May 11, 1954 F. A. MANN, JR 2,677,900

LAUNDRY SHAKE-OUT DEVICE

Filed Jan. 14, 1950 2 Sheets-Sheet 1

FIG. 1

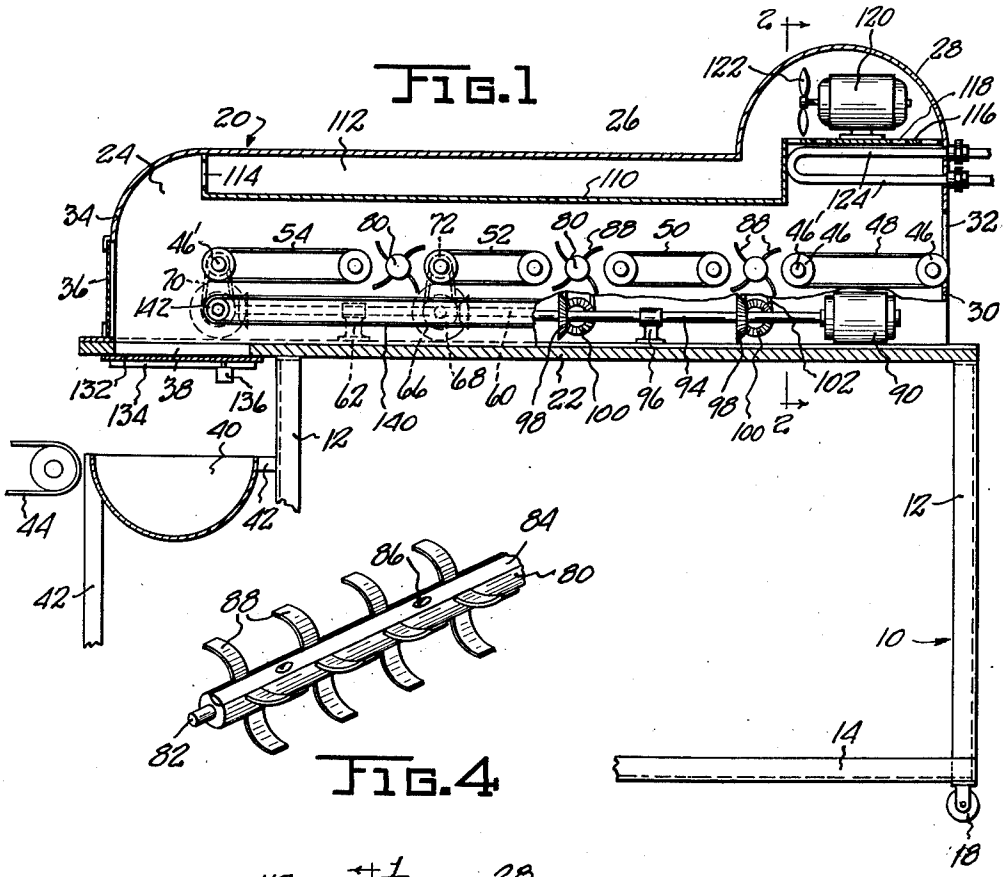


FIG. 4

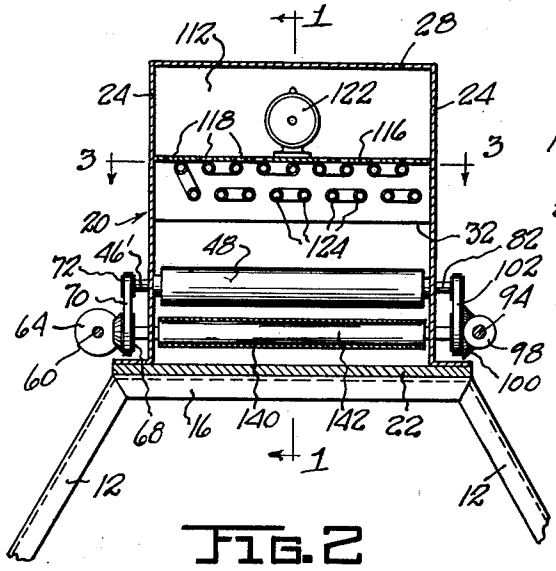


FIG. 2

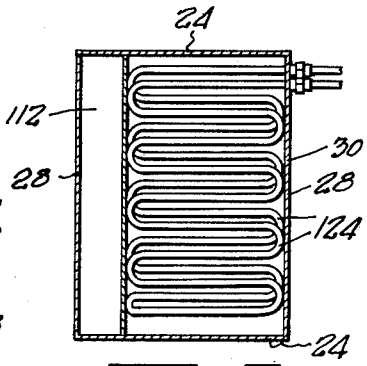


FIG. 3

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LAUNDRY SHAKE-OUT DEVICE

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2 Sheets-Sheet 2

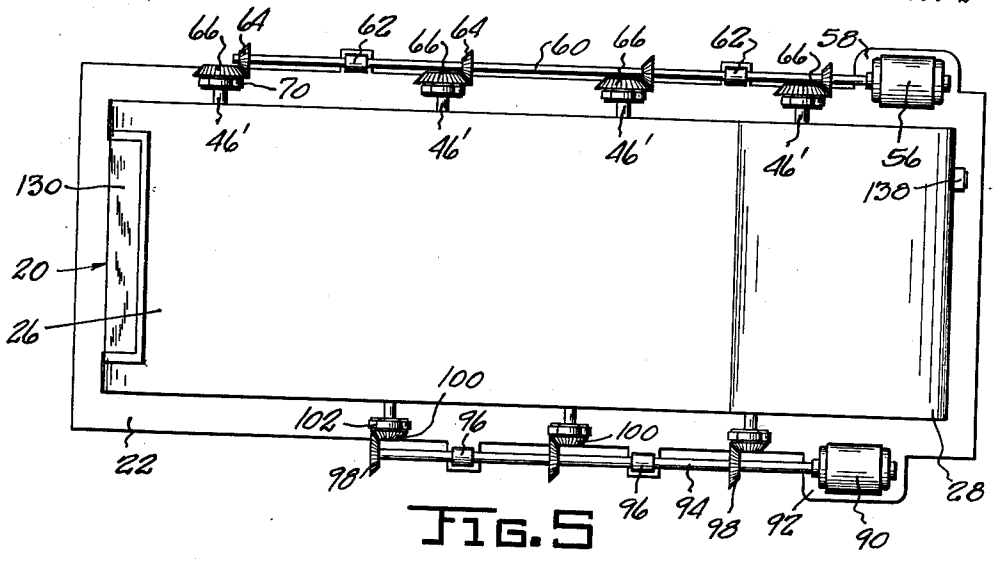


FIG. 5

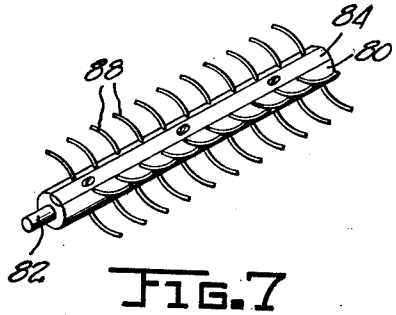


FIG. 7

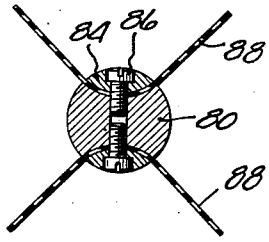


FIG. 6

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LAUNDRY SHAKE-OUT DEVICE

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Application January 14, 1950, Serial No. 138,651

11 Claims. (Cl. 34—225)

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This invention relates to a device for conditioning small laundry items for ironing, which device is particularly intended for use in a commercial laundry handling family washings.

Considerable time is now expended in a commercial laundry in handling small pieces from family bundles which have passed through the washing and extracting machines, in order to prepare those pieces for ironing. The washing and extracting operations tend to twist the individual laundry pieces into compact rolls or wads, and frequently cause the different work-pieces to intertwine in a compact mass formed of a number of work-pieces. This occurs despite the fact that the items of a given bundle are confined together in a net bag during washing and extracting, and the bags separate the laundered items into groups during the washing and extracting operations. As a consequence of the wadding and intertwining of the individual laundry pieces, those individual pieces must be separated and shaken or otherwise spread or flattened in order to permit them to be placed in an ironer. A considerable amount of manual manipulation and handling is now required to accomplish this service, and it is a common practice to station a number of operators at the feeding station of an ironing machine in order to feed the work-pieces to the machine at a rate which permits the machine to operate at any reasonable speed at or approaching its capacity. The number of workers required at this particular station entails a substantial labor cost, and, therefore, any reduction in the number of workers required constitutes a commercial advantage and cost saving to the laundry operator.

The primary object of this invention is to provide a device which will shake out and separate small laundered items quickly and expeditiously with minimum personal attendance or manual handling and which will enable a large volume of small laundered pieces to be fed to an ironing machine at a rapid rate.

A further object is to provide a device of this character having a plurality of conveyors arranged end to end with rotatable members interposed therebetween serving to transfer work-pieces from one conveyor to another and to act upon the work-pieces incident to such transfer in such a manner as to spread, fluff and separate the work-pieces and condition them for ironing.

A further object is to provide a device of this character which will transfer laundered items from a feeding station to a discharge station, which feeds and throws the items upward at spaced intervals in their path of movement to

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spread and fluff the items, which aerates the items by circulating hot air along the path of travel of the items in the device, and which delivers said items in separated, spread and aerated condition at the discharge station.

Other objects will be apparent from the following specification.

In the drawings:

Fig. 1 is a fragmentary longitudinal vertical sectional view of the device taken on line 1—1 of Fig. 2, and illustrating fragmentarily and in side elevation the support of the device.

Fig. 2 is a transverse vertical sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a horizontal sectional view taken on line 3—3 of Fig. 2.

Fig. 4 is an enlarged fragmentary perspective detail view illustrating one form of flail element usable in the device.

Fig. 5 is a top plan view of the device.

Fig. 6 is a transverse sectional view of a flail member.

Fig. 7 is a fragmentary perspective view of a flail member of slightly different construction.

Referring to the drawings which illustrate the preferred embodiment of the device, the numeral 10 designates a support or framework of any construction found suitable. The framework will be rigid and of any height found desirable. As shown, the support is formed of a number of uprights 12 which may be formed of wood or metal structural members, which are interconnected adjacent their lower ends by horizontal or cross-members 14 welded or otherwise fixedly secured together, and which are secured together at their upper ends by structural members 16. If desired, the supporting structure 10 may be mounted upon rollers, castors, wheels or other rotatable ground-engaging members 18 to facilitate movement of the device from place to place. The rotating ground-engaging parts 18 are not required, however, and the framework 10 may be stationary. Where rotating supports 18 are employed, it may be desirable to provide releasable brake or retainer means (not shown) of any character found suitable, which will serve to maintain the device at a desired position during operation thereof.

A housing 20 is carried by the top of the support 10, said housing preferably having a bottom panel 22, side panels 24 and a top panel 26. The top panel preferably merges with a domed or upwardly offset part 28 located at one end of the device. The housing 20 preferably includes an end wall 30 having an opening 32 formed therein. The opposite end of the housing preferably has

an end wall portion **34** partially closing the same and defining an opening adapted to be spanned by a panel **36** slidably, swingably or otherwise releasably positioned to afford access into the end of the casing **20**, if desired. The housing **20** is preferably longer than the support or frame **10** upon which it is mounted, the panel **22** projecting beyond said support adjacent the portions **34** and **36** and being provided with an aperture **38**. Alternatively, the panel **22** may terminate at the frame, and the housing wall portions **24** and end wall portions **34** and **36** may project longitudinally therefrom.

A work collector or receptacle **40** will preferably be positioned below the panel **22** in a position to receive articles discharged through the opening **38**. Any suitable frame **42** may serve to support the receptacle **40**, the same preferably being positioned at such level that operators may conveniently reach the same to grasp the laundered items. As illustrated, the receptacle **40** may be positioned at substantially the lever of the conveyor **44** illustrated fragmentarily and which forms a part of a conventional commercial ironing machine commonly known in the trade as a flat-work ironer. The ironer is here illustrated as located adjacent to this device; however, it will be understood that the position may be varied according to the requirements, and, in most instances, the instant device will be positioned spaced from the end of the flat-work ironer a distance sufficient to permit workers to stand between the same for the purpose of withdrawing work-pieces from the receptacle **40** and depositing them upon the conveyor **44** of the flat-work ironer.

The housing **20** is elongated and substantially horizontally positioned with its opening **32** at one end intermediate its height. A plurality of conveyors are mounted within the housing, each preferably being a belt type conveyor passing around rollers **46** whose axes are positioned at a common level and which extend transversely of the housing **20** between the end walls **24**. Suitable bearings (not shown) may be provided to journal the rollers **46** or the shafts thereof. As here illustrated, four conveyors **48**, **50**, **52** and **54**, respectively, are provided. The number is illustrative, however, and it will be understood that either more than four or less than four may be provided. The rollers **46**, around which each of the conveyor belts **48**, **50**, **52**, **54** is trained, are spaced apart, as best seen in Fig. 1, so that intervals occur between successive or adjacent conveyors. The belts in each instance are of substantially the same width as the spacing between the side walls **24** of the chamber to substantially completely span the chamber, as best seen in Fig. 2, and the topmost run of each belt is positioned in a substantially horizontal plane and at substantially the same level as the top run of each of the other conveyor belts. The level of the top runs of the conveyor belts will be spaced above the lower edge of the casing opening **32** so as to facilitate the insertion of work-pieces into the chamber **20** and the deposit thereof upon the foremost conveyor **48**.

Any suitable means may be provided for driving the conveyors, the same preferably being driven at the same speed and with their upper runs traveling in the same direction, that is, from right to left as viewed in Fig. 1. The drive means, as here illustrated, has a motor **56** supported upon a suitable platform **58** carried by the frame of the device. The motor drives an elongated shaft **60** which is preferably journaled at spaced points **62** along its length. The shaft **60** has a driving connection with one roller **46** of each set, here illustrated as the rearmost roller. This driving connection may comprise a bevel gear **64** carried by the shaft **60** and meshing with a bevel gear **66** carried upon a stub shaft and mounting a pulley **68**, around which is trained a belt **70** which meshes with a pulley **72** carried by the shaft **46'** of the roller **46** at one end thereof. This arrangement is effective in instances in which the level of the shaft **60** is lower than the level of the roller shaft **46'**. It will be apparent, however, that in instances where said shafts are at substantially the same level, the pulley, belt and stub shaft arrangement may be eliminated and the gear **66** may be mounted directly upon the shaft **46'** of the roller **46**. The arrangement, assuming that the gear ratios are uniform for all of the conveyors, will drive the conveyors at the same speed of travel regardless of the length thereof, it being understood that the said conveyors need not be of equal lengths.

Flail units are positioned in the housing **20** between adjacent conveyors, as best illustrated in Fig. 1. The flail units may be of any suitable construction, for example, a construction similar to that illustrated in Figs. 4, 6 or 7. Each flail unit is characterized by a rigid, rotatable body member or cylinder **80** having a reduced shaft extension **82** at each end thereof journaled in suitable bearings which may be carried by the housing walls **24** or otherwise suitably supported, as upon the framework of the device. The members **80** will preferably be of a length substantially equal to the spacing between the side walls **24** or equal to the width of the conveyor belts and will preferably be notched longitudinally at two or more points, which notches receive longitudinally extending rigid retainer strips **84** which are detachably secured to the body **80**, as by means of bolts **86**. Flexible flail elements **88**, such as elongated rubber strips, cords, ropes or the like, are anchored to the member **80** by extending transversely across one of the grooves at its central portion so as to be retained or clamped in said groove by strip **84**, as best seen in Fig. 6, with its end portions projecting peripherally of the member **80** and spaced from one another and from the projecting ends of adjacent flail elements. In the preferred form there will be two or more flail elements carried by each flail unit and these will be spaced apart short distances, not greatly exceeding two inches, and will be positioned along the full length of the member **80**.

The shaft **82** of each flail unit will be positioned at a level such that the topmost surface of the member **80** will be at a level at or below the level of the top run of the conveyor belts. The member **80** will be positioned between and clear of the rolls **46** of adjacent conveyors. The flail elements **88** will be of such length, however, that they strike at least the discharge end of the adjacent conveyor. In the preferred form the flail unit will be substantially equally spaced between adjacent conveyors so that the flail elements **88** will strike the adjacent ends of the two conveyors between which it is positioned.

The flail element may be driven by any suitable means, for which purpose, as best illustrated in Figs. 1 and 5, an electric motor **90** is provided mounted upon a suitable support or platform **92** preferably at the side of the device opposite that at which the motor **56** is located. The motor **90** drives an elongated shaft **94** journaled in one or

more spaced bearings 96. Any suitable drive mechanism for connecting the flail units for rotation by the motor shaft 94 may be provided. As here illustrated, a plurality of bevel gears 98 are mounted upon the shaft 94, one adjacent each flail unit, which bevel gears 98 mesh with bevel gears 100 mounted upon a stub shaft (not shown), which stub shaft carries a pulley upon which a belt 102 is trained, said belt passing around a pulley (not shown) mounted upon the projecting shaft portion 82 of the flail unit 80. This arrangement accommodates the mounting of the motor 90 and the positioning of the shaft 94 at a lower level than the flail units, but it will be understood that other constructions may be employed, in which said parts are located at substantially the same level, enabling direct mounting of the bevel gears 100 upon the shaft 82 of the flail unit and eliminating the pulleys and belt 102, if desired.

In the operation of the device, the flail units will rotate in a counterclockwise direction as viewed in Fig. 1. These units will be driven at a peripheral speed substantially greater than the linear speed of the conveyors or at least at such speed that the speed of the tip portions of each flail element substantially exceeds the linear speed of the conveyors. The speed will be sufficient to impart substantial centrifugal force to the flexible flail elements and cause them to beat and engage the work-pieces which are discharged from the adjacent conveyor positioned at the right, as illustrated in Fig. 1. The contact of the tips of flail elements with the conveyor from which work-pieces are being discharged, coupled with the speed of rotation of the flail unit, will give to each flail element a snap action as it moves upwardly past or out of contact with the feeding conveyor, which snap action is imparted to or acts upon the work-pieces as the same are being discharged from the adjacent right-hand conveyor, as viewed in Fig. 1. The forces acting upon the flail elements cause those flail elements to slap the work-pieces at a plurality of points, to tend to raise them upwardly, and also to propel them forwardly. This action causes the work-pieces to be transferred onto the conveyor at the left of the flail unit, as viewed in Fig. 1. The combination of the slapping or snap contact of the flail elements with the work-piece, the raising or tossing of the work-pieces upwardly, and the deposit or discharge thereof onto the succeeding conveyor, tends to loosen the work-pieces from their rolled or wadded condition and to separate and aerate the work-pieces. The action is such that, when repeated several times, the work-pieces will be separated, spread and rendered in a condition separating the individual work-pieces, spreading them out, and preparing them for ironing, so that the shaking and stretching of the work-pieces by hand as they are fed to the flatwork ironer conveyor 44 is substantially reduced. In other words, the manual handling of the work pieces is reduced and the processed work-pieces can be fed rapidly onto the flatwork ironer in such a manner as to enable the same to operate at high capacity with only a few operators located at the feed end of the ironer, compared to present feeding practices with ironing machines.

It is desirable further to facilitate the operation of ironing machines, and particularly to enable a flat-work ironer to travel at high speed, to have work-pieces partly dried as they are fed to the ironer. In commercial laundry practices, the extractors serve mechanically or by centrifugal

force to remove excess water from the laundry, but laundered items are substantially damp and contain a great amount of moisture. If this moisture can be further reduced, the speed of operation of the ironer can be increased, thus increasing again the work capacity of the laundry equipment.

In order to partially dry the laundered items as they pass through this shake-out device, there may be provided an air-heating and circulating arrangement in conjunction with the device. Thus a horizontal partition 110 may be provided spaced above the upper runs of the conveyors and below the top 26 of the housing, said partition completely spanning the space between the side walls 24 and providing an elongated upper chamber 112 which extends for the major portion of the length of the housing 20. An opening 114 is provided at the left-hand end of the chamber, as illustrated in Fig. 1, which opens that chamber into communication with the main body of the container. At its opposite end, and particularly at the domed portion 28 of the housing, the partition 110 may be upwardly offset at 116, which partition is provided with a plurality of apertures 118. The upwardly offset portion 116 preferably supports a motor 120 for an air-circulating fan 122 which may be of any suitable type. Thus, although a conventional blade type fan is illustrated here, the fan may be a squirrel cage fan or any other fan found suitable. Heating coils, such as steam coils 124, are positioned immediately below the offset platform 116 and constitute a radiator serving to heat the air which passes therethrough. In the preferred embodiment of the invention, the fan 120 will serve to draw air from the left-hand end of the chamber 112 at the opening 114 for discharge through the apertures 118 and past the heating coils 124. The fan serves to establish a circulation path which discharges the heated air downwardly upon the conveyor 48 and the work-piece carried thereby, and thence along the same toward the left-hand end of the device for reentry at the opening 114 of the chamber 112. The air-circulating system is an open system, rather than a closed system, by reason of the provision of the openings 32 and 38 and the releasable door element 36, and, therefore, any vapor generated is readily and quickly discharged.

It will be apparent that the combination of the action of tossing the laundered items upwardly into the air by the flail units, and the forced circulation of heated air, will serve effectively to aerate the laundered articles, to spread the same, to warm the articles and to partially dry the same, thereby rendering the laundered items in favorable condition for rapid traverse through the flatwork ironer.

Certain additions and variations of the basic device as described herein are possible, which constitute refinements of the device that may be used or desirable in some instances. One of such features illustrated in Fig. 5 constitutes the provision at the discharge end of the device of a transparent housing portion 130 of such dimensions and so located that the operator may look completely through the machine endwise, as through the opening 32, in order to view the entire path of travel of the laundered articles through the device. Thus, in the event any difficulty occurs in the machine, it can be viewed, as in case any laundered articles should be caught at an intermediate part of the device.

Another feature which can be provided in the machine is the provision of a closure 132 adapted to span the discharge opening 38 of the device. This closure may be pivoted or otherwise shiftably mounted and is here illustrated as being slidable in guides 134. Associated with the guides and the closure may be a switch 136 adapted for actuation to one circuit controlling condition when the closure 132 is open, and adapted for a different circuit controlling condition when said plate 132 is operatively positioned. The switch 136 is preferably provided for the purpose of controlling an electrical signal 138, as illustrated in Fig. 5, positioned at the feed end of the device.

The handling of laundered articles in a commercial laundry requires, for systematic operation, the handling of all of the articles of one customer's order at the same time in most instances. The provision of the closure 132 will facilitate the separation of the laundered articles forming parts of different orders. For example, the device may normally be operated with the closure 132 closed as long as there remains in the container 40 any laundered articles from a previous order. When all of the items of the previous order have been removed from the container 40 and fed through the ironer, the closure 132 may be opened, permitting any articles which have collected at the discharge end to be deposited within the receptacle 40, and permitting, further, any articles successively fed therein to be discharged directly into the receptacle 40. The purpose of the signal 138, where utilized, is to warn the operator at the feed end of the device when the closure 132 is in operative position, so that the operator will not start to feed laundered articles from a new bundle or order while the closure 132 is in operative position. Thus, assuming that the feeding of the items of one order has been completed, if the closure 132 is closed, then the operator at the feed station will be warned by the signal not to start feeding another order. As soon, however, as the closure is opened, the signal will be operated and the feeding operator will then be assured that she may commence to feed articles from a new order. The operation herein described, of course, is illustrative or suggestive, and the particular work procedure which is followed in a given laundry may vary from that described herein.

Another feature which may be incorporated within the device is the provision of a low level conveyor 140, such as an endless belt trained around rollers 142 positioned below the level of the conveyors 48—54 and of the flail members 80 and positioned above the bottom 22 of the device. This conveyor will preferably be such length that one end thereof will be positioned between the feed opening 32 and the first flail member 88, and the opposite end thereof will terminate adjacent to the discharge opening 38. This conveyor will be driven from the drive mechanism of the device, as illustrated in Fig. 2, and will serve to carry to the discharge station any small laundered articles which may fall or be carried between adjacent upper elements, as in the case of handkerchiefs which are carried by the flail members rather than being discharged thereby onto a successive feed conveyor. The conveyor 140 will preferably travel at substantially the same speed as the conveyors 48—54, so that each article which may fall from the upper conveyors will travel at substantially the same speed and reach the discharge point with the other laundered articles in the same order or group. The conveyor will automatically discharge these articles through the outlet 38 and into the receptacle 40. If desired, the device may also be provided, at spaced points along the side walls 24 thereof, with openings spanned by releasable closures (not shown) so as to afford access to the interior of the chamber at different points along the length thereof.

While the preferred embodiment of the construction has been illustrated and described, it will be understood that changes may be made within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. A laundry shake-out device comprising a casing having a feed opening and a discharge opening, a plurality of conveyors within said casing arranged substantially in line and spaced apart with the adjacent ends of adjacent conveyors at substantially the same level, and rotors positioned between adjacent conveyors with their axes below the work-supporting portions of said conveyors and mounting flexible members projecting peripherally, said rotors operating at high speed to propel work pieces discharged by one conveyor forwardly and upwardly onto the adjacent conveyor.

2. A laundry shake-out device comprising a casing having a feed opening and a discharge opening, a plurality of conveyors within said casing arranged substantially in line and spaced apart with the adjacent ends of adjacent conveyors at substantially the same level, a plurality of flail devices each interposed between adjacent conveyors and rotating on axes below the upper portions of said conveyors for transferring work-pieces from one conveyor to another, and means for circulating air through said casing.

3. A laundry shake-out device comprising a casing having a feed opening and a discharge opening, a plurality of conveyors within said casing arranged substantially in line and spaced apart with the adjacent ends of adjacent conveyors at substantially the same level, a plurality of flail devices each interposed between adjacent conveyors and rotating on axes below the upper parts of said conveyors for transferring work-pieces from one conveyor to another, means for circulating air in said casing, and means for heating the air.

4. A laundry shake-out device comprising an elongated housing having a feed opening at one end thereof and a discharge opening in the bottom of the other end thereof, a plurality of conveyors arranged end to end between said openings and spaced apart with adjacent ends of adjacent conveyors at substantially the same level, and a plurality of rotors each positioned between a pair of adjacent conveyors with their axes below the upper parts of said conveyors, said rotors rotating at a peripheral speed greater than the speed of travel of said conveyors and serving to transfer work from one conveyor to another.

5. A laundry shake-out device comprising an elongated chamber having intake and discharge openings, a plurality of conveyors arranged end to end and in spaced relation with the adjacent ends of adjacent conveyors at substantially the same level, each conveyor advancing work lengthwise in said chamber for a fraction only of the length of the chamber, and high speed rotary members between adjacent conveyors and below said conveyor level for tossing work from the dis-

charge end of one conveyor upwardly and forwardly onto the feed end of the adjacent conveyor.

6. A laundry shake-out device comprising an elongated chamber having intake and discharge openings, a plurality of conveyors arranged end to end and in spaced relation with the adjacent ends of adjacent conveyors at substantially the same level, each conveyor advancing work lengthwise in said chamber for a fraction only of the length of the chamber, and high speed rotary members between adjacent conveyors and rotating on axes below said conveyor level for tossing work from the discharge end of one conveyor upwardly and forwardly onto the feed end of the adjacent conveyor, said rotary members each mounting a plurality of peripherally projecting flexible flails.

7. A laundry shake-out device comprising an elongated chamber having intake and discharge openings, a plurality of conveyors arranged end to end and in spaced relation, each conveyor advancing work lengthwise in said chamber for a fraction only of the length of the chamber, high speed rotary members between adjacent conveyors for tossing work from the discharge end of one conveyor upwardly and forwardly onto the feed end of the adjacent conveyor, a longitudinal partition dividing said chamber into two compartments communicating with each other at opposite ends, and a fan for circulating air through and between said compartments.

8. A laundry shake-out device comprising an elongated chamber having intake and discharge openings, a plurality of conveyors arranged end to end and in spaced relation, each conveyor advancing work lengthwise in said chamber for a fraction only of the length of the chamber, high speed rotary members between adjacent conveyors for tossing work from the discharge end of one conveyor upwardly and forwardly onto the feed end of the adjacent conveyor, a longitudinal partition dividing said chamber into two compartments communicating with each other at opposite ends, a fan for circulating air through and between said compartments, and a heater for heating the air.

9. A laundry shake-out device comprising an elongated substantially horizontal housing having an intake opening at one end and a discharge opening in its bottom at its opposite end, a plurality of short substantially aligned horizontal conveyors arranged in end to end spaced apart relation with the adjacent ends of adjacent conveyors at substantially the same level, and rotary members traveling at a peripheral speed

greater than the linear speed of said conveyors and each interposed between the adjacent ends of adjacent conveyors to transfer work from conveyor to conveyor, said rotary members rotating on axes below the level at which work is supported by said conveyors.

10. A laundry shake-out device comprising an elongated substantially horizontal housing having an intake opening at one end and a discharge opening in its bottom at its opposite end, a plurality of short substantially aligned horizontal conveyors arranged in end to end spaced apart relation, rotary members traveling at a peripheral speed greater than the linear speed of said conveyors and each interposed between the adjacent ends of adjacent conveyors to transfer work from conveyor to conveyor, said conveyors constituting belts substantially spanning said housing transversely and having their upper runs in substantially coplanar relation intermediate the height of said housing, said rotary members having axes below the level of said upper belt runs, and means for actuating said conveyors and rotary members for substantially continuous operation.

11. A laundry shake-out device comprising an elongated substantially horizontal housing having an intake opening at one end and a discharge opening in its bottom at its opposite end, a plurality of short substantially aligned horizontal conveyors arranged in end to end spaced apart relation, and rotary members traveling at a peripheral speed greater than the linear speed of said conveyors and each interposed between the adjacent ends of adjacent conveyors to transfer work from conveyor to conveyor, said rotary members each positioned below the level of the work on the conveyors and including a plurality of peripherally projecting flexible flails each of a length to strike the end portion of at least the adjacent discharging conveyor as said member rotates.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
312,342	Duryea	Feb. 17, 1885
473,263	Proctor	Apr. 19, 1892
847,038	Ayres	Mar. 12, 1907
986,226	Schwartz	Mar. 7, 1911
2,064,965	Wiel	Dec. 22, 1936
2,501,224	Kadell	Mar. 21, 1950
2,506,476	Troy	May 2, 1950

FOREIGN PATENTS

Number	Country	Date
688,037	Germany	Feb. 10, 1940