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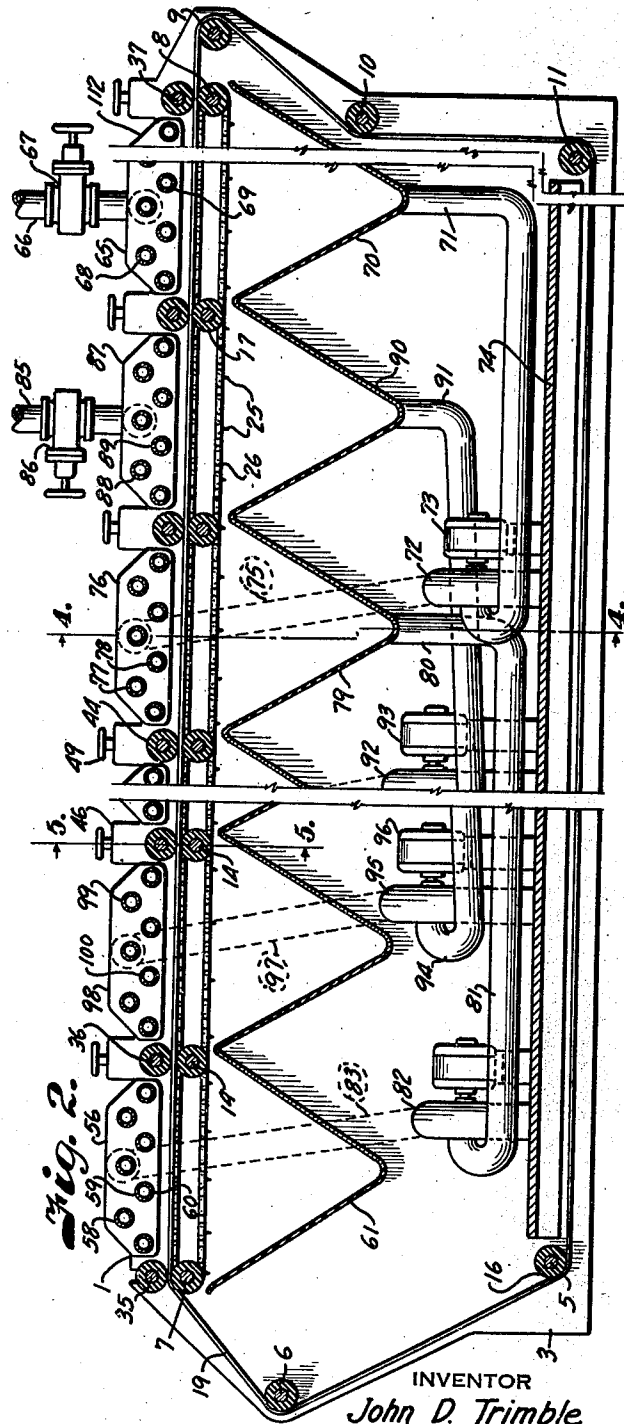
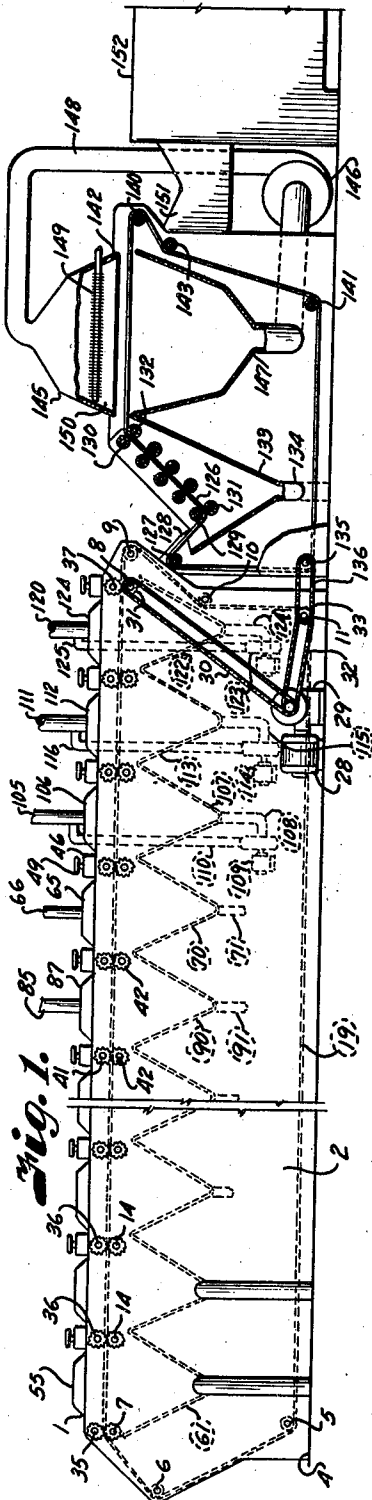
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APPARATUS FOR LAUNDERING AND IRONING FABRIC PIECE WORK

Filed March 27, 1940

3 Sheets-Sheet 1



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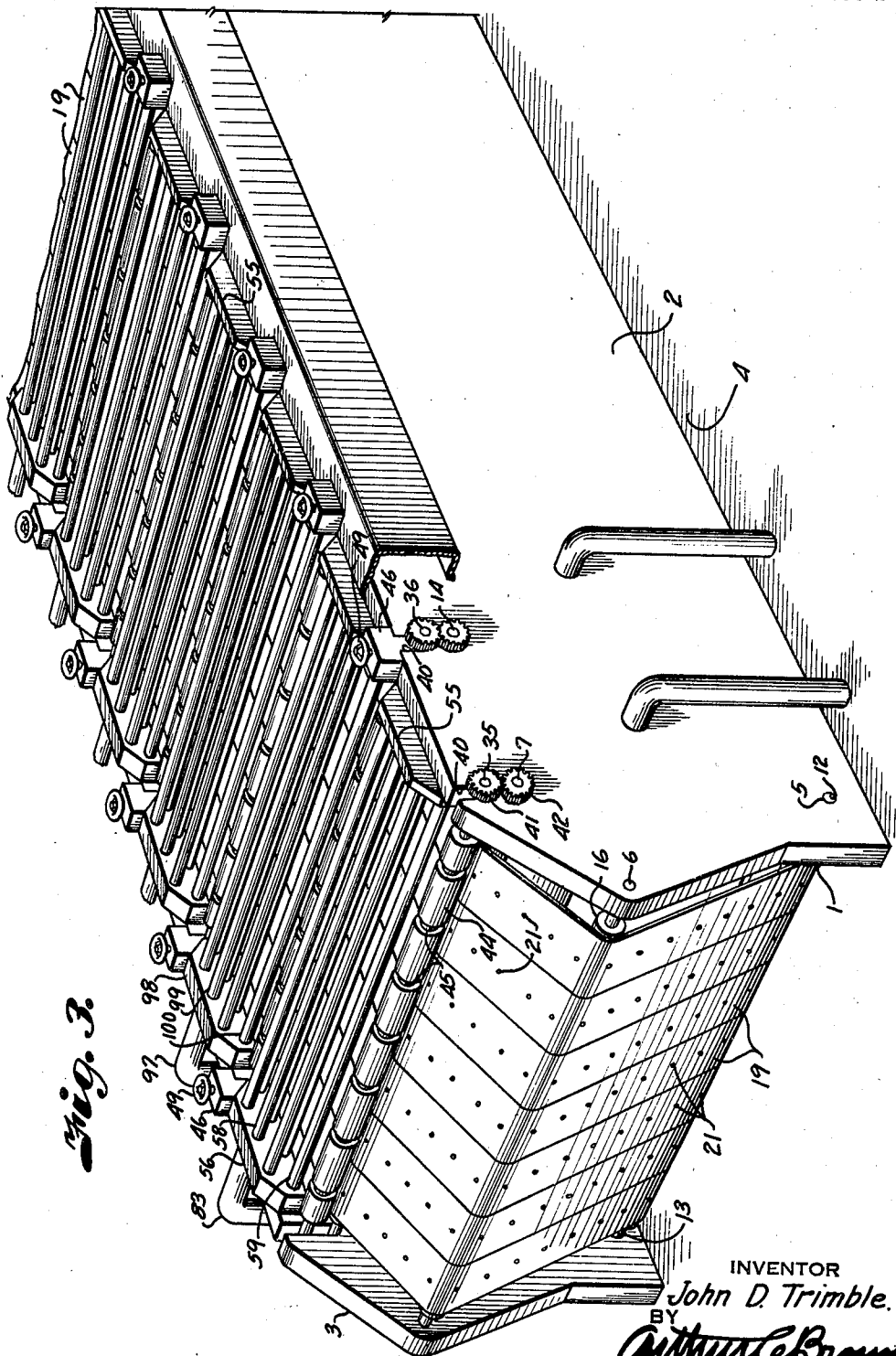
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3 Sheets-Sheet 2



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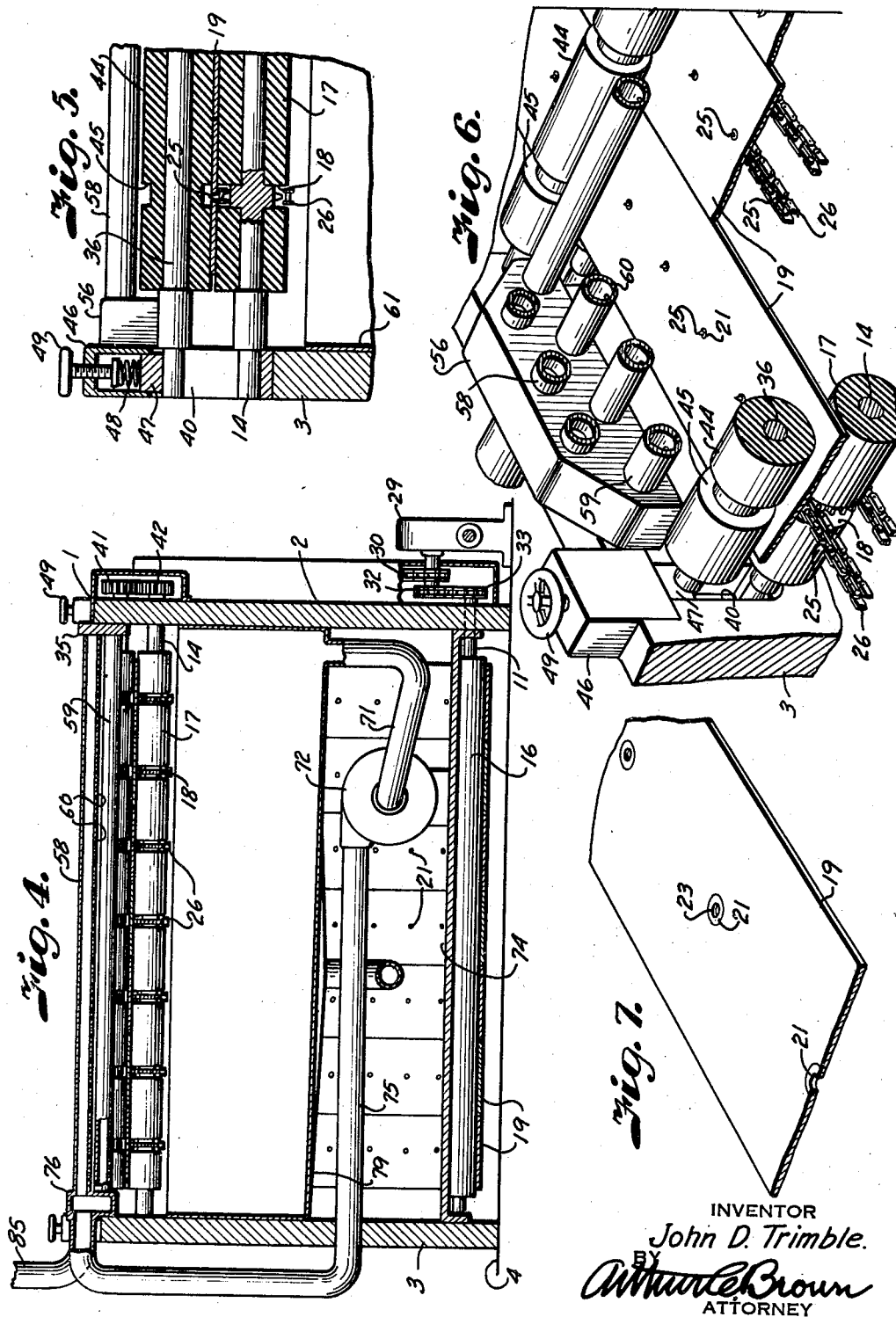
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APPARATUS FOR LAUNDERING AND IRONING FABRIC PIECE WORK

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3 Sheets-Sheet 3



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APPARATUS FOR LAUNDERING AND IRON-
ING FABRIC PIECEWORK

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4 Claims. (Cl. 68—22)

This invention relates to an apparatus for laundering fabric piece-work, the principal objects of the invention being to provide a convenient, relatively economical and highly efficient apparatus for such purposes.

Other objects of the present invention are to provide for laundering and ironing individual work pieces in a relatively short time, whereby laundry service may be speeded up, and whereby repetition of treatment of isolated work pieces need not seriously retard the processing of a segregated group or bundle of work pieces to be laundered and ironed; to provide for laundering and ironing a segregated group or bundle of work pieces in such a manner as to allow a so-called "while you wait" service for laundering and ironing establishments; to obviate the necessity for marking or identifying work pieces as a result of providing for running a number, group or bundle of work pieces through the whole apparatus as a unit, the unit being accompanied only by a bundle identification ticket or the like; to provide for obviating the necessity of use of nets and the like, as in conventional practices for identification of work pieces in a laundry wash room and to eliminate the use of pin marks or work piece identifications other than nets in such wash rooms; to reduce the amount of floor space and separate pieces of machinery in a laundering and ironing establishment, together with the additional attention normally required of such machinery; to conserve supplies normally employed in laundries, such as saturating, soaping, rinsing, bleaching, bluing and souring mediums by re-use of such supplies; to provide a substantially automatic laundering and ironing apparatus, in which the method of accomplishing the desired results is substantially continuous; and to provide improved elements and arrangements thereof in the apparatus employed in carrying out and accomplishing the above noted objects.

In accomplishing these and other objects of the present invention, I have provided novel details of structure, the preferred form of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a side elevational view, partly in vertical section, of a laundering and ironing apparatus embodying the features of the present invention.

Fig. 2 is a longitudinal vertical cross-section through the laundering machine forming a part of the present invention.

Fig. 3 is a detail fragmentary perspective view of the feeding end of the laundering machine.

Fig. 4 is a vertical transverse section through the laundering machine, substantially on the line 4—4, Fig. 2, particularly illustrating the manner in which supplies may be circulated for re-use.

Fig. 5 is a fragmentary detail vertical cross-section through a portion of the laundering machine on the line 5—5, Fig. 2, showing the relation of conveyors and roller elements.

Fig. 6 is a fragmentary detail perspective view of portions of the laundering machine, particularly illustrating the relation of the supply header sprays to the conveyors and rollers.

Fig. 7 is a fragmentary detail perspective view of a portion of a conveyor belt suitable for use in the laundering portions of the apparatus forming a part of this invention.

Referring more in detail to the drawings, which illustrate a preferred structure by which the method may be carried out:

1, Fig. 1, designates a laundering and ironing apparatus, which preferably includes a frame comprising side walls 2 and 3, Fig. 3, arranged on a suitable support 4 such as a floor in a room of a laundering establishment.

The walls 2 and 3 are vertically arranged and spaced apart a distance sufficient to receive therebetween a plurality of shafts 5, 6, 7, 8, 9, 10, and 11, Fig. 2, which are preferably rotatably mounted in suitable bearing openings 12 and 13 in the side walls Fig. 3. Additional shafts 14 are mounted in similar bearing openings arranged in substantially the same horizontal plane in each side wall of the machine and in substantially equally spaced relation to the outer shafts 7 and 8.

Suitable guide rollers 16, Fig. 4, are mounted on the shafts 5, 6, 9, 10, and 11, and rollers 17 are mounted on the shafts 7, 14 and 8, Fig. 2, which rollers are provided with spaced grooves 18.

Endless conveyor belts 19 are mounted on the rollers in surrounding relation thereto except the roller 10, which may serve as a tensioning device to take up slack in the conveyor. The conveyor belts are preferably formed of a flexible, chemically resistant, substantially non-stretchable material, such as suitably perforated "Monel" or like metal. The conveyor belts have spaced and aligned grommets 21, Fig. 7, which surround holes 23 in the conveyors or belt. The conveyor belt 19 may be of suitable over-all width, preferably at least as wide as a conven-

tional sheet for a double bed, and a suitable number of individual conveyor belts 13 may be employed, as shown in Figs. 3 and 4, to substantially cover the rollers on their supporting shafts.

The perforations in the conveyor are to pass cleansing mediums therethrough and the grommets in the conveyors are for the purpose of receiving spaced projections 25 on a chain or like drive 26 mounted on sprockets 27, Fig. 6, in the grooves of the rollers 7, 14, and 8, the projections extending through the grommets on the outer surface of the conveyors to support and hold flat work pieces and the like intended to be laundered and ironed by the present apparatus.

It is believed apparent that an operator may stand at the feed end of the apparatus, as shown in Fig. 3, and apply work pieces to the conveyor for movement along the machine in response to movement of the chain drive 26, which, through movement of the projections thereon, engages the grommets and work pieces to move the conveyors and work pieces.

In order to move the chain, a motor 23, Fig. 1, may be suitably supported and provided with a power take-off 29, on which a chain or like drive 30 is mounted at one end, the other end of the drive 30 being mounted on a sprocket 31 that is suitably supported on the shaft 8, Fig. 2. Similar chain drives may also be provided for each of the conveyor belts 19 and are mounted on sprockets between the rollers 7, 14 and 8 on the shaft.

Another chain drive 32, Fig. 1, may also be mounted on the power take-off 29 at one end and on a sprocket 33 at its other end, the sprocket 33 being mounted on the shaft 11 in such a manner as to move a roller 16 thereon for aiding in moving the conveyor belts.

Transversely arranged shafts 35, 36, 37 and the like, Fig. 1, are mounted on the side walls 2 and 3 of the apparatus adjacent the upper edges thereof in superimposed relation to the shafts 7, 14, and 8, Fig. 2, as by mounting the ends of the shafts 35, 36 and 37 in vertically arranged slots 40, Fig. 3. The ends of the shafts exteriorly of the side walls are provided with pinions 41, meshing with gears 42 on the shafts 7, 8 and the like, whereby the shafts 35, etc. are moved synchronously with the shafts 7, etc. Rollers 44, Fig. 3, are arranged on the shafts 35, 36 and 37, and have grooves 45 therein for passing the grommets and the projections 25 on the chain drives 26, as such projections pass beneath or between the rollers on the shafts.

In this manner, the work pieces placed on the conveyor belts are not only held in flattened condition on the conveyors by the projections 25, but are also pressed onto the conveyor belts by the rollers 44.

It is ordinarily desirable to force the rollers 44 downwardly to positively press on the work pieces on the conveyor belts, and to this end, blocks 46, Fig. 6 may be mounted in certain of the slots 40 over the ends of the upper row of roller shafts, pressing plates 47 frictionally engaging the rotating ends of the shafts and being pressed downwardly by springs 48, Fig. 5, which bear on the plates 47 and on the lower ends of adjustable tensioning devices 49, such as the set screws shown.

In laundering operations, the work pieces to be laundered are ordinarily first saturated with water, then soaped, then rinsed, and then provided with bleaching, bluing, and/or souring mediums to additionally treat the work pieces being

laundered. In order to saturate the work pieces substantially immediately after being fed to the machine, headers 55 and 56, Fig. 3, are provided between a pair of vertical slots 43 in the respective side walls of the machine. The headers are connected by transversely arranged, preferably staggered, pipes 58 and 59, the pipes having perforations as shown at 60, Figs. 4 and 6, for spraying jets of water on the work pieces as they travel below the pipes on the conveyor belts. As the water is forced through the work pieces, it also passes through the porous conveyor belts and is preferably collected in a trough 61, Fig. 2, of suitable shape and material that may be fixedly mounted between the side walls of the machine immediately below the spray or jet pipes in order to catch the water issuing therefrom. Suitable arrangements may be made for draining the water from the trough as and when desired.

The pipes 58 and 59 are preferably fed from the header 55, Fig. 4, to which the pipes are connected.

At the feed end of the laundry machine, it is not essential that the water be of any great degree of cleanliness for the purpose of saturating the work pieces with water, since such water is primarily to loosen the particles of dirt and the like in the work pieces to be laundered. It is desirable to employ water not only for saturation of work pieces, but also for rinsing them when other treating mediums, such as soap, are applied to the pieces. It is therefore possible to use clean water as a rinse and used or relatively dirty water for saturation of the work pieces, and thus make a considerable saving of water by using the same water for two or more purposes.

As shown in Fig. 2, therefore, I prefer to supply the manifold of a header 65 adjacent the delivery or discharge end of the laundering machine with fresh water, as by a supply conduit 66 under control of a valve 67. The water issuing from the pipes 68 and 69 of the header 65 passes through work pieces on the conveyor below the pipes as rinse water and is collected in the trough 70. A drainage pipe 71 is preferably connected with the trough 70, and leads to a pump 72 that may be actuated by a motor 73, both pump and motor being suitably supported on a partition 74 of suitable strength and arrangement.

Assuming that for the first few operations, the work pieces are first wet with water, then soaped, and then rinsed, an alternate arrangement of soap and water treatments may be provided. The fresh water from the header 65 may thus be withdrawn from the trough 70 and pumped by the pump 72 through a line 75, Fig. 4, into a header manifold 76, Fig. 2, and from the header 76 through the pipes 77 and 78 to be sprayed upon work pieces therebelow. The water passes through the work pieces, the porous conveyors, and is subsequently caught in the trough 79 where it may be withdrawn or drained by a line 80, and ultimately carried by a line 81, Fig. 2, to the pump 82. The pump 82 forces the water which is by this time relatively dirty through the conduit 83 into the header 55 and pipes 58 and 59 for passage onto the work pieces to saturate the same, the dirty water being collected in the trough 61 and being disposed of in a suitable manner, as above indicated.

Soap may be applied to the work pieces in much the same manner as the rinse and saturating water for the reason that relatively dirty soap may be used for first treating the work

pieces and relatively fresh soap for subsequently treating the work pieces.

In treating the work pieces with soap, a supply line 85, Fig. 2, is provided which is controlled by a valve 86 and leads to a header manifold 87 mounted on a side wall 3 of the laundering machine. Perforated pipes 88 and 89 project from the header 87 for spraying jets of liquid or like soap through work pieces below the pipes, the soap being collected in a trough 90 below the conveyor belts. A drainage pipe 91 is connected with the bottom of the tank or trough 90, which leads to a pump 92 that may be driven by a motor 93, the pump 92 and motor 93 being suitably supported on the partition 74.

As in the case of the water with which the work pieces are treated, the soap may be circulated from an end soap tank adjacent the discharge end of the machine to other soap tanks alternately arranged between the water tanks or troughs, relatively dirty soap ultimately being fed by the duct 94 to a pump 95, which in response to actuation of a motor 96, forces the relatively dirty soap through the duct 97 up to the header 98 and manifold therein for supplying the staggered pipes 99 and 100 with soap to be sprayed through the jet openings in the pipes and consequently soaping the work pieces on the conveyors substantially immediately after they have been saturated with water issuing from the header manifold 56.

When the work pieces have been saturated, soaped and rinsed to a degree dependent upon their initial condition, and further, to a degree in which they are adequately cleansed, it is sometimes desirable to bleach or oxidize dirt or dark stains in the work pieces. A bleaching medium may be applied to the work pieces, as by a suitably controlled supply line 105, Fig. 1, which connects with a header 106 having spray pipes similar to the water and soap spray pipes previously described, the bleaching medium being sprayed onto and through the work pieces and being collected in a tank or trough 107 therebelow mounted on the side walls of the apparatus. A drain 108 is also preferably provided for the trough 107, together with a motor actuated pump 109 for forcing the bleaching medium through a duct 110 for return to the header 106 to circulate the bleaching medium, whereby it may be re-used until its original characteristics require revitalization, at which time a new supply may be provided.

It is also sometimes desirable to rinse the bleaching medium from the work pieces and a suitably controlled supply line 111 may be provided for this purpose, which connects with another header manifold 112 having pipes to spray jets of the rinsing medium on the work pieces passing therebeneath, the medium being collected in a tank 113 and circulated to the manifold by a motor driven pump 114 and lines 115 and 116 connected respectively with the tank 113 and manifold 112.

A final bluing and/or souring medium spray is then preferably provided for whitening the work pieces and/or neutralizing alkaline constituents of cleansing soap, the final application of work piece treating medium preferably being effected by a suitably controlled supply line 120 connected with a header manifold 121 and having spray pipes which force the mediums through the work pieces, the mediums being collected in the tank or trough 122, and being circulated by

the pump 123 through drain and supply ducts 124 and 125 respectively.

If desired, additional circulating rinses may also be provided.

With the construction thus far described, work pieces are saturated, soaped, rinsed, bleached, blued and/or soured, and, if desired, rinsed, at which time they are discharged from the laundering machine onto a conveyor 126, Fig. 1, which extends about a roller on a shaft 127 that is rotatably mounted on suitably arranged supports 128. The conveyor 126 extends below wringer roller shafts 129 and 130 and above wringer rollers 131 and 132 for wringing out the major part of the moisture contained by the work pieces after leaving the laundering machine. The wringer roller shafts are suitably rotatably supported in transverse relation to a tank or trough 133, the tank 133 catching the moisture wrung from the work pieces, a suitable drain 134 being provided for the tank 133.

The conveyor 126 also engages about a drive roller on a shaft 135 which is connected, as by a chain drive 136, with a sprocket on the shaft 11 in such a manner that movement of the conveyor 126 is synchronous with and directly proportional to movement of the conveyor belt 19. The conveyor 126 also passes over rollers 140 and 141 that are mounted on shafts rotatably supported in a drier housing 142. A tensioning roller 143 may also be provided, if desired.

The wringer rollers 130 and 132, together with the roller 140, are preferably supported in substantially the same horizontal plane to provide the conveyor 126 with a horizontal path below a drier 145, which consists of a blower pump 146 that forces air from a reservoir 147 through the duct 148 over a heater 149 out of the funnel-shaped blower hood opening 150 onto the work pieces to be dried. Heat loss is reduced to a minimum by circulating the heated air, which is supplied to the reservoir 147, thus effecting a further saving of supplies in the present method and apparatus.

From the conveyor 126, after the work pieces pass through the drier, they are delivered to an ironer apron 151, the path of the work pieces being continued from the apron 151 into and through a suitable ironing apparatus 152. Upon passage through the ironer 152, the work pieces are fully treated in accordance with the present method and apparatus, and may be suitably packaged for delivery to the owner.

The operation of the apparatus constructed as described is generally substantially as follows:

Suitable work pieces to be laundered and ironed, such as napkins, sheets and the like, are applied to the feed end, Fig. 3, of the laundering machine and, upon energization of the motor 28, the conveyors move in a clock-wise direction, Fig. 3, for drawing the work pieces between the rollers. The work pieces are saturated with water issuing from the pipes 58 and 59 after which the work pieces are soaped in the immediately following pipes. The work pieces are then rinsed and soaped alternately until fully cleansed, after which they pass below bleaching, rinsing, souring and/or bluing spray jets, and, if desired, other rinsing sprays, to the delivery or discharge end of the laundering machine, where they fall upon the conveyor 126. The conveyor 126 causes the work pieces to travel between the wringer rollers and below the hot air blast from the drier, after which the work pieces are dropped onto the ironer apron and

passed into the ironer. From the ironer, the work pieces are collected, packaged and delivered to the owner.

Movements of the conveyors 19 and 126 are synchronized by the chain drive connections 26 for the conveyors 19 as driven by the chain drive 30 and motor 28, together with the chain 32 and sprocket 33, the conveyor 126 being driven in direct relation to the conveyor 19 by the chain drive connection 136 and sprocket 135.

Fresh water is circulated from adjacent the discharge end of the laundering machine through the duct 71, pump 72 and duct 75 into an alternately arranged trough or tank, and subsequently alternately into other water tanks or troughs where it is finally delivered to the header 56 at the feed end of the laundering machine for passage through the work pieces to initially saturate the same and loosen the dirt therein. Soap solution is similarly passed through alternate headers and spray pipes for spraying relatively clean soap at the discharge end of the laundering machine and relatively dirty soap at the feed end of the machine. Bleaching, rinsing, sour and/or blue solutions and final rinses are circulated within their own systems and the supplies are thus materially conserved.

It is apparent, therefore, that I have provided, by this invention, a continuous laundering, drying and ironing mechanism, in which a series of steps are carried out upon work pieces to cleanse and deliver the same in an ironed and finished form. It is further apparent that a minimum amount of attention is required, and that floor space in a laundering establishment is reduced to a minimum by this invention.

What I claim and desire to secure by Letters Patent is:

1. In an apparatus of the character described, spray means for saturating work-pieces to loosen dirt therein, means for applying cleansing medium to said work-pieces, spray means for applying a rinsing medium to the work-pieces for rinsing the cleansing medium from said work-pieces, a sump for catching the rinsing medium, means for withdrawing the rinsing medium from the sump and delivering said rinsing medium to the saturating spray means for re-using the rinsing medium, a second means for applying cleansing medium to the work-pieces subsequently to rinsing thereof, means for gathering cleansing medium from the second-named cleansing means and delivering said cleansing medium to the first-named cleansing means for re-using the cleansing medium, and means for rinsing the cleansing medium applied to the work-pieces by the second-named cleansing means from the work-pieces.

2. In an apparatus of the character described, a continuous belt, means for supporting the belt for carrying work-pieces to be laundered, a series of spray heads mounted above the paths of the work-pieces, alternate spray heads being adapted to deliver cleansing medium and rinsing medium respectively to the work pieces, sumps below the belt under each spray head, means for supplying fresh rinsing medium to the last spray head in said series, means for supplying cleansing medium to the next adjacent spray head, and means for withdrawing the separate mediums from the respective sumps and delivering said mediums to alternate spray heads arranged forwardly in the path of the work-pieces relative to the last and next adjacent spray head.

3. In an apparatus of the character described, means for conveying work-pieces to be laundered through the machine, a series of spray heads mounted above the path of the work-pieces, sumps below the path of the work-pieces under each spray head, means for supplying cleansing medium to a spray head, means for withdrawing the cleansing medium from its respective sump and delivering said medium to alternate spray heads arranged forwardly in said series whereby the used cleansing medium is applied to the dirty work-pieces, means for supplying alternate spray heads with a rinsing medium for rinsing the cleansing medium from the work-pieces, and wringer means for wringing the work-pieces after each application of a rinsing or cleansing medium.

4. In an apparatus for laundering fabric work-pieces, a saturating section, alternate cleansing and rinsing sections, means for conveying the work-pieces through the respective sections, a sump located under each of the respective sections, means on the last cleansing section for applying cleansing medium to the work-pieces as they pass therethrough, wringer means at the end of said section for removing the cleansing medium from the work-pieces whereby the cleansing medium removed is caught in the respective sump thereto, means for withdrawing the cleansing medium from said sump, and delivering said cleansing medium to the next forwardly adjacent cleansing section for application to the work-pieces, means supplying rinsing medium to the rinsing sections for rinsing the cleansing medium from the work-pieces, and means for withdrawing the rinsing medium from the first rinse section sump and delivering said used rinsing medium to the saturating section for use in saturating the work-pieces to loosen the dirt therein before application of cleansing medium.

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