58 preferably is self-contained within the flatwork feeding and smoothing attachment 36. In accordance with the preferred construction, suitable power means such as an electric motor 78 is mounted suitably within the casing 40. A driving pulley or sprocket 80 is connected to the drive shaft of the motor 76, said shaft preferably rotating at a lower speed than that of the motor through the use of a gear head, not shown, built into the motor, and being of conventional commercial design. Additional speed reducing means are employed between the pulley or sprocket 80 and the sprocket gear 76 the same being in the form of a large diameter pulley or sprocket 82 which is fixed to and rotates with a small diameter sprocket gear 84. An appropriate belt or sprocket chain 86 drivingly connects the pulley or sprocket 82 with the pulley or sprocket 80. Also, sprocket chain 88 drivingly connects the sprocket gears 76 and 84, the entire arrangement being such that the spiral-surfaced rolls 42, 44 and 58 are driven so as to have desired surface speeds which preferably are greater than the speed at which the flatwork piece is moved into the ironer by the feed apron 28. By reason of the movement of the upper surfaces of the rolls 42 and 44 away from the feed entrance of the ironer and the upper surface of roll 58 toward the feed entrance of the ironer, by the power and drive means just described, flatwork pieces being fed to the ironer, when draped across the upper surfaces of said roll will be subjected to effective transfer spreading thereof, as well as longitudinal tensioning thereof.

The flatwork feeding and smoothing attachment comprising the present invention also includes at least one, and preferably two, finger or nip rolls 90 and 92 which readily are shown in FIGS. 1, 2, 4, 6 and 7. The preferred construction of said rolls is that they are formed from aluminum tubing having a wall thickness of between, for example, ⅛ and ¼ inch, as best can be seen from FIG. 7. Fitted into opposite ends of the tubes comprising said rolls are plug members 94 having reduced diame-

ter projections comprising stub shafts 96 integral therewith. The plug members 94 are united securely with the opposite ends of the tubes of rolls 90 and 92 by any convenient means such as by press-fitting, welding, tapped connections such as screws, and the like. Preferably, the plug members and stub shafts are formed from steel.

Fixed to and projecting forwardly toward the ironer from each of the casings 38 and 40 is an arm 98 which engages a projecting bracket 100, fixed to the frame or housing of the ironer 10, as shown in FIG. 4. Suitable slots 102 are formed in the brackets 100 to receive bolts 104 which extend through said slots and appropriate correspondingly spaced holes formed in the arms 98 so as to secure the casings 38 and 40 effectively to the frame or housing of the ironer 10.

The arms 98 especially have an additional function, namely, to support suitable bearing blocks 106, best seen in FIGS. 4, 6, and 7, the same preferably being formed from bronze or other appropriate bearing metal which is different from the composition of the stub shafts 96. Pairs of vertical guide members 108 are fixed at the lower ends thereof to the upper surface of arms 98, for example, which arms preferably are angle irons as shown in FIG. 7. The vertical guide members also have appropriate channels, best seen in FIG. 6, facing each other so as to accommodate opposite edges of the bearing blocks 106 in order that the blocks may float therein inasmuch as, in the preferred operating conditions of the feeding and smoothing attachment, the nip or finger rolls 90 and 92 normally ride upon the upper course of the feed apron 28 except when flatwork is moving beneath the nip or finger rolls and over the upper surface of the feed apron 28 while being fed to the entrance of the ironer. Thus, the rolls 90 and 92 readily can adapt themselves to various thicknesses of flatwork being fed to the ironer.

By reason of the rolls 90 and 92 comprising tubes preferably formed from aluminum or other metal or even non-metallic material having a high coefficient of thermo-conductivity, said rolls will pick up ambient heat from the ironer and especially the steam chest 12 adjacent the entrance of the ironer as well as the ironing roll 14 nearest the entrance and, while the exact function and operation of said finger or nip rolls relative to said heat is not exactly known, it is known that said rolls quickly become heated following the commencement of any ironing operation of the ironer 10 and reach, as well as maintain, the temperature which is far higher than comfortably can be sustained by placing the human hand upon said rolls for more than a scant fraction of a second. As a result of this, the finger or nip rolls 90 and 92 not only engage the leading edge or end of a piece of flatwork and hold it firmly against the feed apron 28 so as to insure feeding thereof to the ironer but, in addition, the heat of the rolls 90 and 92 is transmitted directly to the damp flatwork pieces being fed to the ironer thereby and a marked amount of predrying of said damp flatwork pieces occurs in addition to elevating the temperature of the flatwork pieces so that there is no appreciable drop in temperature of the steam chest and ironing rolls as a result of the damp flatwork pieces first contacting the same while being fed to the ironer. The rolls 90 and 92 also are maintained in highly polished condition and, especially since they are non-ferrous, they are not subjected to rusting or any other form of undesirable corrosion. The highly polished condition thereof, further, produces a certain amount of ironing of the upper surface of the flatwork pieces while being passed to the entrance of the ironer and said upper surface of the flatwork pieces normally is not ironed by the ironer due to the fact that the exterior surfaces of the ironing rolls 14 are rough as compared both to the surfaces of the concave upper surface portions of the steam chest 12 and the exterior surfaces of the rolls 90 and 92, whereby a piece of flatwork having an overall smoothly ironed condition, especially when considering both surfaces of the flatwork piece, is produced in contrast to where only one side of a piece of flatwork is ironed as in connection with the function of a conventional ironer which does not employ finger rolls such as applicant's rolls 90 and 92.

Due to the fact that the height of the feed aprons 28 of ironers will vary somewhat between one ironer and another, the slots 102 enable the positioning of the finger or nip rolls 90 and 92 at different elevations relative to the floor, so as to permit the same to be disposed upon the upper surface of the upper course of the feed apron 28 so as to be rotated thereby. Also to aid in such vertical adjustment of the casings 38 and 40 relative to the floor, each casing preferably is provided with a somewhat cup-shaped base member 110, which is rectangular in plan view, and preferably fits within the lower end of the transversely rectangular casings 38 and 40, for vertical adjustment relative thereto, such adjustment being made possible by reason of slots 112 formed in the upwardly extending sides of the base members 110, such vertical adjustment being secured by any simple means such as bolts 114.

As has been briefly referred to above, when the feeding operators for the ironer stretch the leading edge of a piece of flatwork and place the same upon the feed apron 28 so that said stretched leading edge immediately is engaged by the foremost finger or nip roll 90, such operators immediately at least loosely and quickly spread the opposite edges of the rest of the oncoming flatwork piece away from each other and drape the same down over the spiral-surfaced rolls 42, 44 and 58. While the weight of the hanging trailing end of the flatwork piece over these spiral-surfaced rolls is adequate to provide a certain amount of beneficial transverse spreading thereof, as well as longitudinal stretching of the flatwork piece in the direction of feed thereof to the ironer, it is preferred in accordance with the principles of the present invention that the trailing portion of the flatwork piece while being fed to the ironer and especially while moving over the upper surfaces of the spiral-surfaced rolls shall be subjected to a substantial amount of longitudinal tension which, in addition to effecting such longitudinal stretching and smoothing of the flatwork piece, also greatly enhances the straightening and smoothing of the very trailing end of the flatwork piece just prior to it moving over the spiral-surfaced rolls.

Such substantial tensioning of the trailing end of flatwork pieces occurs by the use of vacuum means comprising, in its preferred embodiment, a vacuum chest 116 which, in one very simple but suitable form, comprises an elongated sheet metal housing 118 which is rectangular in cross-section as clearly shown in FIGS. 11 and 12, for example. In order to facilitate the cleaning of any residual lint from the interior of the housing 118, the front cover 120 thereof preferably is removable and simple but effective attaching means comprise bending one edge of one side of the housing 118 upwardly and preferably somewhat rearwardly as best shown in FIG. 11 to comprise a securing flange 122 which preferably extends along the housing for its entire length. One edge of the cover plate 120, which also is coextensive in length with the housing 118, is bent rearwardly and downwardly to form a locking channel 124 which receives the securing flange 122 of the housing 118, while the opposite edge of the cover plate 120 is bent at a right angle thereto to provide a locking flange 126 which, at spaced intervals along its length is provided with slots 128 which open through the terminal edge of the flange 126. Said slots receive securing means which, in the preferred embodiment of the invention, comprise self-tapping screws 130. Thus, simply by loosening these screws 130, and sliding the flange 126 laterally away from the edge of the housing which have the screws 130 fastened thereto, the front cover plate 120 may be dis-

engaged from the housing at the lower edge thereof and then unhooked from the upper edge of the housing, thereby to free the cover plate from the housing entirely.

The housing 128 is provided at opposite ends 132 which are secured to the housing by any suitable means such as welding, soldering or the like. Said ends are of appreciable thickness and readily are capable of having a tapped hole formed therein for purposes of receiving the threaded end of a clamping bolt 134 which likewise extends through an aligned hole in the inner wall respectively of the casings 38 and 40. By employing only a single clamping bolt at each end, it is possible to angularly adjust the vacuum housing 118 about its longitudinal axis relative to the casings 38 and 40 so as to dispose the cover plate 120 thereof at the most suitable angle, such as shown in FIG. 1.

The front cover plate 120 of the vacuum chest 116 is provided with a plurality of openings, preferably in the form of a series of two rows of staggered slots 136. Such arrangement is not to be regarded as restrictive since other patterns and types of openings may be utilized. Also, within the housing 118, between the ends and the intermediate portion thereof, are flow-restricting baffle plates 138 which each have a restricting opening 140 therein.

In its simplest form, the vacuum chest 116 is provided with a single air outlet 142 which is in the rear wall thereof and is connected by a preferably flexible conduit or duct 144 to the intake of a suitable blower or fan 146 which withdraws air from the interior of the vacuum chest 116 at such a rate that an effective vacuum is produced therein which causes the drawing of air through the slots 136 except when the same are covered by a piece of flatwork. When so covered, sufficient suction is caused by the operation of the blower or fan 146 that the movement of the flatwork past the cover plate 120 of the vacuum chest 116 is impeded so as to produce a longitudinal stretch upon the flatwork otherwise being pulled into the ironer by the operation of the ironer rolls 14 for example. Thus, the flatwork is stretched tautly in a longitudinal direction and this results in a very effective engagement of the undersurface of the flatwork piece by the spiral members 46 and 48 of rolls 42 and 44, and spiral members 60 and 62 of roll 58, thus enhancing the transverse spreading of the flatwork piece by said spiral members upon said rolls. In addition, and very beneficially, the suction produced on the interior of the vacuum chest 116 causes a very high percentage of any free lint occurring upon the flatwork piece to be drawn into the chest and through the blower fan 146, the same being exhausted through the outelt 148, for discharge into a suitable collection member such as vacuum bag 150 shown in FIG. 9. The fan is operated by any suitable power means such as an electric motor 152 which preferably has a system of speed reduction pulleys connected by a drive belt 154.

The provision of the flow-restricting baffles 138 and the openings 140 therein, in conjunction with the substantially centrally disposed air outlet 142, assures that there will be substantially as much suction produced in the outer end portions of the vacuum chest 116 as adjacent the mid-portion thereof nearest the air outlet 142. In the event any lint becomes trapped or accumulated within the vacuum chest 116, the front cover plate 120 thereof is readily removable to assure easy access thereto for purposes of cleaning such accumulated lint therefrom. The removal of lint from such flatwork pieces is of a special importance relative to hospital laundries and especially in the laundering of flatwork pieces such as covers, sheets, etc. used in operating rooms where aseptic conditions of as high degree as possible should be maintained relative to open wounds, incisions and the like. Further, however, the drawing of substantial amounts of air through the flatwork pieces while moving over the outer surface of the cover plate 120 and especially the slots 136 therein, causes a marked amount of drying of the flatwork to occur, such drying being of a pre-drying nature prior to the final drying of the sheet within the ironer, such final drying however further being enhanced by the action of the heated nip or finger rolls 90 and 92, the operation of which is described hereinabove. In addition, the angular adjustability of the vacuum chest 116 about its longitudinal axis, by reason of the clamping nature of the bolts 134 comprising a pivot when loosened, permits the cover plate 120 of the vacuum chest 116 to be disposed at the preferred angle of movement of the flatwork thereover and especially the trailing end thereof prior to the same engaging the spiral-surfaced rolls 42, 44 and 58, thus assuring maximum efficiency of the smoothing of the flatwork pieces incident to the same being fed to the ironer, such smoothing being in both transverse and longitudinal directions.

The vacuum chest 116 also functions to a high degree of efficiency in straightening the extreme trailing end of a piece of flatwork which, as is well known in regard to ironing flatwork by industrial and commercial ironers, it usually produces a problem incapable of ready solution by automatic means. When the flatwork pieces are being fed entirely by human operators, it is possible for such operators to manually smooth the trailing ends of flatwork pieces prior to the same immediately passing into the entrance of the ironer. This of course is time consuming and therefore expensive when considering present labor rates of pay. As the extreme trailing end of a piece of flatwork passes over the slots 136 for example, the tendency of the vacuum within the chest 116 during such movement is to stretch out such extreme trailing edge and, once the same has been stretched out, it will not return entirely to its previous wrinkled condition when said extreme trailing end leaves the slots 136 for example. However, the movement of the rolls 42 and 44 in such direction that the upper surfaces thereof move away from the entrance of the ironer also further enhances the straightening of the trailing end of the flatwork piece. Finally, to still further enhance such straightening operation relative to the trailing end of the flatwork piece, a friction bar 156 extends between the casings 38 and 40 and is connected at its opposite ends to the inner walls of said casings by any suitable means such as bolts or the like, not shown. The friction bar 156 may, for example, be in the nature of either an angle iron or a channel, one surface of which is uppermost and is substantially parallel to the path of movement of a piece of flatwork between the roll 58 and the feed apron 28. Preferably, the upper surface of the friction bar 156 is just slightly below said path of movement when the piece of flatwork is stretched taut, but when the trailing end of a piece of flatwork leaves the spiral-surfaced roll 44, it will no longer be rendered taut because the upper surface of the roll 58 is moving in the direction of the path of movement of the flatwork piece, whereby the trailing end of said flatwork piece will be dragged across the upper surface of friction bar 156 and thereby be straightened longitudinally prior to passing beneath the finger rolls 90 and 92 and from there into the ironer. The friction means upon the bar 156 may be produced by any suitable material or mechanism, certain forms of rough-surfaced rubber being highly suitable for the purpose.

While the invention has been described and illustrated in its several preferred embodiments, it should be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways falling within the scope of the invention as claimed.

I claim:

1. A smoothing attachment for use with a flatwork ironer provided with ironing rolls and arranged to iron individual pieces fed thereto and having an entrance end and a feed apron adjacent said entrance to receive flatwork pieces to be ironed and feed them to the ironing rolls of the ironer, said smoothing attachment comprising in combination supporting means positionable forwardly

of and adjacent and parallel to the entrance end of said feed apron of said ironer, elongated spreading roll means extending along said supporting means and rotatably supported at opposite ends thereby forwardly of and in parallel relationship to the outermost edge of said feed apron, a plurality of projecting means extending spirally around said spreading roll means and respectively spiralling substantially continuously in opposite directions from an intermediate location on said roll means toward the opposite ends of said roll means, the upper surface of said spiral projecting means being exposed to have separate pieces of flatwork draped thereover with the trailing ends thereof depending freely incident to feeding the leading edge of the flatwork pieces to said feed apron of said ironer, drive means to rotate said spreading roll means in a direction to permit said spiral projecting means to spread flatwork pieces outwardly from the intermediate portion of said spreading roll means toward the opposite ends thereof as said roll means rotates and the flatwork pieces are draped thereover by gravity, and means supported stationarily relative to said supporting means and positioned outwardly of said spreading roll means relative to said entrance end of said ironer and having an outer surface positioned at a lower level than the upper surface of said roll means over which the draped flatwork pieces extend incident to being draped over said roll means and operable to impose a drag in addition to normal friction upon said flatwork pieces in opposition to the feeding movement thereof by the feed apron of said ironer, whereby spreading engagement of said flatwork pieces by said spreading roll means to spread said pieces laterally is facilitated and the drag effect imposed upon said pieces stretches and smooths the same longitudinally.

2. The smoothing attachment set forth in claim 1 further including an additional spreading roll means similar and parallel to said spreading roll means and positioned between the latter and said feed apron of said ironer and the upper surface thereof being exposed to have said flatwork pieces draped thereover, drive means also connected to said additional spreading roll means and operable to rotate the same in such direction that the upper surface thereof moves toward said ironer and the drive means for said other spreading roll means rotating the same in such direction that the upper surface thereof moves away from said ironer while the spiral projecting means on both said spreading roll means spiral in directions to stretch the opposite edges of flatwork pieces apart when draped thereover.

3. The smoothing attachment set forth in claim 1 further characterized by said drag-imposing means comprising vacuum means operable to draw the flatwork pieces against the outer surface of said vacuum means while permitting sliding movement of said pieces relative to said outer surfaces of said vacuum means and thereby impose a drag upon the trailing portion of said flatwork pieces in the direction of feed of said pieces while moving over said spreading roll means for spreading of said pieces in a direction transverse to said direction of feed of said pieces.

4. The smoothing attachment set forth in claim 3 further characterized by said vacuum means comprising an elongated hollow member having a forward surface provided with openings extending therethrough, and including pump means connected to said hollow member and operable to create a pressure therein less than atmospheric.

5. The smoothing attachment set forth in claim 4 further characterized by said pump means being connected to said hollow member intermediately of the ends thereof and including suction-equalizing means whereby the suction adjacent the ends of said member is substantially equal to that intermediate of the ends.

6. The smoothing attachment set forth in claim 4 further characterized by said hollow member having a smooth forward face of appreciable area arranged to be engaged slidably by flatwork pieces when draped thereover and provided with a series of openings extending therealong to permit the passage of air therethrough incident to creating suction to adhere said flatwork pieces slidably against said surface and thereby place said pieces under tension longitudinally when being fed to said ironer by the feed apron thereof.

7. The smoothing attachment set forth in claim 6 further characterized by said smooth forward face of said hollow member being on a cover detachably connected to said hollow member to permit access to the interior thereof when desired.

8. The smoothing attachment set forth in claim 5 further characterized by said hollow member having interior baffle means intermediately of the connection of said pump means with said hollow member and the ends of said hollow member, said baffle means extending transversely of said member perpendicularly to the longitudinal axis thereof and having openings therein to permit constricted passage of air therethrough.

9. A smoothing attachment for use with a flatwork ironer provided with ironing rolls and arranged to iron individual pieces fed thereto and having an entrance end and a feed apron adjacent said entrance to receive flatwork pieces to be ironed and feed them to the ironing rolls of the ironer, said smoothing attachment comprising in combination supporting means positionable forwardly adjacent and parallel to the entrance end of said feed apron of said ironer, elongated spreading roll means extending along said supporting means and rotatably supported at opposite ends thereby forwardly of and in parallel relationship to the outermost edge of said feed apron, a plurality of projecting means extending spirally around said spreading roll means and respectively spiralling in opposite directions substantially continuously from an intermediate location on said roll means toward the opposite ends of said roll means, the upper surface of said spiral projecting means being exposed to have separate pieces of flatwork draped thereover with the trailing ends thereof depending freely incident to feeding the leading edge of the flatwork pieces to said feed apron of said ironer, means to rotate said spreading roll means in a direction to permit said spiral projecting means to spread the opposite side edges of flatwork pieces outwardly from the intermediate portion of said spreading roll means toward the opposite ends of said roll means as said roll means rotates and the flatwork pieces are draped thereover by gravity, means supported stationarily relative to said supporting means and positioned outwardly of said spreading roll means relative to said entrance end of said ironer and having an outer surface over which said draped flatwork pieces extend incident to being draped over said spreading roll means and operable to impose a drag in addition to friction upon said flatwork pieces in opposition to the feeding movement thereof by the feed apron of said ironer, whereby engagement of said flatwork pieces by said spreading roll means to spread said pieces laterally is facilitated, and stationary friction means positioned between said feed apron and spreading roll means and parallel thereto and having a frictional surface thereon in the path of movement of flatwork pieces to said feed apron, said friction means being operable to hold the trailing ends of flatwork pieces stretched after they leave said spreading roll means and before being engaged by said feed apron.

10. For use with a flatwork ironer having ironing means arranged to be heated and iron individual pieces and said ironing means having an entrance end and a feed apron adjacent said entrance end to receive flatwork to be ironed for feeding to said ironing means and receive heat therefrom, a smoothing attachment for spreading damp flatwork pieces transversely to the direction of feed to the entrance end of said ironing means and comprising in combination, supporting means arranged to be positioned parallel to and along the entrance end of the ironing means

of a flatwork ironer, a feed roll supported at opposite ends by said supporting means in contact with the upper feeding surface of said feed apron to provide positive feed means for flatwork pieces by said apron to said ironing means, said supporting means for said feed roll permitting vertical floating thereof upon said feed apron and said feed roll being formed from material having a high coefficient of thermal conductivity and capable of absorbing heat from the ironer and also of reflecting said heat to flatwork pieces as engaged by and passed between said feed roll and feed apron of said ironer, thereby partially pre-drying said flatwork piece prior to passing into said ironer, an elongated spreading roll extending along said supporting means forwardly of said feed apron and rotatably supported thereby substantially parallelly to and adjacent the forward end of said feed means of the ironer, the upper surface of said spreading roll being positioned and freely exposed to engage a piece of flatwork draped freely thereover while being fed to said ironing means, a plurality of projecting rib-like means extending spirally around said roll and respectively spiralling in opposite directions from an intermediate location upon said roll substantially continuously to the opposite ends thereof, means to rotate said roll in a direction to cause the upper surface thereof to move oppositely to the direction of feed of flatwork to the ironer by said feed apron, whereby when the leading end of a piece of flatwork is engaged by the feed means of said ironer and said piece is draped over said spreading roll the spiral projections of said spreading roll will operate when rotated to spread the opposite side edges of said piece of flatwork away from each other and thereby smooth said piece across the entire width thereof prior to same being ironed by said ironer, and means supported stationarily relative to said supporting means and positioned outwardly of said spreading roll relative to said entrance end of said ironer and arranged to have flatwork pieces pass thereover slidably and operable to impose a drag in addition to gravity upon said flatwork pieces in opposition to the feeding movement thereof by the feed apron of said ironer, whereby the transverse spreading action of said spreading roll means upon said flatwork pieces is facilitated.

11. A smoothing and pre-drying attachment for use with a flatwork ironer having ironing means arranged to be heated and an entrance end and feed means comprising endless feed apron means supported exteriorly but adjacent said entrance end for movement of the upper course of said feed apron toward said entrance end to feed flatwork pieces to said heated ironer and subjected to heat from said ironer, said attachment comprising support means attachable to the opposite sides of an ironer capable of being heated adjacent said feed end thereof, and aluminum roll means rotatably supported at opposite ends by said support means above said feed apron means for frictional contact therewith and parallel to the outer edge of said feed apron means, said roll means providing a high coefficient of heat conductivity and having a polished heat deflecting surface, said roll means being operable to obsorb ambient heat radiating from said feed apron means and the entrance end of said ironer and transmit some of said heat directly to flatwork pieces by direct contact therewith as they are carried beneath said roll means by said feed apron means, whereby said flatwork pieces are partially pre-dried by the heat obtained from said roll means.

12. The smoothing and pre-drying attachment set forth in claim 11 further characterized by said roll means being hollow.

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