United States Patent [19]

Weir

[11] **3,729,846**

[45] **May 1, 1973**

[54] **LAUNDRY FEEDING MACHINE**

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[73] Assignee: **McGraw-Edison Company,** Elgin, Ill.

[22] Filed: **Apr. 30, 1971**

[21] Appl. No.: **139,026**

[52] **U.S. Cl.**.....**38/143**

[51] **Int. Cl.**.....**D06f 67/04**

[58] **Field of Search**.....271/79, 74, 45, 69, 271/54; 38/2, 143

[56] **References Cited**

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3,429,063	2/1969	Myers	38/143
3,421,756	1/1969	Weir	38/143 X
3,376,036	4/1968	Weir	38/143 X

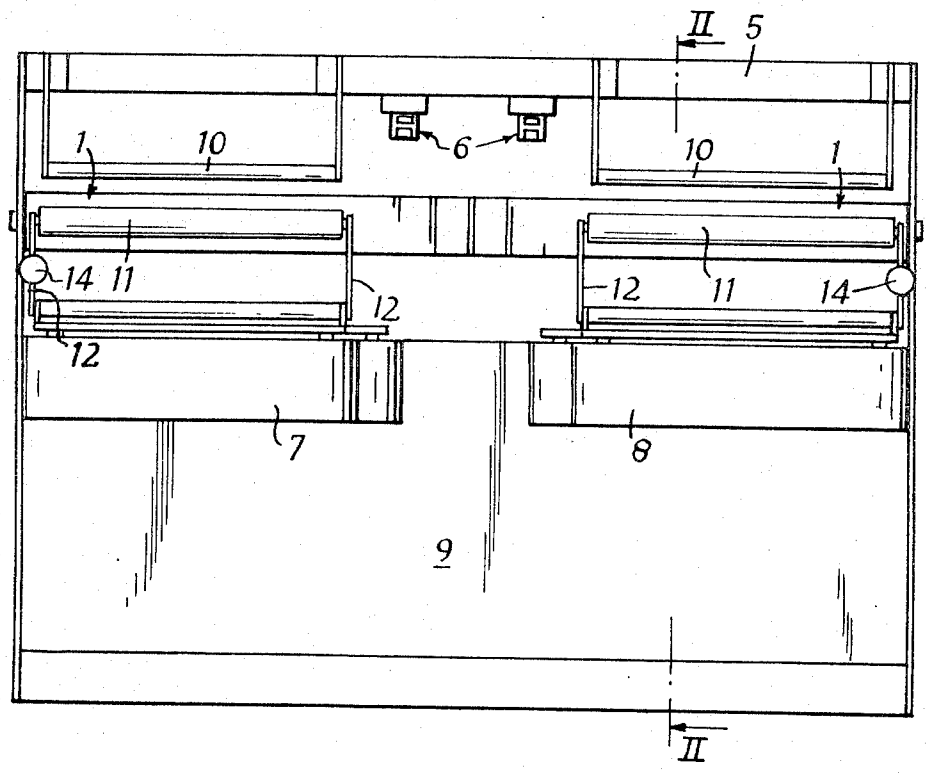
Primary Examiner—Geo. V. Larkin

Attorney—Wenderoth, Link & Ponack

[57] **ABSTRACT**

A laundry feeding machine having a conveyor with an upper run which moves in a forward direction, a pair of clamps above the conveyor adapted to grip the tow corners of a leading edge of an article to be fed, means for moving the clamps apart transversely and holding them apart against tension in the leading edge, and air jet means for directing, against an article so held, a forward blast of air such that on release by the clamps the leading part of the article is blown forward on to the conveyor.

10 Claims, 11 Drawing Figures



4 Sheets-Sheet 1

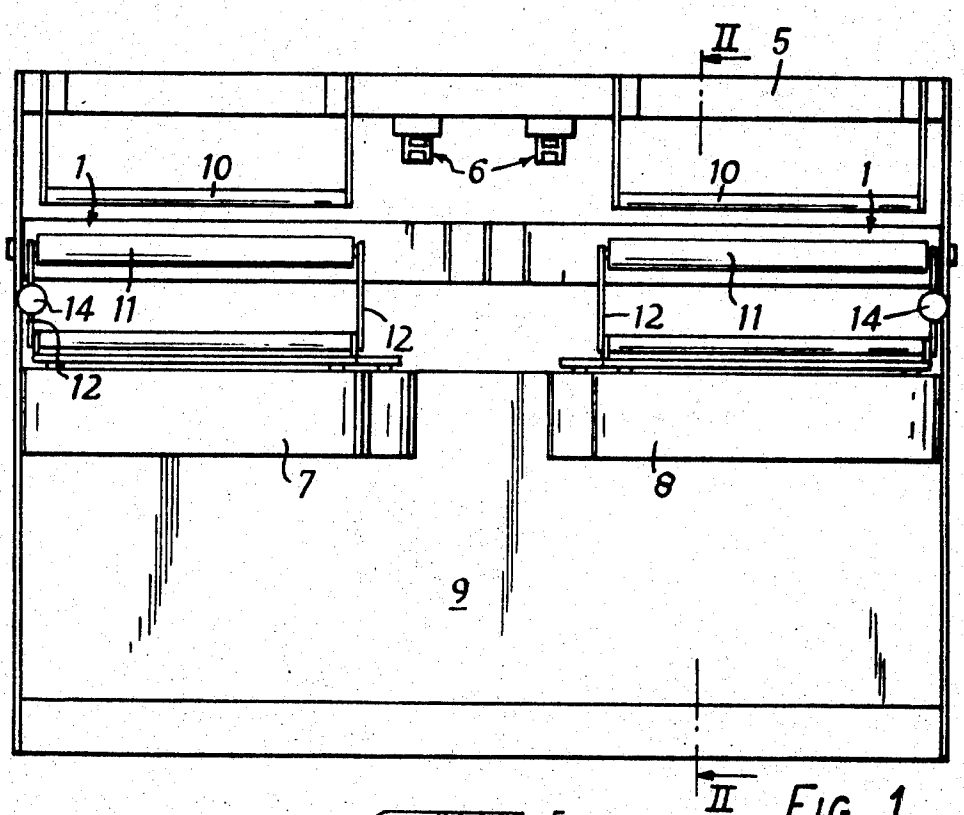


FIG. 1.

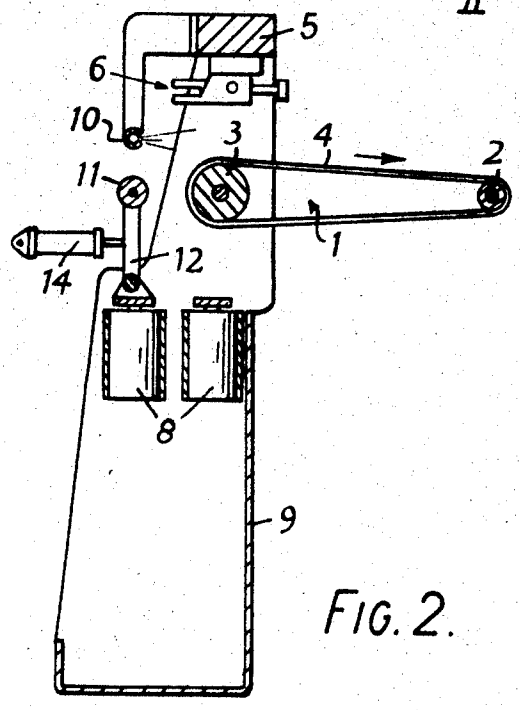


FIG. 2.

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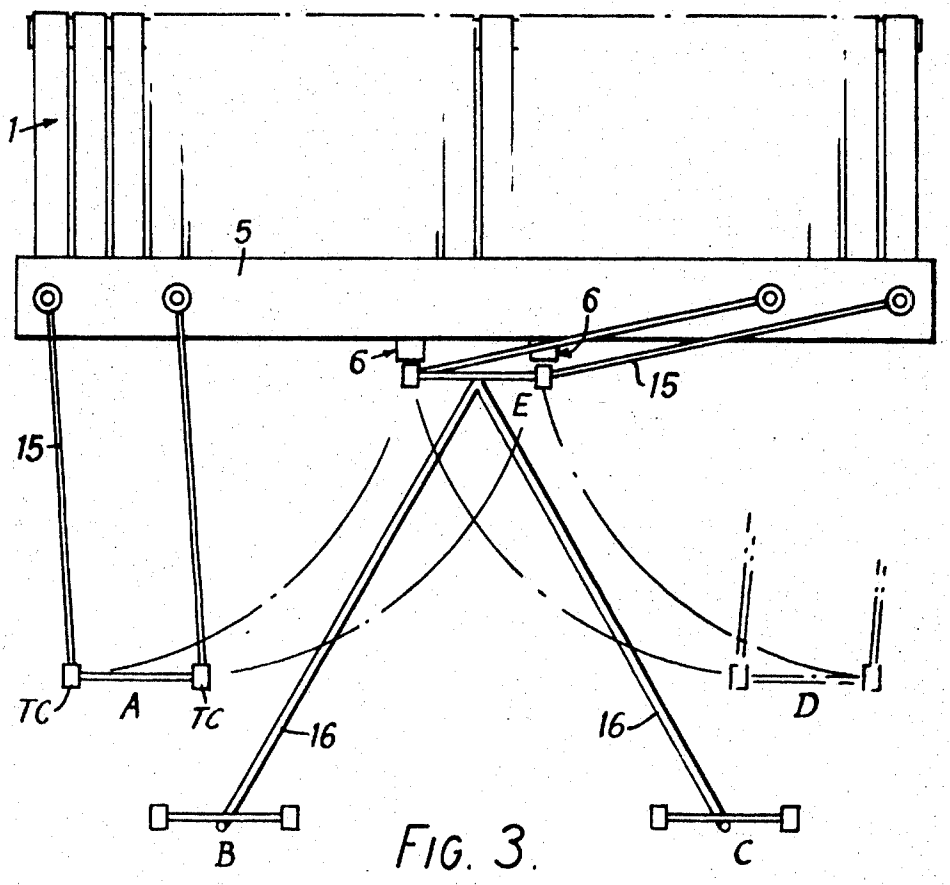

FIG. 3.

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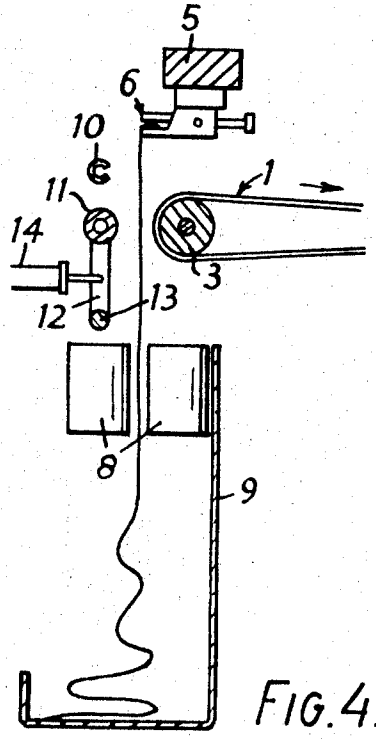

FIG. 4.

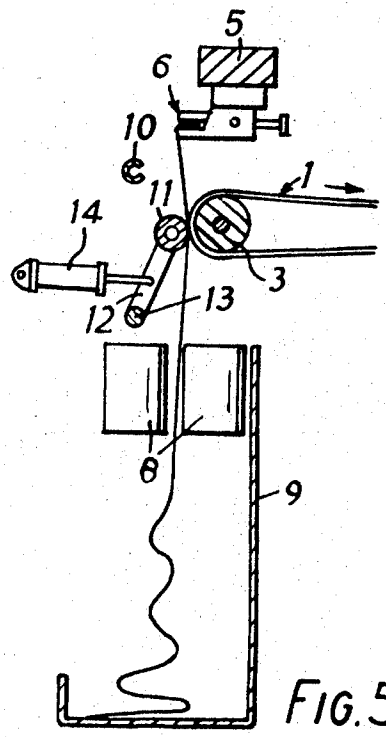

FIG. 5.

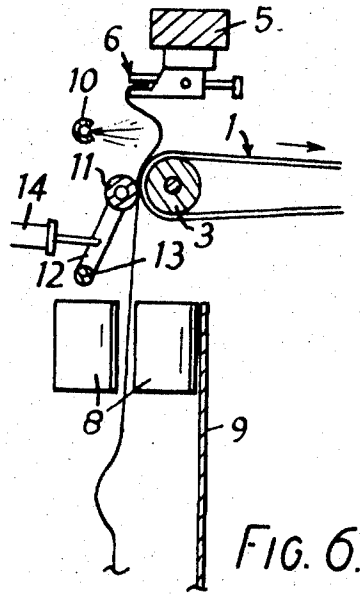

FIG. 6.

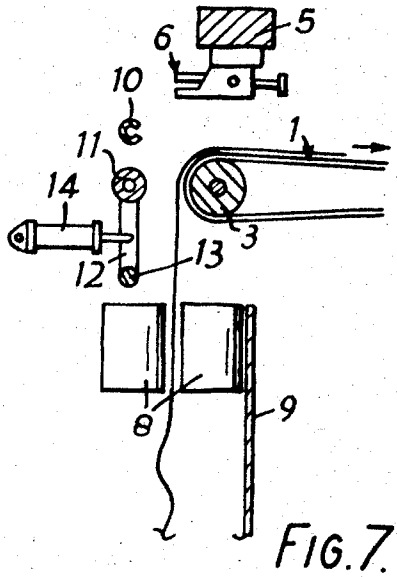

FIG. 7.

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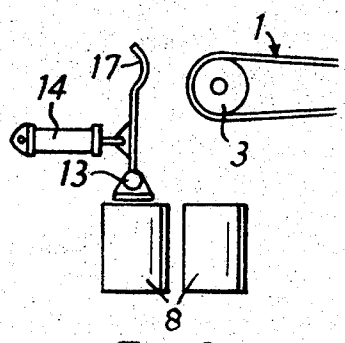

FIG. 8.

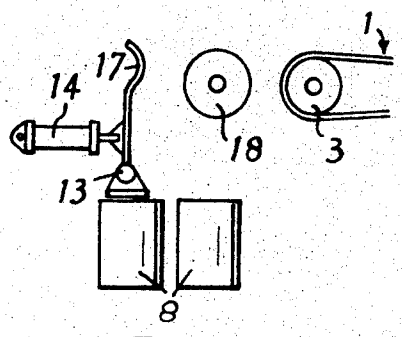

FIG. 9.

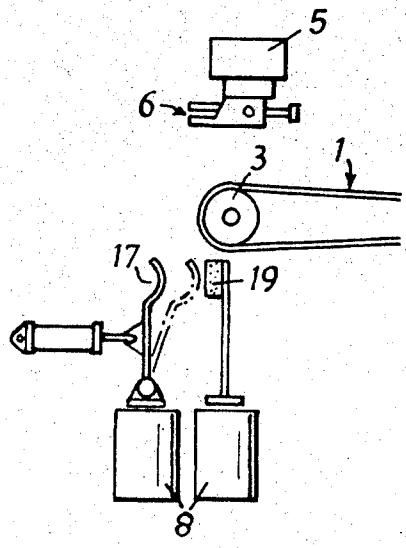

FIG. 10.

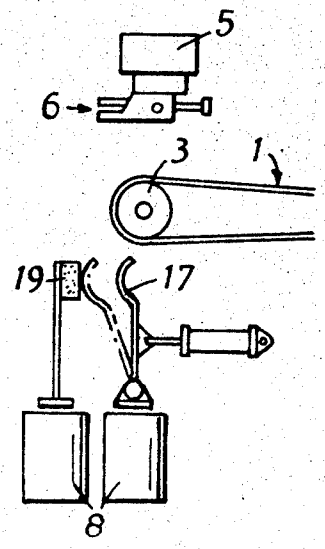

FIG. 11.

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LAUNDRY FEEDING MACHINE

The invention relates to a machine for feeding laundry articles (usually flat-work articles such as sheets) to an ironing machine.

In U.S. Pat. No. 3,421,756 there is described a laundry feeding machine having a conveyor with an upper run which moves in a forward direction, a pair of clamps adapted to grip the two corners of a leading edge of a laundry article to be fed, means for moving the clamps apart transversely and holding them apart under tension in the leading edge, means for advancing the clamps thus held apart over the upper run of the conveyor and means for opening the clamps to drop the leading edge on to the conveyor. The clamps are mounted on a beam extending above and across the conveyor and the beam is moved forward to feed the article and back to receive the next article.

Transfer feed devices have been devised whereby a number of operators — perhaps four or more — may feed a machine of the kind described, each operator feeding a respective pair of transfer clips at a respective feed station. The articles are carried by the transfer clips from the feed stations to a common transfer station where they are transferred to the clamps. A machine of this type is disclosed in U.S. Pat. No. 3,376,036. With this arrangement it is found that the maximum speed at which articles can be fed is limited by the speed at which the beam can be reciprocated. U.S. Pat. Nos. 3,421,756 and 3,604,132 disclose typical drive mechanisms for moving the beam. In practice, it is difficult to achieve a feeding rate of more than about 20 sheets per minute. The present invention seeks to overcome this difficulty.

According to the present invention there is provided a laundry feeding machine having a conveyor with an upper run which moves in a forward direction, a pair of clamps above the conveyor adapted to grip the two corners of a leading edge of an article to be fed, means for moving the clamps apart transversely and holding them apart against tension in the leading edge, and air jet means for directing, against an article so held, a forward blast of air such that on release by the clamps the leading part of the article is blown forward on to the conveyor. With this arrangement there is no need to move the clamps and associated beam forward and back over the conveyor, so that not only are the speed-limiting effects of beam inertia overcome but also the complex beam moving mechanism may be dispensed with.

There is a danger that the article may fall as the clamps are released before being blown onto the conveyor. This is because even if the conveyor is of relatively high friction material there is a danger that the hold on the short length of the leading part of the article blown on to the conveyor will be unable to overcome the force tending to pull the article off the conveyor due to the weight of the trailing part of the article. Therefore support means are preferably provided to support the weight of the trailing part of the article, at least initially, as it is fed forwards. Preferably the support means comprises a pair of trapping rollers or shoe plates which may be pressed forwards to trap the article along a line against the conveyor as it passes over the rear roller or against a feed roller provided behind the rear roller of the conveyor, or against a stationary stop below the rear roller.

The air jet means preferably comprises a pair of air tubes which together extend across the machine with a space at the center through which the articles are fed on the grips for transfer to the clamps for spreading, each air tube having one or more slots or a series of jet holes forwardly directed.

The present invention may be used in a feeder without the multiple station transfer feed facilities but these are necessary if full advantage is to be taken of the increased speed of operation which the invention allows.

The conveyor may be allowed to run continuously. Alternatively, however, the conveyor may be stopped momentarily as the leading part of the article is blown down on to it. As the conveyor is re-started there is a drag between the conveyor and the article which tends to draw out any creases in the leading part of the article. A similar effect may be achieved by providing a rotating feed roller immediately behind the conveyor and momentarily braking the feed roller, the articles being fed thus being stopped or slowed momentarily during feeding.

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

FIG. 1 is a schematic front elevation of a laundry article feeding machine in accordance with the invention;

FIG. 2 is a schematic cross-sectional view taken on line II—II of FIG. 1;

FIG. 3 is a diagram illustrating in plan view the transfer feed mechanism of the machine of FIGS. 1 and 2;

FIGS. 4 to 7 are diagrams based on FIG. 2 showing four successive stages in the feeding of a sheet;

FIG. 8 is a diagram showing a shoe plate which is an alternative to the clamping rollers of FIGS. 1 to 7;

FIG. 9 is a diagram showing the disposition of the feed roller, which can be used in an alternative embodiment of the machine of FIGS. 1–8; and

FIGS. 10 and 11 are diagrams showing alternative clamping support arrangements.

Referring now to FIGS. 1 and 2, there is shown a feeding machine for feeding sheets which comprises a frame in which is mounted a conveyor 1 which is driven to run around a front roller 2 and a rear roller 3 so that an upper run 4 of the conveyor moves forwards in the direction shown by the arrow. The conveyor comprises a number of spaced parallel continuous loop bands (FIG. 3) which move together around the rollers.

Mounted above the conveyor is a spreader beam 5 which is fixed and which carries two spreader clamps 6. The adjacent corners of the sheet to be spread are secured in place in the clamps. The clamps slide in the beam and are coupled to move symmetrically about the center line of the machine to spread the sheet along the edge thereof between the corners. In FIG. 7 the clamps are shown in their innermost, loading position, also indicated in FIG. 3 at the central feeding station E.

Beneath the conveyor there is provided an arrangement for spreading the trailing part of a sheet fed by the machine as it is drawn onto the conveyor. The spreading arrangement is as disclosed in U.S. Pat. No. 3,431,665 and comprises two pairs 7 and 8 of contra-rotating endless bands. These bands have inner runs which move outwardly from the center of the machine and straighten the sheet by drawing the right-hand and

left-hand sides of the sheet apart. An oscillating mechanism moves the inner runs of each pair of bands together and apart periodically to give a pulsating effect so that the sheet is gripped intermittently. A trough **9** holds the trailing part of the sheet.

A pair of air tubes **10** is provided behind the conveyor and, when viewed from the side, between the conveyor and the clamps **6**. The air tubes are connected through a valve (not shown) to a high pressure air supply and each tube has a number of forwardly facing perforations along its length which constitute air holes.

Beneath the air tubes there are two respective clamping rollers **11** freely rotatably mounted on arms **12**. Arms **12** are pivoted at **13** and the rollers **11** can be swung to contact the conveyor at the rear roller **3** thereof and be withdrawn by means of pneumatic rams **14**.

The machine of FIGS. **1** and **2** has a transfer feed arrangement which allows four operators to feed the machine simultaneously. FIG. **3** shows the transfer feed arrangement in plan view. For the sake of clarity the air tubes, clamping rollers and pulsating band spreaders have been omitted from FIG. **3**. There are four feeding stations A, B, C and D at each of which an operator stands. Each feeding station has a pair of transfer clips TC. Those at stations A and D are mounted on pivoting arms **15** and those at stations B and C are slidably mounted on guides **16**. Each operator feeds two adjacent corners of a sheet into the clips of the loading station and presses a control button associated with the station. If no other transfer clips are at this time at the central feeding station then the loaded transfer clips are conveyed to the central feeding station E where the corners of the sheet are automatically transferred to the respective clamps **6**. The transfer clips then return. If another pair of transfer clips is at station E when the control button is pressed then the information is stored in a simple memory and queueing circuit which determines the order of precedence. The loaded clips are thus held and moved in turn when station E is freed. U.S. Pat. Nos. 3,376,036 and 3,664,046 disclose typical appropriate circuits for this movement. In FIG. **3** the transfer clips for station D are shown at the loading station E. This transfer arrangement and automatic control allows each operator to work at her own speed independently of the other operators.

Referring now to FIGS. **4** to **7** there are shown four successive stages in the feeding of a sheet. Firstly (FIG. **4**) the two corners of the leading edge of the sheet are transferred to the clamps **6** and thus the sheet is solely under the control of the spreader clamps. The clamps are then moved apart across the beam **5** until the leading edge of the sheet is straightened. This condition is detected by a switching arrangement which then arrests the clamps. U.S. Pat. Nos. 3,421,756 and 3,604,132 disclose details of the typical appropriate clamp separating and stopping structures. The clamp rollers **11** are brought forward (FIG. **5**) responsive to the detected condition by actuation of rams **14** to clamp the sheet against the conveyor where it passes over the rear roller **3**.

The air valve to the air tubes **10** is then opened and jets of air strike the sheet (FIG. **6**). The clamps **6** are released by pneumatically operated release mechanisms coupled to the air line for the air tubes. The leading part of the sheet is thus blown down onto the conveyor and is drawn tight as it is dragged forward by the moving conveyor.

Finally, when a sufficient length of the leading part of the sheet has been fed onto the conveyor so that there is sufficient frictional engagement between the sheet and the conveyor to prevent the weight of the trailing part of the sheet from pulling the sheet off the conveyor, the clamping rollers **11** are withdrawn. Conventional means (not shown) can be provided to sense this condition, for example a photocell unit (not shown) spanning the conveyor between adjacent bands the beam of which is broken by the leading edge of the sheet moving along the conveyor. The position of the photocell unit can be adjusted along the conveyor by trial and error for a typical sheet being run and when once this condition is determined, the photocell can be fixed in place at this location for subsequent sheets. The trailing part of the sheet is spread by the pulsating band spreader.

FIG. **8** shows that instead of rollers **11** there may be provided a pair of smooth curved metal shoe plates **17** which press the sheet against the conveyor.

FIG. **9** shows an arrangement similar to FIG. **8** in which there is further provided a feed roller **18** behind the rear roller **3** of the conveyor. The feed roller is as described in U.S. Pat. No. 3,421,756, being coupled to be driven with the conveyor, where further, however, a clutch and brake arrangement is provided to halt the feed roller instantaneously while the advancing conveyor continues to draw the leading edge of the sheet forwardly. This momentary drag on the sheet draws out creases in the leading edge. The shoe plates **17** or the rollers **11** trap the sheet against the feed roller.

Referring now to FIG. **10**, there is shown a shoe-plate support arrangement similar to that shown in FIGS. **8** and **9** except that instead of being pressed against the roller **3** or roller **18** the sheets are clamped by the shoe plates **17** against a stop **19** which is stationary beneath roller **3**. While this arrangement supports the trailing part of the sheet it will be appreciated that the sheet is prevented from being drawn forwards while clamped. In fact, this is an advantage since the drag on the sheet provided by the clamping action allows any rucks in the leading part of the sheet to be drawn out by the conveyor without the need to arrest the conveyor or the feed roller **18** momentarily. The clamping action by the shoe plate **17** is momentary — lasting for only about one-fourth second while the leading part of the sheet is being blown on to the conveyor. Thereafter the shoe plate is withdrawn and the sheet released.

FIG. **11** shows an arrangement similar to that shown in FIG. **10** except that the positions of the shoe plates **17** and stop **19** are reversed. Only one shoe plate is provided and this extends across the machine from one side to the other.

The normal position of the shoe plate is beneath roller **3** and it is brought out when necessary to clamp a sheet against stop bars **19**, of which there are two with a space at the center of the machine.

I claim:

1. In a laundry feeding machine having a conveyor with an upper run which moves in a forward direction, a pair of clamps above the level of the upper run of the

conveyor and adapted to grip the two corners of a leading edge of an article to be fed, and means on which the clamps are mounted for moving them apart transversely to tension the leading edge of the article, that improvement comprising air jet means between said clamps and the upper run of the conveyor and rearwardly of the clamps relative to the forward direction of movement of the upper run of the conveyor for forming a blast of air directed forwardly in the same direction as the direction of movement of the upper run of the conveyor against an article held by the clamps, whereby on release of the article by the clamps, the leading edge of the article is blown forwardly and downwardly against the upper arm of the conveyor.

2. The improvement as claimed in claim 1 in which said air jet means comprises a pair of air tubes extending across the machine and spaced apart at the center of the machine a distance sufficient to allow the articles to be fed between the air tubes to the clamps, each air tube having forwardly directed air vent means.

3. The improvement as claimed in claim 1 further comprising means for supporting the weight of the trailing part of the article as it drapes over the rear of the conveyor when the leading part of the article is blown onto the conveyor, said means being positioned adjacent the rear end of the conveyor and being movable toward and away from said article for engaging the trailing part of the article to at least partially support the weight thereof.

4. The improvement as claimed in claim 3 in which said means comprises a pair of members spaced across the machine adjacent the rear end of the conveyor, pivoted arms on which said members are mounted for movement toward and away from said rear end of the conveyor, and means coupled to said arms for moving said arms to move said members toward and away from said conveyor.

5. The improvement as claimed in claim 4 in which said members are freely rotatable rollers.

6. The improvement as claimed in claim 4 in which said members are shoe plates.

7. The improvement as claimed in claim 1 in which said machine further comprises a feed roller positioned to the rear of the conveyor and coupled to and driven with the conveyor, and said improvement further comprises means coupled to said feed roller for momentarily halting the feed roller while the conveyor continues to draw the leading edge of the article forwardly, whereby a momentary drag is produced on the sheet which draws out creases in the leading edge.

8. The improvement as claimed in claim 1 in which said machine further comprises a feed roller positioned to the rear of the conveyor and coupled to and driven with the conveyor, and said improvement further comprises a member adjacent said feed roller and being movable toward and away from said feed roller for engaging said article as it moves between the member and the feed roller for momentarily halting the movement of the article over the feed roller while the conveyor continues to draw the leading edge of the article forwardly, whereby a momentary drag is produced on the sheet which draws out creases in the leading edge.

9. The improvement as claimed in claim 1 further comprising means for imposing a drag on the trailing part of the article as it drapes over the rear of the conveyor when the leading part of the article is blown onto the conveyor, said means being a pair of opposed members positioned adjacent the rear end of the conveyor with the article running between them and being movable relatively to each other toward and away from each other, and moving means coupled to at least one of said members for moving said member.

10. The improvement as claimed in claim 1 further comprising transfer feed means comprising a plurality of transfer mechanisms for transferring an article to be fed to said conveyor from a plurality of separate stations, each transfer mechanism having a pair of grips thereon for gripping the article to be fed, and each transfer means being movable from a respective feed station to the position of said clamps.

* * * * *