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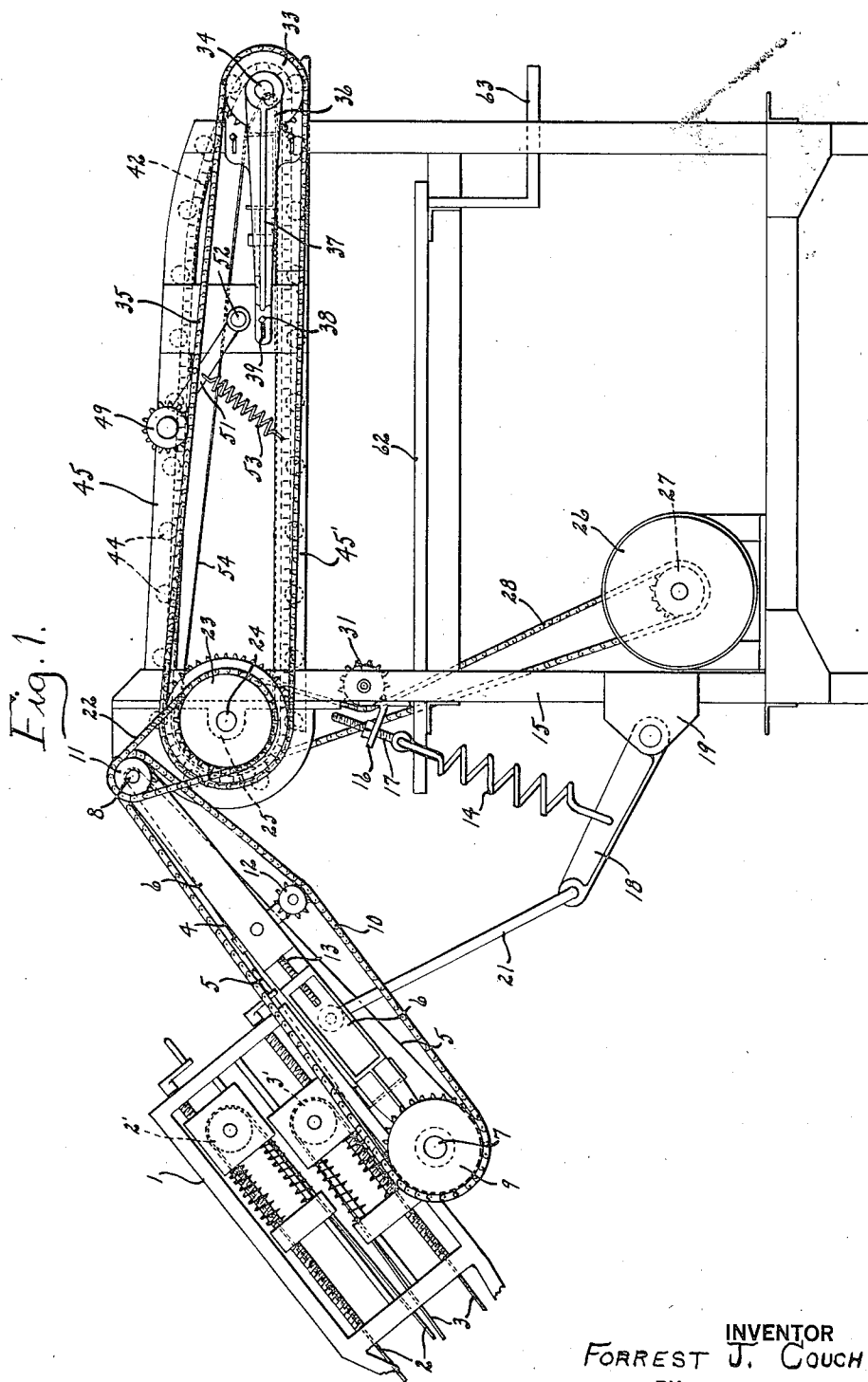
F. J. COUCH

2,019,560

TOWEL STACKER

Filed June 20, 1933

3 Sheets-Sheet 1



INVENTOR
FORREST J. COUCH
BY
Brockett, Hyde, Higley & Meyer
ATTORNEYS

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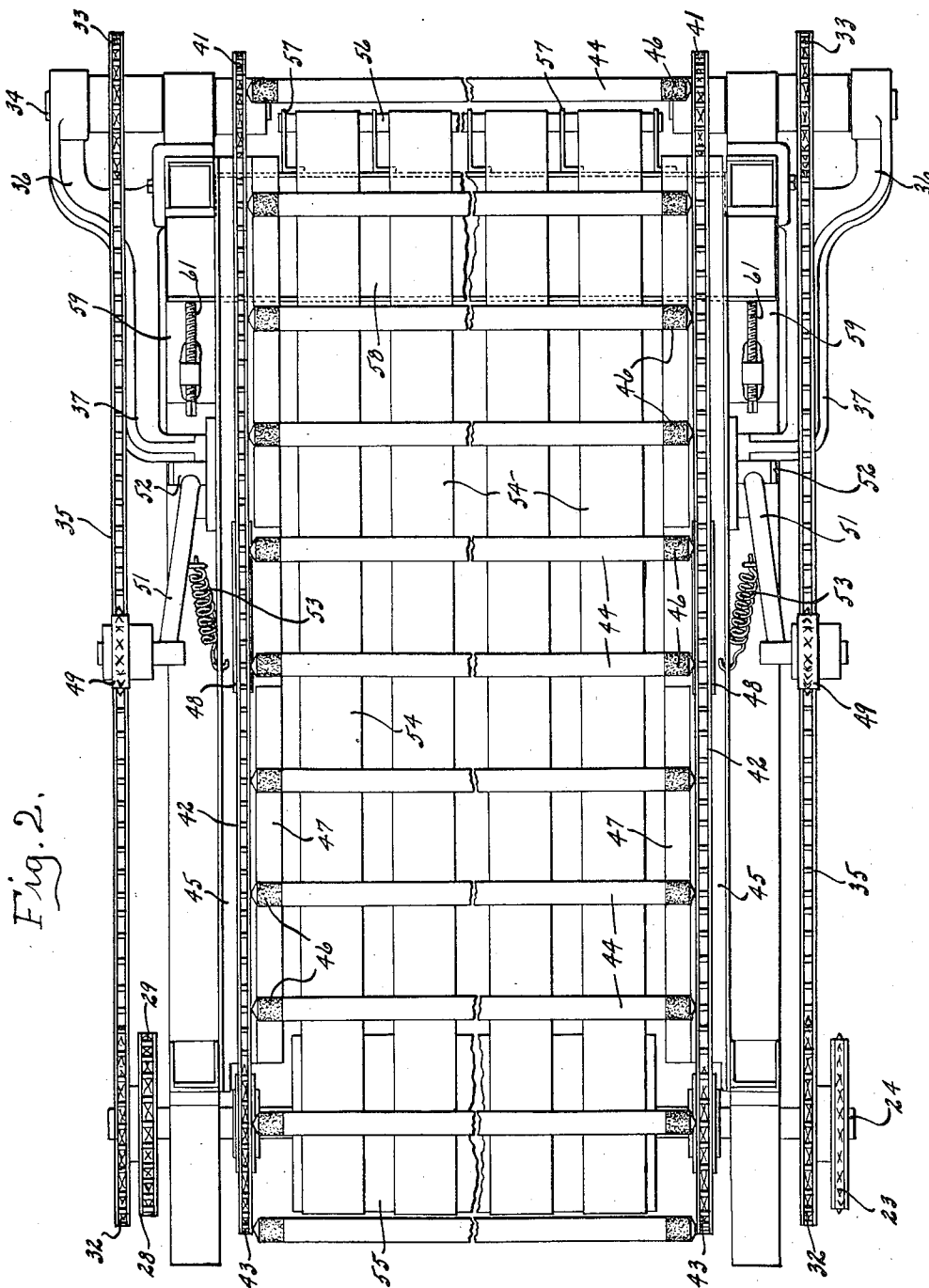
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INVENTOR
FORREST J. COUCH
BY
Brockett, Hyde, Higley & Meyer
ATTORNEYS

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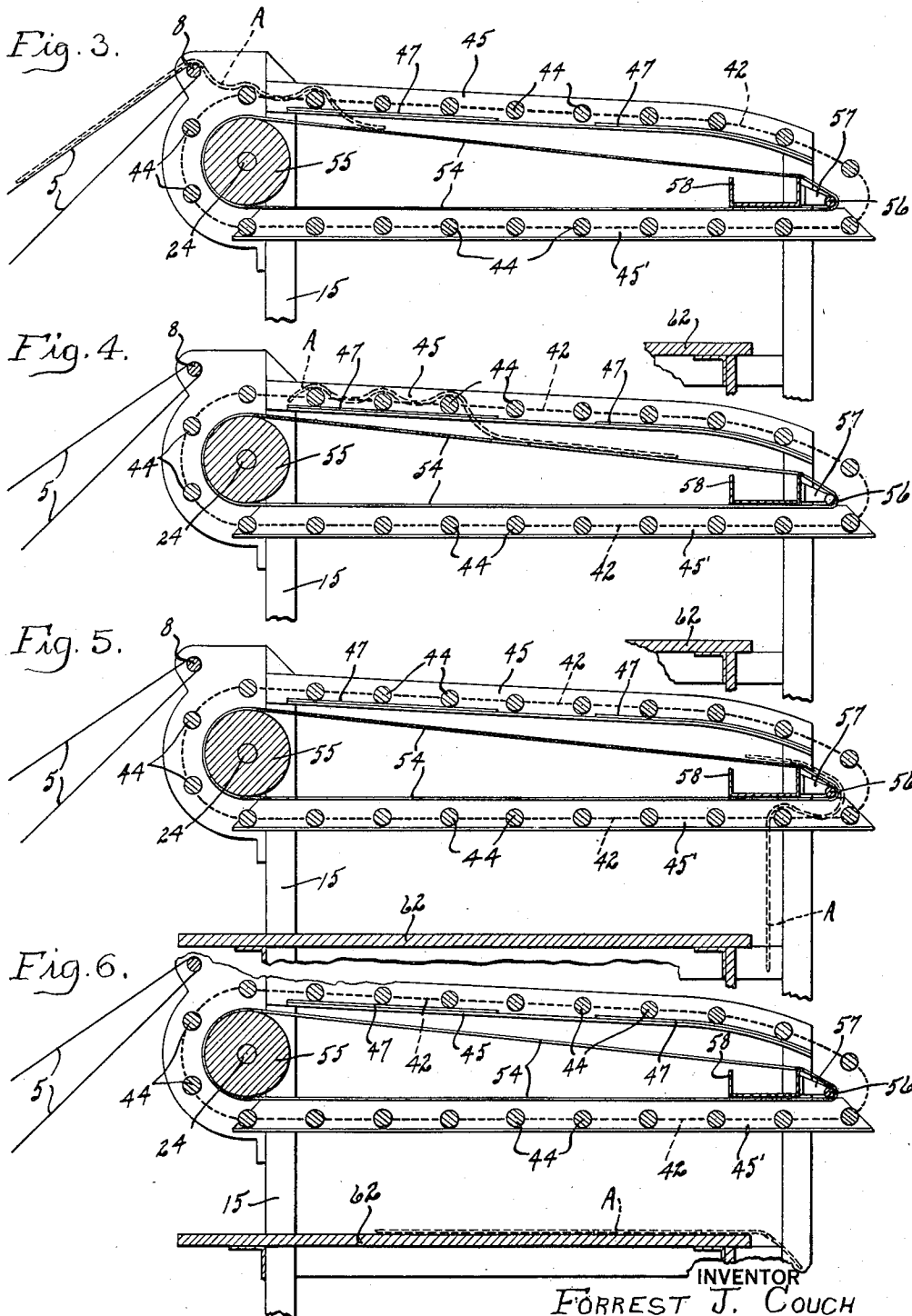
F. J. COUCH

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3 Sheets-Sheet 3



INVENTOR
FORREST J. COUCH
BY
Brockett, Hyde, Higley & Meyer
ATTORNEYS

UNITED STATES PATENT OFFICE

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TOWEL STACKER

Forrest J. Couch, Rochester, N. Y., assignor to
The American Laundry Machinery Company,
Cincinnati, Ohio, a corporation of Ohio

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10 Claims. (Cl. 271—76)

This invention relates to a method and apparatus for handling laundered articles, particularly flatwork, delivered from an ironing machine or as the result of some other finishing operation in a laundry or elsewhere. More particularly, the invention relates to a stacker for automatically stacking towels or other more or less limp, flat articles into piles without wrinkling.

As towels and the like are delivered from an ironing machine in a laundry, it is necessary to stack these in piles properly positioned for the next operation, such as inspecting and folding. The present invention aims to provide an apparatus which may be used in conjunction with such ironing machine, or other item of laundry or other equipment which delivers flatwork, and which will carry the articles away from the ironing or other machine, and deposit them in stacks or piles ready for the next operation. It is, accordingly, an object of the present invention to provide an apparatus which stacks or piles flat, limp articles automatically. Another object of the invention is to provide a machine for stacking flatwork in piles without wrinkling the same. Still another object of the invention is to provide a stacker for flat, flexible articles, from which the stacker the articles are delivered automatically and stacked into neat piles without the necessity of an attendant. Other objects will in part be obvious and will in part appear hereinafter.

The invention may be embodied in a mechanism including a travelling conveyor for transporting towels from an ironing machine or for transporting other flat, limp articles and delivering these to another conveyor. This second conveyor is equipped with rollers which travel in an endless path and receive the articles on their upper surfaces. Endless belts or similar means, are positioned so as to receive the articles from the rollers, this action being brought about by the rotation of the rollers causing the leading end of the towel or other article to drop through the space between adjacent rollers and then to be drawn onto a belt due to the slightly greater speed of the belt with relation to the rotating surfaces of the rollers. When the article has been carried to the end of the conveyor, it will drop by gravity off this belt and another roller intercepts it during its fall and carries it backward a short distance. The net effect is to spread the article upon a surface positioned below the conveyor for the purpose of receiving a pile of the articles.

Such a mechanism, constituting a preferred embodiment of the invention, is set forth in the

accompanying drawings forming part of the specification, in which:

Fig. 1 is a side elevation of the apparatus in position at the delivery end of an ironing machine; Fig. 2 is a corresponding plan view with parts omitted; and Figs. 3 to 6 inclusive are longitudinal sectional views showing a towel in different positions as it passes through the apparatus.

In the drawings, the delivery end of an ironing machine has upper and lower delivery belts 2 and 3 running over shafts 2' and 3' respectively. The stacker, forming the subject matter of the present invention, is provided with a conveyor 4 which is held against the ironing machine frame by suitable means, described below, so as to receive the ironed work from the ironing machine. This conveyor consists of conveyor belts 5 carried on a frame 6 and extending over a roller on the shaft 7 and over a rod 8. A sprocket 9 is secured to the shaft 7 and is driven by a chain 10 passing over another sprocket 11 attached to the rod or shaft 8. A tightener 12 and a screw 13 serve to adjust the chain 10. The conveyor 4 is shown as sloping upwardly away from the ironing machine and in close proximity thereto. Its position may be adjusted by means of springs 14, two in number, although but one is shown, which are attached to the main frame 15 of the stacker by means of a bracket 16 and adjustable screw means 17. The other end of the spring is attached to an arm 18, pivotally connected at one end to the frame 15 by means of a bracket 19 and connected at its other end by links 21 to the conveyor frame 6. The conveyor 4 may be raised or lowered so as to hold the upper surface of its lower end constantly in yielding contact with the frame of the ironing machine 1 by turning the nut on the screw means 17.

The drive for the conveyor 4 consists of a chain 22 passing over the sprocket 11 and over a sprocket 23 rigidly mounted on a shaft 24 journaled in bearings 25 rigid on the frame 15 of the stacker. A motor 26 is mounted on the lower part of the frame and carries a sprocket 27 connected by a chain 28 to another sprocket 29 rigidly attached to the shaft 24 and thus drives this shaft. A tightener 31 is adjustably mounted on the frame 15 for the purpose of tightening the chain 28.

The drive for the stacker proper is also from the motor 26, which drives the shaft 24. Sprockets 32 are rigidly mounted on shaft 24, toward the ends thereof as seen in Fig. 2. These sprockets are connected to sprocket wheels 33 rigidly mounted on a shaft 34, at the other

end of the stacker, by means of chains 35. This shaft 34 is rotatably mounted in the forked ends 36 of frames 37, each of which frames is adjustably secured to the main frame 15 by means of suitable screw bolts 38 passing through slots 39 in the frames 37. This slotted mounting permits longitudinal adjustment of the shaft 34 with relation to the shaft 24.

The shaft 34 also carries other sprocket wheels 41, two in number, which are rigid thereon and are operatably connected by means of chains 42 to sprockets 43 loosely mounted on the shaft 24. The chains 42 are thus driven through the shaft 34 and the chains 35. The chains 42 are located adjacent the upright sides of the frame 15 and carry rollers 44 rotatably mounted therein, one end of each roller engaging one of the chains and the other end of the roller engaging the other of the two chains. The distance between the chains 42, and consequently the width of the rollers 44, approximately equals the total width of the ironing machine delivery belts 2 and 3.

As indicated, the rollers 44 are pivotally connected to the chains 42 and when these chains are driven by the sprocket wheels 41, the rollers are carried away from the ironing machine. The extremities of the rollers are supported by angle irons 45 and 45' for a large part of their travel and these extremities are preferably covered with a surface 46 of friction material, such as rubber. When the covered ends of the rollers contact with the flat metal track 47, provided by the angle irons 45, the friction causes the rollers to turn on their axes as they travel away from the ironing machine.

At a point somewhat removed from the ironing machine, and preferably intermediate between the shafts 24 and 34, metal shoes 48 are rigidly attached to the angle irons 45 and are of such width that only the chains 42 will contact therewith, the same being a sliding contact. At the same time, the tracks 47 are cut away coextensively with the shoes 48, with the result that the combined weight of the rollers 44 and of the chains 42 is supported for the greater part of the distance between the shafts 24 and 35 by the tracks 47 and for a short distance by the shoes 48. The purpose of these shoes is to support the traveling mechanism while freeing the friction ends of the rollers 44 from contact with the track for a purpose later to be described. Chain tightener wheels 49 are pivotally mounted on the free ends of arms 51 which are, in turn, pivotally mounted at 52 on the stacker frame 15. These tighteners are yieldingly held against the chains 42 by means of springs 53 suitably attached to the frame.

As may be seen in Fig. 1 of the drawings, the rollers 44, suitably spaced from each other, and mounted in the chains 42 constitute an endless band passing over the sprockets 41 and 43. Within the space circumscribed by the rollers and connecting mechanism, are endless belts 54 extending around a drum 55 rigidly mounted on the shaft 24 and extending around a rod 56 at the delivery end of the stacker. The rod 56 is rigidly carried by brackets 57 which are attached to a channel iron 58. This channel iron is so mounted as to be slidable longitudinally on short angles 59 rigidly secured to the angle irons 45. Set screws 61 are provided adjustably connecting the channel iron 58 with the short angle irons 59 so that slack in the belts 54 may be taken up.

The complete machine also includes means of support for the stacked towels or other articles of flatwork, such supporting means being suitably positioned with relation to the stacker mechanism. Thus, a table or shelf 62 is located some distance below the belts 54 and a short distance to the left of the rod 56, so as to receive flatwork and properly pile the same. Another shelf 63 may also be provided at the right-hand end of the table or shelf 62 and located directly below the end of the carrying mechanism for receiving articles which may drop directly therefrom.

In operation, the ironing machine delivery belts 2 and 3 deliver the flatwork articles, such as towels A, in a plurality of lanes on the belts 5 which carry the same upwardly on an incline over the rod secured at 8, where the individual towels fall by gravity onto the rollers 44. The belts 5 are driven by means of the chain 10 and 20 associated sprockets and this chain is in turn driven by the chain 22 passing over the common shaft mounted at 8. Power is transmitted to the chain 22 through the shaft 24 which is driven from the motor 26 by means of the chain 25 28. The laundered articles are now carried along for a short distance by the rollers 44 but the forward end of the article is soon drawn over the particular roller on which it rests and falls onto the upper surface of one or more of the belts 54. This is brought about by the rotation of the rollers caused by their frictional contact with the track 47. The towel is now in the position diagrammatically illustrated in Fig. 3 of the drawings. Thereafter the towel is gradually drawn off the rollers and onto one of the belts by the greater speed of the belt which slightly exceeds that of the upper side of the rotating traveling rollers and is about the same as that of the ironing machine belts 2 and 3. Travel of the rollers 44 away from the ironing machine is caused by driving the chains 42, carrying these rollers, through the sprockets 41 which rotate with the shaft 34 driven by the shaft 24 through described chain and sprocket means. The belts 54 are driven by the drum 55, the dimensions of the various parts being chosen so that the speed of the upper sides of the rollers 44 is slightly less than the speed of the belts, as mentioned.

As the flat fabric article advances with the belt 54, it gradually leaves the rollers and then, at the end of the belt where this turns under to return in the opposite direction, the towel A commences to drop and its advanced end hangs down away from the belt. In this position, the advanced end of the article hangs down through the space between two of the rollers 44, as seen in Fig. 5, and is intercepted by one of these rollers and swept onward over the table 62, as it falls, so that the article is spread out on the surface of such table. Subsequent articles, carried along by a given belt, will be successively stacked on top of one another in a neat pile.

It will be noted in Fig. 6 of the drawings, that one end of the towel there illustrated, droops over an end of the table, this being done so that the operator can conveniently grasp the entire stock of towels when removing them from the table and also to hold the ends of the towels while they are being laid in a stack. The shelf 63 acts to catch any short towels which might not be carried over the table 62 before dropping, to prevent these from falling on the floor.

The action of the above described apparatus 75

is such as to carry towels, or similar laundered articles, away from an ironing machine automatically and to draw these along a carrier in such a manner that wrinkles are not formed.

by one operator. Each of the stacks consists of a pile of laundered flatwork without wrinkles and uniformly satisfactory to the customer from this point of view.

While the method and apparatus have been described above in connection with the stacking of laundered articles and, more particularly, in connection with the stacking of towels and similar small articles of flatwork, the method is also applicable to the handling of other flat articles of a limp or flexible nature and the machine may be adapted to such other uses. In fact, any flat articles having physical properties similar to that of cloth can be handled by the machine. The apparatus is also capable of modification, without departing from the scope of the invention, as by altering the relative positions of the traveling belts 54 and the traveling rollers 44, provided only that such rollers cooperate with a belt to intercept the articles, as they cease their forward movement, to carry these backward so as to spread the same. The ratio of relative speed between the surfaces of the rotating rollers and the traveling belt may also be varied as conditions require.

Since, as mentioned above, the speed of the belts 54 is about the same as that of the ironing machine belts 2 and 3, it is possible to dispense with the separate motor drive for the stacking mechanism and to drive the latter from the ironing machine, as by connecting the shaft 24 with the shaft 3' of the ironing machine by suitable chain and sprocket means. In such modification, the motor 26 and the chain 28 would be omitted. Similarly, the stacker may be driven from other machines which deliver articles thereto, by suitable connection to moving parts of the other machine.

What I claim is:

1. A stacker comprising an endless belt for supporting and carrying fabric articles, and a series of rollers traveling around said belt and positioned to intercept said fabric articles as they fall off said belt and spread the same in a flat pile.

2. A stacker comprising means for carrying flat, limp articles in series in one direction on top of said means, means for carrying said articles in the opposite direction underneath said first mentioned means while said articles are falling, a surface positioned beneath said last mentioned means for receiving said articles consecutively in a flat pile and another surface positioned in advance of and below said first-named surface for receiving articles too short to be carried back to the first-named surface.

3. A stacker comprising an endless traveling belt, endless chains carrying spaced rollers pivotally mounted thereon and positioned exteriorly of said belt, a track for said rollers coaxing with the same at a location below said belt, and friction bands on said rollers in rolling contact with said track surface.

4. A stacker comprising an endless traveling belt, endless chains carrying spaced rollers pivotally mounted thereon and positioned around said belt, a track for said rollers substantially co-extensive with said claims, friction bands on said rollers in rolling contact with said track surface, and a gap in said track providing a space in which said rollers are free to turn without contacting with a surface.

5. A method of stacking flat, limp articles, which comprises spreading the same in a moving lane, causing the articles to fall by gravity from the

5 The rollers 44 act to pull towels off the conveyor belts 5 leading from the ironing machine, after these have dropped on the rollers by gravity; the underlying upper surface of the belts 54 then takes the towels away from the rollers, and the rollers travel around the belt to again contact with the towels when these commence to ride off the belts. This interception of the towels by the rollers sweeps the articles along in the reverse direction to that which they have previously taken on the top surface of the belt but, since the towel is continuously dropping by gravity at this stage, the result is that the trailing end of the towel is carried the farthest distance backward toward the ironing machine, while the advanced end is carried the shortest distance in this direction, so that the towel is neatly spread on the surface provided to receive it. When the towel first rests on the rollers 44, there may be a tendency for it to straighten out and to ride onward without dropping onto one of the belts. Such an eventuality would, of course, defeat the purpose of operation, since the towel would merely roll off the rollers without being carried back and spread. To prevent any tendency of a laundered article to remain on the rollers, the track 47 is cut away and the shoes 43 are provided at an intermediate point in the travel of an article to support the rollers through the chains 42 only, leaving the friction ends 46 of the rollers free of contact with any surface so that the rollers can roll or turn freely on their end pivots and thus permit the leading ends of the towels or other articles to drop down between the rollers and contact with the belts 54.

40 The herein described apparatus results in a large saving in time and labor of handling flatwork and cooperates very effectively with ironing machines or other laundry machines performing operations on this class of work. By its use, towels and other small articles are automatically stacked into as many piles as there are lanes of towels and as fast as they are ejected by the ironing machine. The pieces are stacked uniformly, with the side edges stacked in alignment, provided articles of the same width are fed through the machine and the operator feeds them properly. The ends will not be in exact alignment but this variation is of no consequence. Another advantage resulting from its use is that, while articles may be stacked and piled in any position desired on the table 62, by adjusting the position of this table with relation to the delivery end of the machine, positioning of the table so that one end of the stack extends a short distance beyond the edge of the table enables the stack to be grasped and removed easily while also holding the towels against slippage. The machine also piles the flat articles in proper position for the next operation, that of inspecting and folding, in that the articles are stacked with the ironed side down as a result of being carried for a short distance in a reverse direction on the under side of the stacker.

The apparatus is entirely automatic in operation, requiring no operator, and all moving parts are driven by one motor. An attendant is, of course, required to carry the stacks of towels to the inspectors and folders but the several piles, corresponding to the individual belts 54, are adjacent one another and can be easily taken away

path of said lane, intercepting the articles during such fall, and applying a lateral force to the same in one plane to spread and stack the articles in a pile.

- 5 6. A method of stacking flat, limp articles, which comprises applying a tractive force to the articles at discontinuous portions of their surfaces, feeding the articles in a moving lane and spreading the same, causing the articles to fall by gravity from the path of said lane, and applying a lateral force to the articles in substantially one plane during their fall to spread and stack the same in a uniform pile.

7. Apparatus for stacking a succession of limp fabric articles, comprising belt means mounted to have a stretch adapted to support an article, means for driving said belt means to advance said article along and from said stretch, a train of rollers arranged in parallel spaced relation to define an endless path having a stretch above said belt stretch and a stretch below said belt means, means for actuating said train along said path in the direction of belt movement but at less speed, and means for actuating said rollers about their axes in said upper train stretch to cause an article supported thereon to be transferred therefrom to said belt stretch.

8. Apparatus for stacking a succession of limp fabric articles, comprising belt means mounted to have a stretch adapted to support an article, means for driving said belt means to advance said article along and from said stretch, a train of rollers arranged in parallel spaced relation to define an endless path having a stretch above said belt stretch and a stretch below said belt means, means for actuating said train along said path in the direction of belt movement but at less speed, means for actuating said rollers about their axes in said upper train stretch to cause an article supported thereon to be transferred therefrom to said belt stretch, and means for actuating said rollers about their axes in said lower

train stretch to cause an article supported thereon to be delivered therefrom during travel along said stretch.

9. Apparatus for stacking a succession of limp fabric articles, comprising belt means mounted to have a stretch adapted to support an article, means for driving said belt means to advance said article along and from said stretch, a train of rollers arranged in parallel spaced relation to define an endless path having a stretch above said belt stretch and a stretch below said belt means, means for actuating said train along said path in the direction of belt movement but at less speed, and means for actuating said rollers about their axes in said upper train stretch to cause an article supported thereon to be transferred therefrom to said belt stretch, said last named means providing an interruption in said axial roller actuation during travel along said upper train stretch.

10. Apparatus for stacking a succession of limp fabric articles, comprising belt means mounted to have a stretch adapted to support an article, means for driving said belt means to advance said article along and from said stretch, a train of rollers arranged in parallel spaced relation to define an endless path having a stretch above said belt stretch and a stretch below said belt means, means for actuating said train along said path in the direction of belt movement but at less speed, means for actuating said rollers about their axes in said upper train stretch to cause an article supported thereon to be transferred therefrom to said belt stretch, means for actuating said rollers about their axes in said lower train stretch to cause an article supported thereon to be delivered therefrom during travel along said stretch, and table means disposed below the lower stretch of said roller train and having an edge disposed to be engaged by said articles as they are delivered from said train.

FORREST J. COUCH.