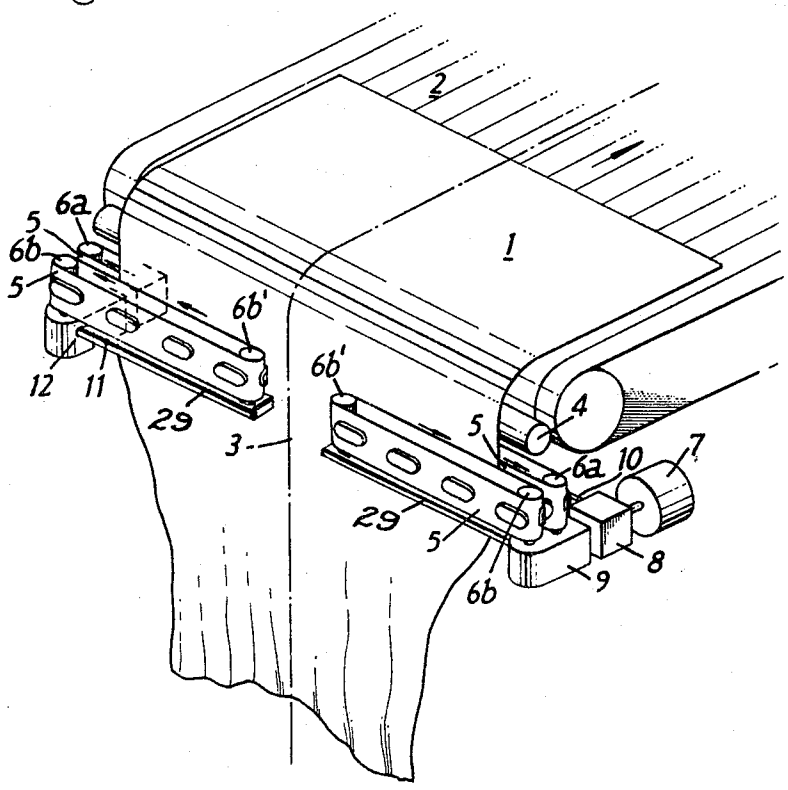
March 11, 1969 H. J. WEIR 3,431,665

SHEET SPREADING DEVICE

Filed July 12, 1967 Sheet 1 of 2

Fig. 1.



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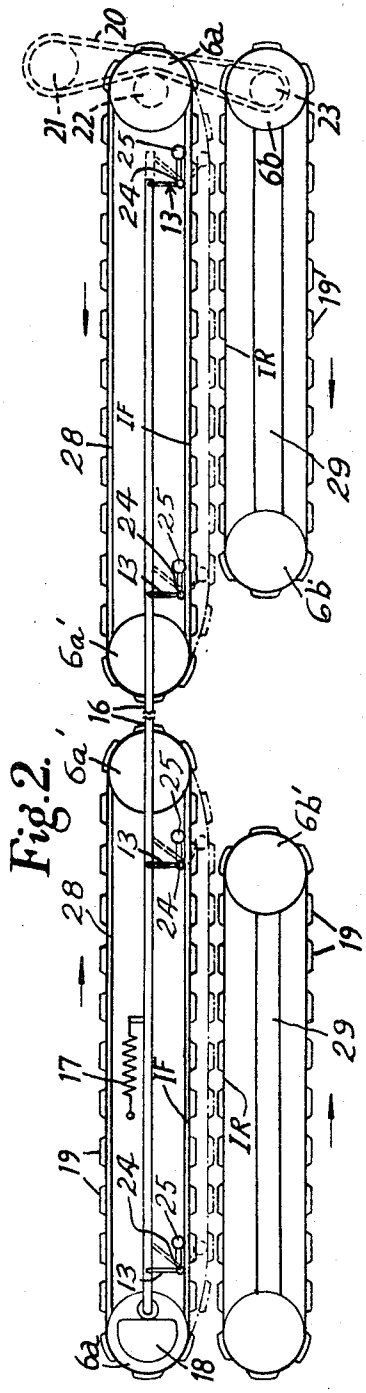


Fig.2.

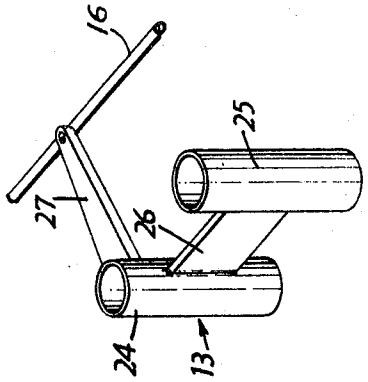


Fig.3.

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SHEET SPREADING DEVICE

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U.S. Cl. 38—143 8 Claims
Int. Cl. D06f 67/04; D02g 1/00; D06c 3/00

ABSTRACT OF THE DISCLOSURE

For use in a laundry a device for spreading sheets as they are fed to an ironer. Two pairs of endless contra-rotating bands are positioned one on either side of the centre line of the sheet as it is drawn forwards, the bands engaging one side of the sheet between each pair and drawing the sides outwardly from the centre. The inner runs of the bands which engage the sheet are reciprocated towards and away from each other periodically to engage and release the sheet periodically.

The invention relates to a device for spreading sheets and the like in preparation to their being ironed in an ironing machine. In ironing an article, such as a sheet, in a laundry the leading edge of the article is fed between the ironer rollers and the trailing part is drawn on thereby. Steps must be taken to ensure that the trailing part of the article is substantially free from rucks and folds before passing between the ironer rollers. The present invention seeks to provide an improved spreading device through which the trailing part of the article may be drawn as it is fed to the ironer. The device may be used if the sheet is fed by hand to the ironer but is particularly suitable for use in conjunction with an automatic feeding machine, particularly of the kind described in my copending patent applications Nos. 550,439, filed May 16, 1966 and 612,386, filed Jan. 30, 1967, where the spreading device of the present invention would take the place of the air-box spreading arrangements described.

According to the present invention there is provided a device for spreading a sheet or the like which is fed forwards with its centre on a centre line, the device comprising two pairs of endless bands arranged symmetrically, one pair on either side of the centre line, each band having an inner run which faces the inner run of the other band of the pair, means for driving the bands in contra-rotating fashion, the inner runs having a component of movement outwardly from the centre line, and means for periodically moving a substantial length of the inner runs of each pair of bands together and apart, the arrangement being such that respective sides of the sheet are drawn between the inner runs and spread symmetrically sideways thereby, the periodic movement of the inner runs providing a periodically varying grip on the sheet.

Preferably the bands are all driven at the same peripheral speed and the periodic movements of both pairs of bands are synchronised and in phase. This is a particularly simple way of ensuring that the sideways drag of the two pairs of bands on the sheet is balanced and the spreading is symmetrical, even at relatively low periodic frequencies.

The periodic movement of the inner runs with respect to each other may be effected in a number of ways. For example, the bands, with their respective carriers, may be moved bodily towards and away from each other or means may be provided within one or each band of each pair for deflecting a substantial length of the respective inner run transversely towards the other inner run of the pair. In a preferred embodiment of the invention

there is provided, within one band of each pair, a pair of pivoted rocker arms arranged one at each end of the inner run so that the band slides over the ends thereof, simultaneous actuation of the two rocker arms swinging the ends towards the other belt of the pair and thereby moving substantially the whole of the inner run towards the other belt against the tension in the belt. Release of the rocker arms allows the tension in the belt to draw the inner run back to its initial position. Conveniently, no provision is made to move the other inner run of the pair transversely, said one inner run merely being pushed against the other and released periodically. Clearly, however, a similar set of rocker arms could be provided for the other inner run, actuation of the two sets being suitably synchronised.

Preferably a mechanical linkage is provided between the drives for all the bands to ensure that they are all driven at the same peripheral speed, and preferably the rocker arms for the different pairs of bands are mechanically linked together to ensure synchronous operation.

A further important feature of the preferred embodiment of the invention is that the bands have raised pads spaced apart on their outer surfaces, the arrangement being such that the pads on the facing inner runs of the belts co-operate with each other to engage the sheet when the inner runs are brought together. The spaces between the pads allow room for the convolutions in the sheet as they are progressively spread out.

Preferably the bands are disposed on either side of the centre line extending perpendicularly thereto, although if it is desired to apply more longitudinal drag to the sheet the belts may be offset slightly from the perpendicular rearwardly from the centre.

The invention will further be described with reference to the accompanying drawings, of which:

FIGURE1 is a perspective view of a laundry feeding machine incorporating the invention;

FIGURE 2 is a plan view of the spreading device of FIGURE 1; and

FIGURE 3 is a perspective view of one of the rocker arms of FIGURE 2.

FIGURE 1 shows the conveyor of a feeding machine of the kind described in the aforementioned copending applications. The sheet **1** is laid by a pair of grips (not shown) onto a forwardly moving conveyor **2** with its centre on a centre line **3**. The conveyor **2** draws the leading part of the sheet forwards in the direction indicated by the arrow and the trailing part of the sheet is drawn over a feed roller **4**. The spreading device in accordance with the invention is provided immediately beneath the feed roller and comprises four endless bands **5** arranged in two pairs, one pair on either side of the centre line **3**. The bands rotate continuously around vertical pulleys **6***a* and **6***b* which are all 4" diameter and which are rotated at about 150 r.p.m. Drive for the bands is taken from an electric motor **7** through a gear-box **8** to a reversing drive arrangement **9** which ensures that pulleys **6***a* and **6***b* are driven at equal speeds in opposite directions so that the bands of each pair are contra-rotating, as indicated by the arrows, the inner runs of the bands moving outwardly from centre line **3**. A shaft **10** runs across the machine and couples gear-box **8** to a similar gear-box **11** which drives the pulleys of the other pair of belts through a reversing drive arrangement **12**. The free ends of the bands **5** are guided around idler pulleys **6***a'* and **6***b'*, only the idler pulleys **6***b'* for the frontmost bands being visible in FIG. 1. The idler pulleys are mounted on cantilever bars **28** and **29**, visible in FIG. 2.

FIGURE 2 is a schematic plan view of the spreading arrangement and shows means (for convenience not shown in FIGURE 1) for reciprocating the inner runs

IF of the foremost bands transversely towards and away from the inner runs IR of the rear-most bands. Mounted within each of the foremost bands near the pulleys therefor are two right-angle rocker arms **13** pivoted on beams **26** about vertical pivots at **24** and having ends **25** which bear against the inside of the inner runs IF. A tension member in the form of a link rod **16** couples the four rocker arms together, being pivoted to each, and movement of the link rod across the machine to the right rocks the rocker arms about their pivots to project the inner runs IF against the tension in the belts transversely towards the inner runs IR. In this position, illustrated in broken line, the sheet is gripped relatively firmly between the inner runs IF and IR. A spring **17** returns the link rod when it is released and the bands are allowed to assume the normal positions shown. At this time the sheet is gripped less firmly, or virtually not at all.

Rod **16** is reciprocated by the action of a cam **18** fixed to rotate with the left-hand pulley **6***a* and cut so that there is one complete reciprocal movement of the bands for every revolution of the pulley. For every foot of travel of the bands it is arranged that the inner runs are together for about 7″ and apart for about 5″.

The bands carry raised pads **19** of felt 6″ in length and spaced 2″ apart. The pads on runs IF and IR are arranged to cooperate with each other so that when the runs are together the pads grip the sheet but the spaces between the pads allow the convolutions in the sheet to be drawn out progressively.

FIGURE 2 illustrates the nature of the reversing drive employed between pulleys **6***a* and **6***b*. For convenience only that for the righthand pulleys is illustrated, shown comprising a chain **20** which is driven from the motor **7** via a sprocket **21** and which drives sprockets **22** and **23** mounted respectively on pulleys **6***a* and **6***b* in the manner shown.

FIGURE 3 shows in detail a rocker arm **13**, which has the pivot **24** and the end **25** in the form of hollow tubes **24** and **25** welded together with a spacer **26**, tube **24** constituting the shaft for a pivot axle (not shown) and an arm **27** being at its end coupled to the rod **16**.

The invention is not restricted to the details of the foregoing description of one embodiment thereof. For example, the pads **19** may be formed integrally in a thermoplastic belt, in which case suitable gripping profiles can be moulded in. The tension member in the form of push-rod **16** may be replaced in the interests of light weight by a tension member in the form of a wire acting in tension against a return spring and fixed to the rocker arms. The mark/space ratio of the engagement and disengagement of the bands may be varied by suitably cutting the cam and the speed of reciprocal motion in relation to the belt speed may be different from that shown by suitably gearing the cam to the pulley.

I claim:

1. A device for spreading a sheet or the like which is fed forwardly with its center on a centerline of the device, the device comprising two pairs of endless bands positioned symmetrically with respect to said centerline, one pair on each side of the centerline, each band having an inner run which faces the inner run of the other band of the pair, means coupled to said bands for driving the bands in contra-rotating fashion, the inner runs moving outwardly from the centerline, and means engageable with the inner runs of one band of each pair for periodically moving a substantial length of the inner runs of each pair of bands together and apart, whereby respective sides of a sheet positioned between the inner runs are drawn between the inner runs and spread symmetrically sideways, the periodic movement of the inner runs together and apart providing a periodically varying grip on the sheet.

2. A device as claimed in claim **1** wherein the means for driving the bands drive the bands at the same peripheral speed and the means for periodically moving the inner runs of the pairs of bands are coupled so as to operate synchronously and in phase.

3. A device as claimed in claim **1** in which said means for moving the inner run comprises a pair of rocker arms pivotally mounted within one band of each pair, one at each end of the inner run with the band sliding over the free end thereof, and means associated with each pair of rocker arms for rocking the arms about their pivotal mounting to swing said free ends thereof towards and away from the other belt of the pair so as to give said periodic movement.

4. A device as claimed in claim **3** wherein the rocker arms for both pairs of bands are mechanically ilnked to move all the rocker arms together.

5. A device as claimed in claim **4** wherein the means for rocking the rocker arms comprises a tension member coupled with all the rocker arms and spring loaded in one direction and a cam engaged with the tension member for moving the tension member periodically in the other direction to rock the rocker arms.

6. A device as claimed in claim **3** wherein pulleys are provided around which said bands run and the cam is coupled with one of said pulleys.

7. A device as claimed in claim **1** wherein each of the bands have raised spaced apart pads on their outer surfaces, the pads on the facing inner runs of the belts cooperating with each other to engage the sheet when the inner runs are brought together.

8. A device as claimed in claim **7** wherein the pads are of felt.

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G. V. LARKIN, *Assistant Examiner.*

U.S. Cl. X.R.

28—1; 26—54