May 4, 1943. W. E. MYERS 2,318,252

LAUNDRY MACHINE

Filed July 27, 1940 3 Sheets-Sheet 1

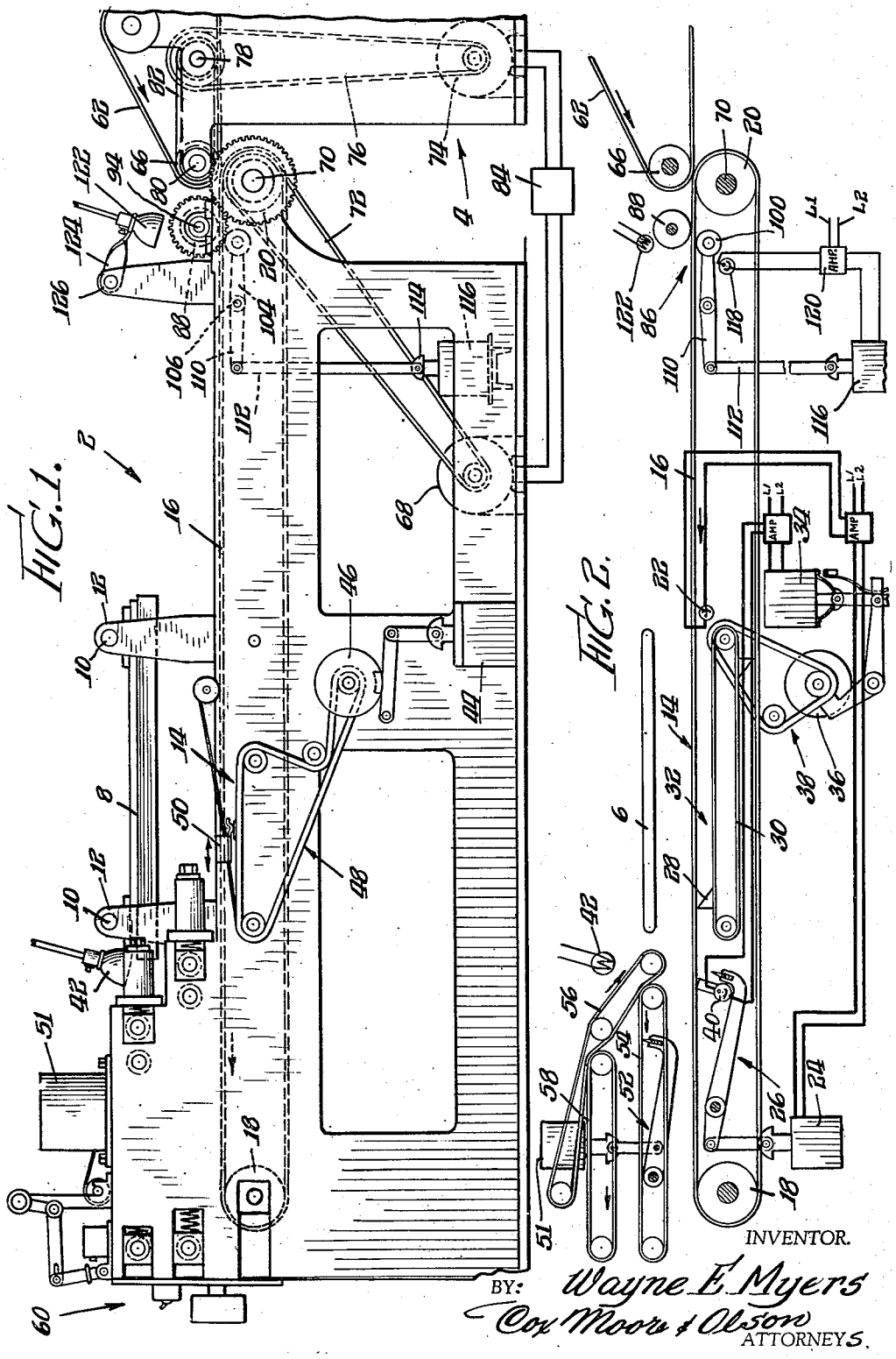


FIG. 1.

FIG. 2.

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LAUNDRY MACHINE

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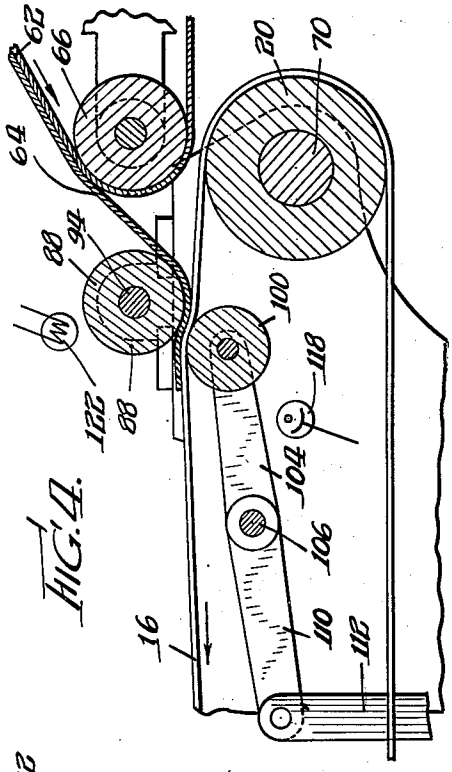


FIG. 4.

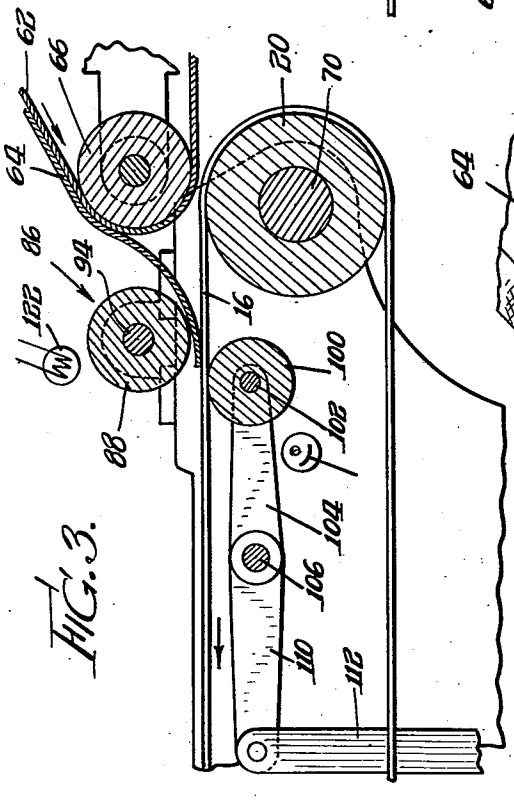


FIG. 3.

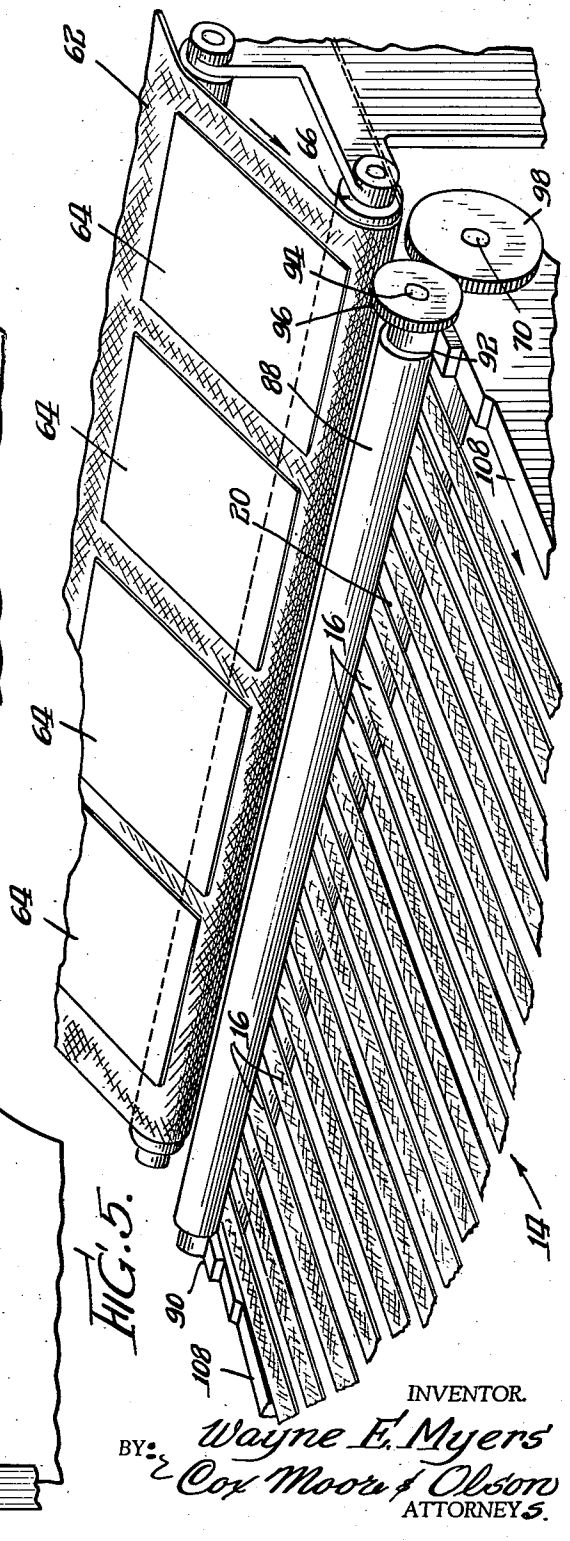


FIG. 5.

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LAUNDRY MACHINE

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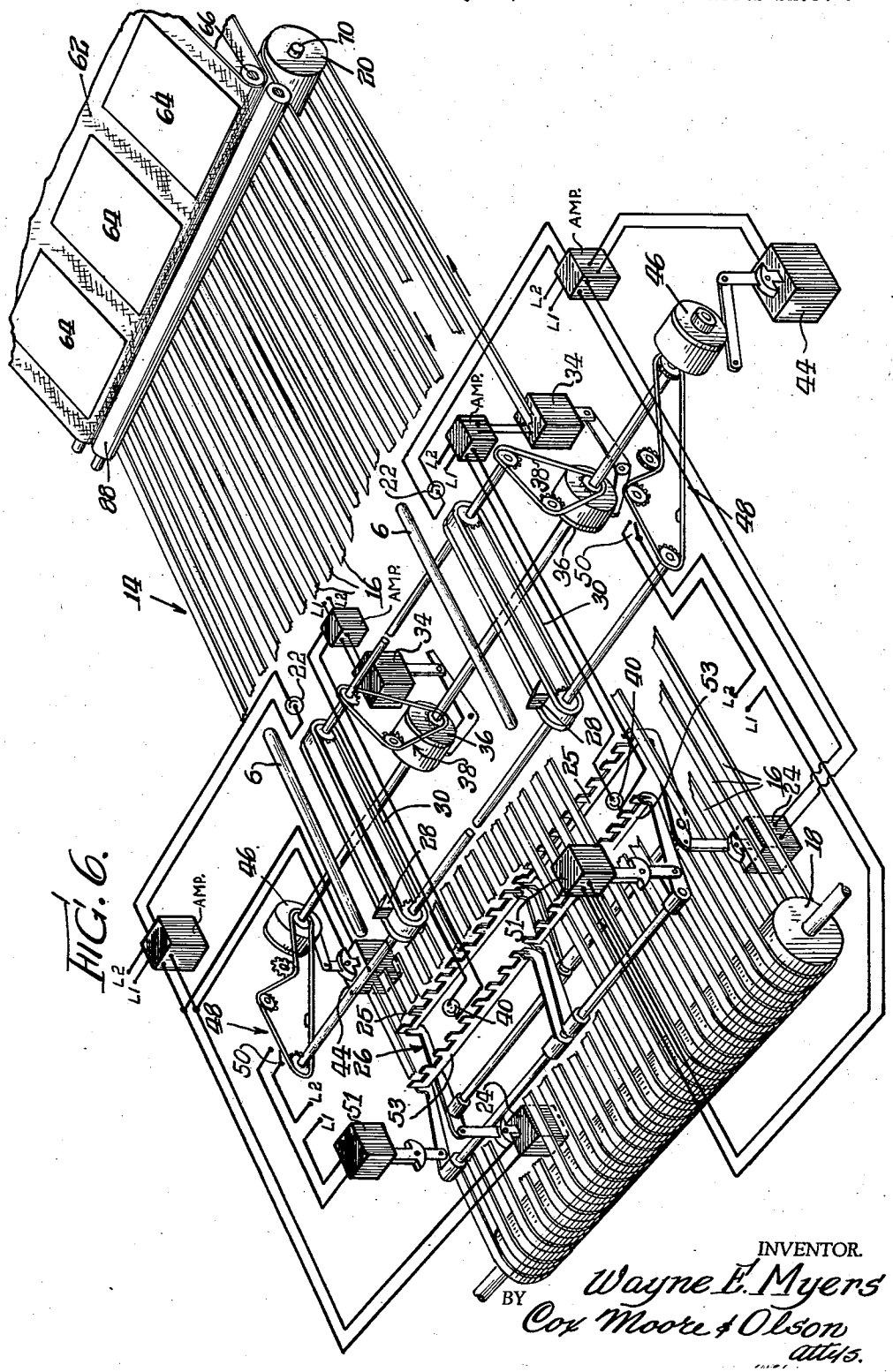


FIG. 6.

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UNITED STATES PATENT OFFICE

2,318,252

LAUNDRY MACHINE

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Application July 27, 1940, Serial No. 348,057

10 Claims. (Cl. 38—2)

The present invention relates to a laundry machine and more particularly to a machine for ironing and folding laundry flat work.

It is an object of this invention to provide in combination with an ironer and a folder, each having article conveying means, means for transferring a plurality of laterally aligned articles from the ironer to the folder in unison so that all of the laterally spaced and aligned articles may be simultaneously folded in the same proportionate parts.

It is a further object of the invention to provide a folder for use with an ironer on which articles to be handled may be placed in longitudinal, substantially end-to-end abutting relation and yet by conveying means of the folder presented to a folding mechanism in longitudinal relation so spaced as to permit the folding mechanism to handle the articles in proper succession.

A further object is to provide a folder for use with an ironer on which flat work articles may be transferred from the ironer and fed by the folder, without creasing and in perfectly ironed condition, to the folding mechanism.

Applicant's invention also contemplates the provision of a photoelectrically controlled means for insuring the simultaneous transfer of a plurality of articles from an ironer to a folder.

It is a further object of my invention to provide in a folding machine of a structure similar to that described in my copending application, Serial No. 278,603, filed June 12, 1939, which has matured into Patent No. 2,291,487, granted July 28, 1942, for an improvement in a Folding machine, means cooperating with the conveying tapes of the folding machine for insuring simultaneous transfer of a plurality of articles, such as sheets, towels, pillow-slips, et cetera, from the ironer to the folding machine.

Other objects and advantages of the invention will be apparent from the following description when taken in connection with the accompanying drawings, wherein

Figure 1 represents a view in side elevation of a machine embodying my invention;

Figure 2 is a diagrammatic view explaining the principles of operation of the machine of Figure 1;

Figure 3 is an enlarged fragmentary view of a portion of Figure 1;

Figure 4 is a view similar to Figure 3, but with the parts in a different position of operation;

Figure 5 is a view in perspective of the parts shown in Figures 3 and 4; and

Figure 6 is a diagrammatic, perspective, top view of the machine.

As shown in the drawings, the invention is adapted to be incorporated in a folding machine 2 which is disposed in article transfer relation to an ironing machine 4. The folding machine 2 may be of the structure described in my copending application, Serial No. 278,603, to which reference has previously been made. Such a folding machine may comprise a pair of elongated lamps 6 (Figures 2 and 6) disposed in spaced parallel relation transversely of the machine and mounted in reflectors 8 (Figure 1) secured between rods 10 of spaced hangers 12. The lamps 6 extend longitudinally in relation to a conveyor 14 formed by laterally spaced, parallel conveying tapes 16 passing about rollers 18 and 20 at opposite ends of the folding machine.

In the same vertical plane with each of the lamps 6 but between the upper and lower flights of the tapes 16 is disposed a photoelectric cell 22 connected to and controlling the energization of a solenoid 24 actuating a section 25 of a first folding mechanism 26. In the same horizontal plane with each photoelectric cell 2 is a reflector 28 carried by a conveyor 30 of an article measuring mechanism 32. Each conveyor 30, when actuated, is driven rearwardly at a speed equal or proportional to the forward speed of the tapes 16. Operation of each of the article measuring mechanisms 32 is initiated by the operation of a solenoid 34 controlling a clutch 36 of a driving mechanism 38 for the measuring mechanism. Each solenoid 34 is controlled by a photoelectric cell 40 responsive to the light from a lamp 42, which light is cut off by the leading edge of an article on the conveying tapes 16.

The solenoids 44, which are also actuated by the photoelectric cells 22, control driving clutches 46 of time delay mechanisms 48, each of which, upon the elapsing of a period determined by the length of the article, actuates through the traveling switch mechanism 50 the operating solenoid 51 of a section 53 of a second fold forming mechanism 52. As described in my copending application, each traveling switch mechanism 50 is first driven to the right simultaneously and at equal speed with the mirror 28 and then, on operation of the solenoid 44, to the left at the same speed, which is also the speed of operation of the time delay mechanism 48.

The first fold forming mechanism 26, in folding the articles, feeds them between the sets of conveying tapes 54 and 56 and onto the tapes 54. The second fold forming mechanism 52, in folding the articles, feeds them between the set of conveying tapes 56 and the set of conveying tapes 58 and onto the tapes 58 for conveyance and discharge at the discharge end 60 of the folding machine 2.

The ironer 4 may be of any conventional structure embodying a conveying web 62 capable of simultaneously conveying through the ironer a plurality of small articles 64 (Figures 5 and 6) in laterally aligned relation. The web 62 passes about a roller 66 in juxtaposition and preferably

overlying relation to the roller 20 about which the tapes 16 of the folding machine pass. Thus, as the web 62 is driven in the direction of the arrow in Figures 1 to 5, the articles 64 are fed onto the upper flights of the conveying tapes 16 which move in the direction of the arrow toward the left in each of the figures of the drawings.

The conveying tapes 16 of the folding machine may be driven through one or both of the rollers 18 or 20 by any suitable driving mechanism, as, for example, a motor 68 connected to the shaft 70 of the roller 20 as by a chain or belt 72. The web 62 of the ironer may be driven by one of its feed rollers as, for example, the roller 66, through any suitable driving mechanism including a motor 74 connected by the chain or belt 76 to a sprocket on the shaft 78, which shaft may be coupled to the shaft 80 of the roller 66 as by the chain 82. A suitable speed controller 84 of conventional form may be connected to the motors 68 and 74 to insure that the driving speed of the ironer web does not exceed the driving speed of the folder tapes. If desired, a change speed mechanism in the ironer drive may be such that the speed of the ironer web is always maintained less than the speed of the folder tapes. It will be evident that, if desired, the web 62 of the ironer and the tapes 16 of the folding machine may be driven from a single power source through suitable driving mechanisms appropriately interrelated. Whatever character driving mechanism is employed for driving the tapes 62 and 16, it will be connected to drive the tapes 16 at a speed maintained greater than the maximum speed of driving of the web 62 of the ironer so that an operator or operators may place articles in longitudinal juxtaposition or substantially abutting relation on the web 62 in manually feeding the ironer, as is customary for the purpose of operating the ironer at its most efficient or maximum capacity, and without regard to maintaining such a spacing between the articles successively placed on the conveyor as may be required by the operating period of the controlling mechanism or machine.

The tapes 16, being always driven at a higher speed than the web 62, articles successively transferred to the folding machine from the ironer will not be creased but will be maintained flat and sufficiently spaced along the tapes 16 when reaching the measuring and folding mechanisms that these mechanisms may operate properly and reset between successively fed articles.

Articles, as they move from the web 62 onto the tapes 16, are drivingly engaged by the tapes 16 at different instants, depending upon a number of factors such, for example, as differences in the degree of dampness or dryness of the articles, differences in the under-surface condition of the articles, differences in the surface conditions of the tapes 16, differences in the condition of the surface portions of the web 62, et cetera, so that, although the articles 64 may at the end of the web 62 have their forward edges in the same transverse line or plane, they will be drivingly engaged by the tapes 16 at different instances, and hence one article will be advanced relative to another and adjacent articles passing through a single folding blade section 25 or 53 will not properly be folded in proportionate parts, but one of the adjacent articles may be properly folded while the other is folded improperly. Also, where an article overlaps two folding blade sections while articles on opposite sides thereof pass through the measuring mechanisms, it will not be properly folded, but one portion of such overlapping article may be folded partially along one transverse line while the remaining portion is folded along another transverse line. Since the folding tapes 16 are driven at a higher speed than the web 62, such differences in the instant of driving engagement of an article with the tapes 16 are still further accentuated by the time the articles reach the measuring mechanisms.

This improper folding of the articles may be overcome by seeing to it that the articles are fed singly to each measuring mechanism and its associated first and second folding blade sections, and that no article is placed on the ironer in such position that it would overlap a pair of transversely aligned folding blade sections. However, this requires such attention upon the part of the operators placing the articles on the ironer that it is not feasible in the case of high speed work and moreover results in a less efficient utilization of the capacity of the ironer. Applicant has discovered that this proper folding of a plurality of transversely aligned articles may be assured without such attention upon the part of the operators by providing the unison take-off or transfer mechanism 86 which assures that all the plurality of transversely aligned articles will be drivingly engaged by the tapes 16 at the same instant, and hence will be conveyed along the tapes 16 in absolute transverse alignment while passing through the measuring mechanism and the various folding mechanisms.

This unison take-off or transfer mechanism 86 comprises a roller 88 extending transversely of the machine across the series of conveying tapes 16 and journalled in side brackets 90 and 92, the shaft 94 of the roller having secured thereto at one end a gear 96 meshing with a driving gear 98 affixed to the outer end of the shaft 70 of the tape driving roller 20. The roller 88 is positioned slightly above the upper flight of the tapes 16 and in such relation to the rollers 66 and 20 that an article passing from the web 62 will be fed by the web onto the tapes 16 beneath the roller 88. A similar but smaller roller 100 extends beneath the upper flights of the tapes 16 transversely of the machine and is positioned rearwardly or, in the drawings, to the left of the vertical plane through the center of the roller 88. The roller 100 is journalled on a rod 102 carried on the outer end of levers 104 affixed at their opposite ends to a transverse shaft 106 which may be journalled in the side frames or walls 108 of the folding machine or in other suitable brackets affixed to the folding machine supporting structure.

The shaft 106 is swung by a lever 110 secured at one end to the shaft and at its other end pivotally secured to a link or pitman 112 in turn pivotally secured at its lower end to the armature 114 of an operating solenoid 116. The solenoid 116 is controlled by a photoelectric cell 118 which is connected to the conventional amplifier 120, the output of the amplifier being connected to the solenoid 116 so that, upon cutting off of the beam of light upon the photoelectric cell, the amplifier 120 operates its relay to complete the circuit from the power lines L—1 and L—2 to the solenoid 116.

It will be understood that each of the photoelectric cells 22 and 40 is, as described in my copending application, similarly connected to the solenoids actuated thereby, the cells 22 operating upon a projection of light thereon, and the cells 40 operating upon interruption of light thereon. The beam of light for the operation of

the photoelectric cell 118 may be provided by a lamp 122 supported above the upper flight of the tapes 16 as upon a hanger 124 mounted upon a suitable frame 126 carried by the supporting structure of the folding machine. The lamp 122 is positioned rearwardly or to the left of the vertical plane through the axis of the roller 88, and the photoelectric cell 118 is positioned rearwardly or to the left and below the roller 100 to define a common plane or line to the left of, but in close proximity to, the peripheries of the rollers 88 and 100.

If desired, a plurality of sets of lamps 122 and photoelectric cells 118 may be provided in alignment transversely of the folding machine.

In operation, articles are placed on the web 62 of the ironer 4 by an operator or operators positioned at the forward end (not shown) of the ironing machine. It is a simple matter for the operators to place a series of articles on the web 62 in transverse alignment in respect to their forward edges, but it is difficult for the operators to constantly place the articles so that none, when transferred to the folding machine, will overlap both folding blade sections of each folding mechanism. Also, it is frequently desired to intentionally utilize the central portion of the ironer and folder in order that the capacity of the ironer and folder may most effectively be utilized.

Therefore, in the case of a machine constructed in accordance with the present invention, the small articles may be placed by the operator or operators on the web 62 of the ironer without regard as to whether any article overlaps both folding blade sections of each folding mechanism, but the articles are placed upon the web in the customary manner with their forward edges in alignment transversely of the web.

The web 62 carries the articles through the ironing devices (not shown) and presents them in the same transverse alignment to the tapes 16 of the folding machine. In passing from the web 62 the forward edges of the articles pass between the driven roller 88 and the tapes 16, as shown in Figure 3.

When the forward edge of an article interrupts the beam of light upon the photoelectric cell 118 from the lamp 122, this photoelectric cell causes the actuation of the solenoid 116. The solenoid 116, being energized, draws down its armature and the link or pitman 112 connected thereto. This, through the lever 110, effects rotation of the shaft 106 in a direction such that, through the lever 104, the roller 100 is moved upwardly to lift the tapes 16, as shown in Figure 4, so that the articles are gripped between the driven roller 88 and the tapes 16. Thus, the articles are at the same instant positively gripped and fed from the web 62 and along the tapes 16.

Since the peripheral speed of the roller 88 is made equal to the speed of the tapes 16, there is no relative motion between the surface of the roller 88, the articles, and the tapes 16. The cooperative feeding action of the roller 88 and tapes 16 continues until the rear edges of the articles pass the plane of the lamp 122 and photoelectric cell 118 and permit the beam of light to again fall upon the cell.

The rollers 88 and 100 and the photoelectric cell 118 are so positioned in relation to the roller 66 of the ironer and roller 20 that a beam of light upon the cell will be interrupted and the articles drivingly engaged between the tapes 16 and roller 88 before any article is sufficiently advanced along the tapes as to be drivingly engaged by the tapes alone. Thus, the transfer mechanism insures simultaneous transfer of the feeding action from the ironer to the folder in respect to all articles positioned in the same transverse plane upon the ironer.

The roller 88 also further insures that the flat work articles will be transferred from the ironer to the folder without the formation of any creases therein, as will be evident.

It will thus be seen that applicant has provided in combination with an ironer and a folder, each having article conveying means, means for transferring a plurality of laterally aligned articles from the ironer to the folder in unison so that all of the laterally spaced and aligned articles may be simultaneously folded in the same proportionate parts.

Applicant's invention also provides a folder for use with an ironer on which articles to be handled may be placed in longtudinal, substantially end-to-end abutting relation and yet by conveying means of the folder presented to a folding mechanism in longitudinal relation so spaced as to permit the folding mechanism to handle the articles in proper succession.

Applicant has also provided a folder for use with an ironer on which flat work articles may be transferred from the ironer and fed by the folder, without creasing and in perfectly ironed condition, to the folding mechanism.

Applicant has further provided a photoelectrically controlled means for insuring the simultaneous transfer of a plurality of articles from an ironer to a folder.

Applicant has further provided in a folding machine of a structure similar to that described in his copending application, Serial No. 278,603, filed June 12, 1939, for an improvement in a Folding machine, means cooperating with the conveying tapes of the folding machine for insuring simultaneous transfer of a plurality of articles, such as sheets, towels, pillow-slips, et cetera, from the ironer to the folding machine.

It is obvious that various changes may be made in the specific embodiments of the invention set forth for purposes of illustration without departing from the spirit of the invention. Accordingly, the invention is not to be limited to the specific embodiments shown and described but only as indicated in the following claims.

The invention is hereby claimed as follows:

1. In a laundry machine, an ironer, said ironer having article conveying means, and a folder, said folder having a folding mechanism, and article conveying means driven at a speed higher than the speed of the article conveying means of the ironer for conveying articles received from the ironer to the folding mechanism.

2. In a laundry machine, a folder, said folder having folding mechanism and article conveying means conveying articles to the folding mechanism, an ironer, said ironer having article conveying means depositing ironed articles on the article conveying means of the folder at a speed less than the speed of the article conveying means of the folder, and means for causing the article conveying means of the folder to grip positively the articles as deposited thereon by the article conveying means of the ironer to determine the instant of feed transfer from the ironer to the folder.

3. In combination, a laundry-folding machine having a folding mechanism, parallel driven tapes for conveying articles to the folding mechanism and onto which the articles are mechanically fed, article feed means above said tapes adjacent the feed-in end thereof and normally spaced from said tapes a distance greater than the thickness of the articles to be fed, means for driving said article feed means synchronously with said tapes, and means controlled by the articles for relatively shifting said article feed means and said tapes toward each other to grip the articles therebetween to determine the instant of feed transfer to the tapes.

4. In combination, a folding machine, a folding mechanism, parallel driven tapes for conveying articles to the folding mechanism and onto which articles are mechanically fed, article feed means above said tapes adjacent the feed-in end thereof and normally spaced from said tapes a distance greater than the thickness of the articles to be fed, and means controlled by the articles for deflecting all of said tapes simultaneously toward the article feed means to grip the articles between the article feed means and the tapes whereby to determine the instant of feed transfer to the tapes.

5. In combination, a folding machine, a folding mechanism, parallel driven tapes for conveying articles to the folding mechanism and onto which articles are mechanically fed, article feed means above said tapes adjacent the feed-in end thereof and normally spaced from said tapes a distance greater than the thickness of the articles to be fed, and light sensitive means controlled by the articles as they are fed onto said tapes for relatively shifting said article feed means and tapes toward each other to grip the articles between the article feed means and the tapes, said light sensitive means being positioned to cause said relative shifting of the tapes and article feed means prior to the driving engagement of the articles by the tapes whereby to determine the instant of feed transfer to the tapes.

6. In combination, a laundry-folding machine having a folding mechanism, parallel driven tapes for conveying articles to the folding mechanism and onto which articles are mechanically fed, a roller extending transversely of the tapes on one side thereof and normally spaced from the tapes a distance greater than the thickness of the articles to be fed, means for driving said roller at a peripheral speed substantially equal to the speed of the tapes, and means controlled by the articles as they are fed between the roller and the tapes for relatively shifting said roller and said tapes toward each other to grip the articles therebetween, said article controlled means being positioned to cause said relative shifting of the tapes and roller prior to the driving engagement of the articles by the tapes whereby to determine the instant of feed transfer to the tapes.

7. In combination, a folding machine, a folding mechanism, parallel driven tapes for conveying articles to the folding mechanism and onto which articles are mechanically fed, a driven roller extending transversely of the tapes on one side thereof and normally spaced from the tapes a distance greater than the thickness of the articles to be fed, a second roller on the opposite side of said tapes and extending transversely thereof, and means controlled by the articles for shifting said second roller toward said tapes and said tapes toward said driven roller to grip the articles between the driven roller and the tapes whereby to determine the instant of feed transfer to the tapes.

8. In combination, a folding machine having a folding mechanism comprising independently operable, transversely aligned folding blade sections, article conveying means having adjacent sections for conveying articles to the folding blade sections of the folding mechanism and adapted to have a plurality of articles fed thereto in transverse alignment, some of which may extend from one section of the article conveying means to the other, article feed means above said conveying means and extending across both sections thereof, said feeding means being normally spaced from the conveying means a distance greater than the thickness of the articles to be conveyed, means for driving said article conveying means and said feed means synchronously and means controlled by the articles for relatively shifting said feed means and said conveying means toward each other to grip the articles simultaneously therebetween, said article controlled means being positioned to cause such relative shifting of the feed means and conveying means prior to the driving engagement of the articles by the conveying means whereby to determine the instant of initial feeding action by the conveying means.

9. In combination, a folding machine, said folding machine having a plurality of transversely aligned, independently operable folding blade sections, parallel article conveying tapes of which adjacent sections convey articles to adjacent folding blade sections, and an ironer, said ironer having article conveying means adapted to deposit a plurality of transversely aligned articles upon said conveying tapes, means for driving said tapes at a speed higher than the speed of the article conveying means of the ironer, and a driven roller extending transversely relative to said tapes and normally spaced therefrom a distance greater than the thickness of the articles to be fed upon the tapes, and means controlled by the articles for relatively shifting said roller and said tapes to grip the articles simultaneously between the roller and the tapes whereby to transfer the articles from the conveying means of the ironer to the conveying tapes in transverse alignment.

10. In a folding machine, transversely aligned folding blade sections, article conveying tapes having adjacent sections for conveying articles thereon to adjacent folding blade sections, independent means for measuring articles as they are conveyed to the folding blade sections by sections of the conveying tapes, means controlled by the measuring mechanisms for operating said folding blade sections independently, feeding-in means adapted to feed articles in transverse alignment to said conveying tapes in positions such that one of the articles may extend across adjacent sections of the conveying tapes, article feed means above all sections of the conveying tapes and normally spaced a distance greater than the thickness of the articles to be folded, and means controlled by the articles for relatively shifting said last mentioned article feed means and said conveying tapes toward each other to grip the transversely aligned articles simultaneously therebetween whereby to simultaneously transfer the articles in transverse alignment to the conveying tapes.

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