May 8, 1945. W. O. MANLEY 2,375,426

FLAT WORK IRONER

Filed Aug. 30, 1939 3 Sheets-Sheet 1

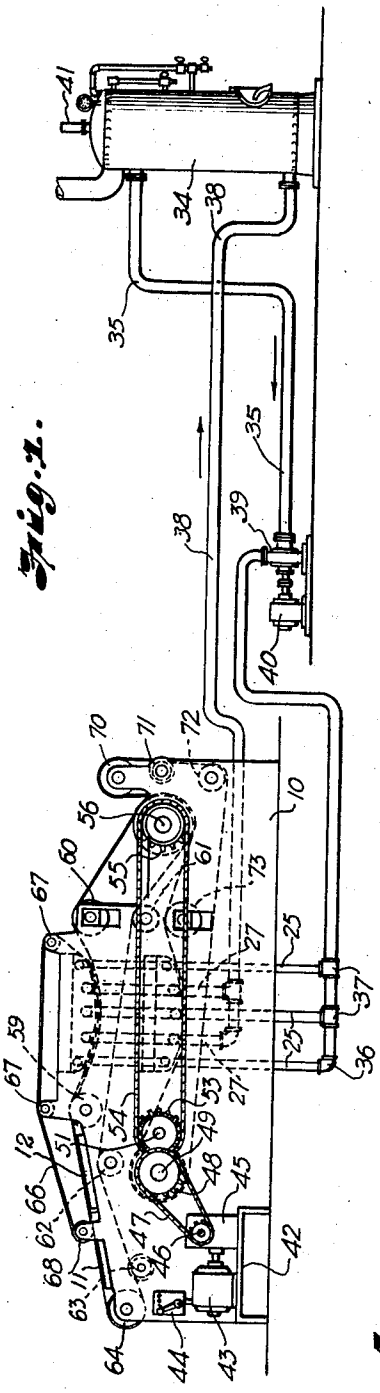

Fig. 1.

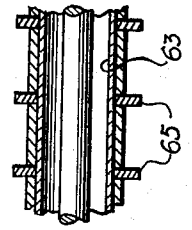

Fig. 8.

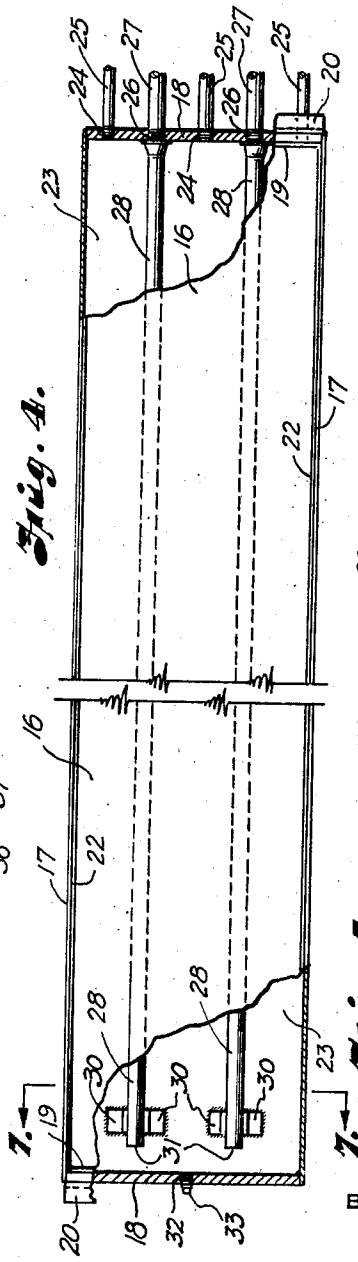

Fig. 4.

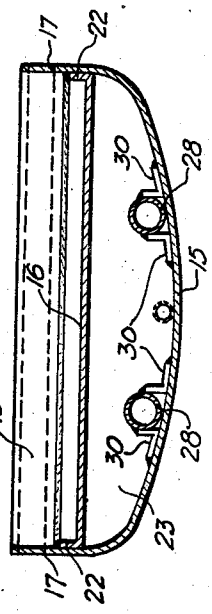

Fig. 7.

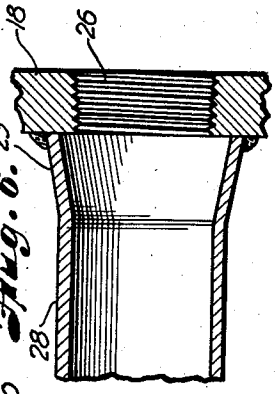

Fig. 6.

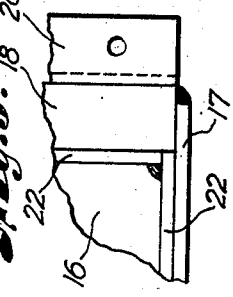

Fig. 5.

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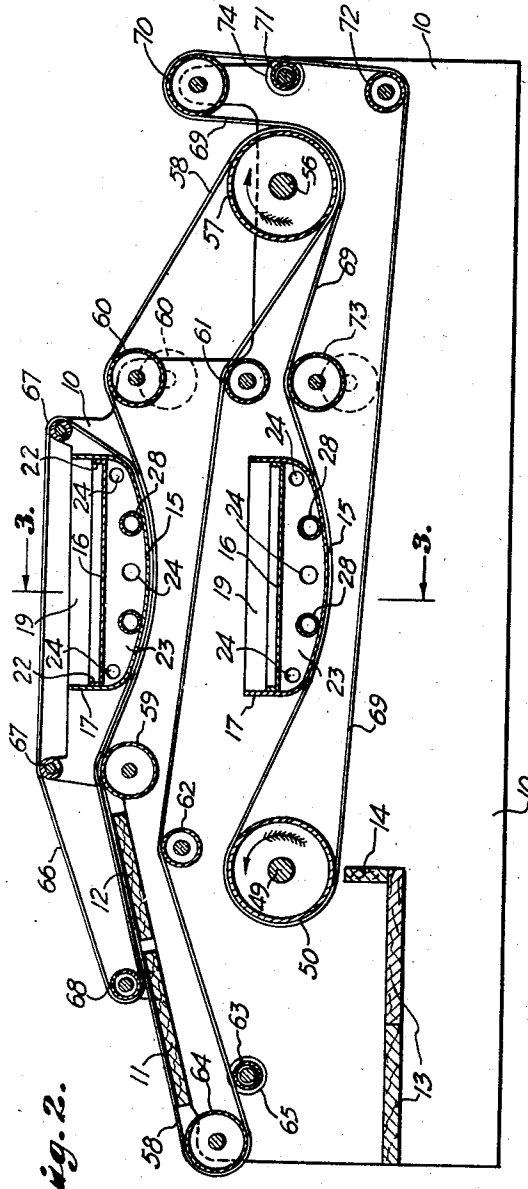

Fig. 2.

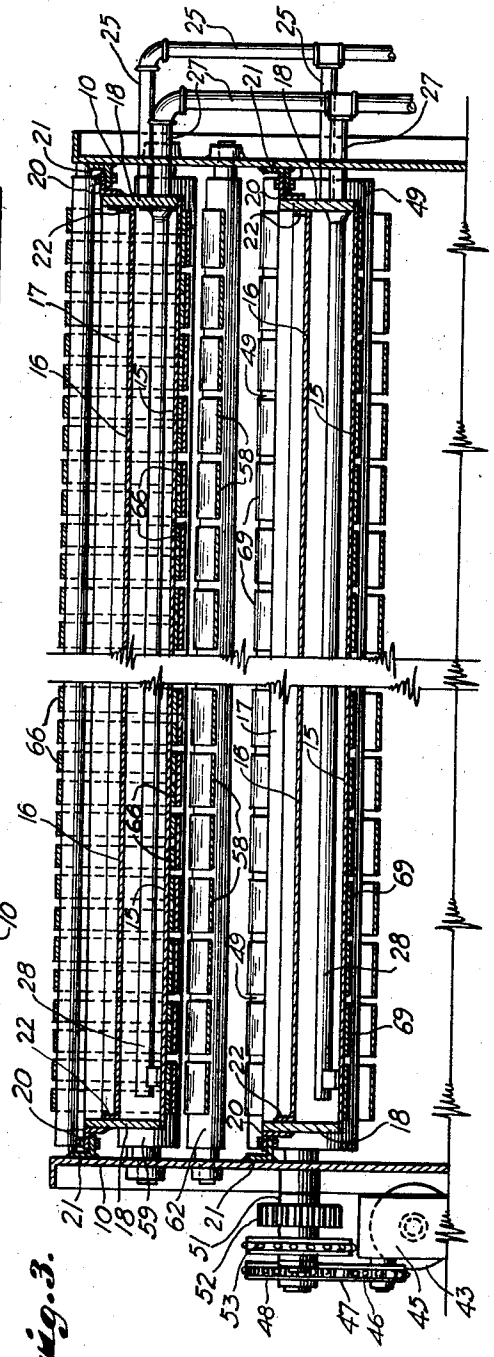

Fig. 3.

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FLAT WORK IRONER

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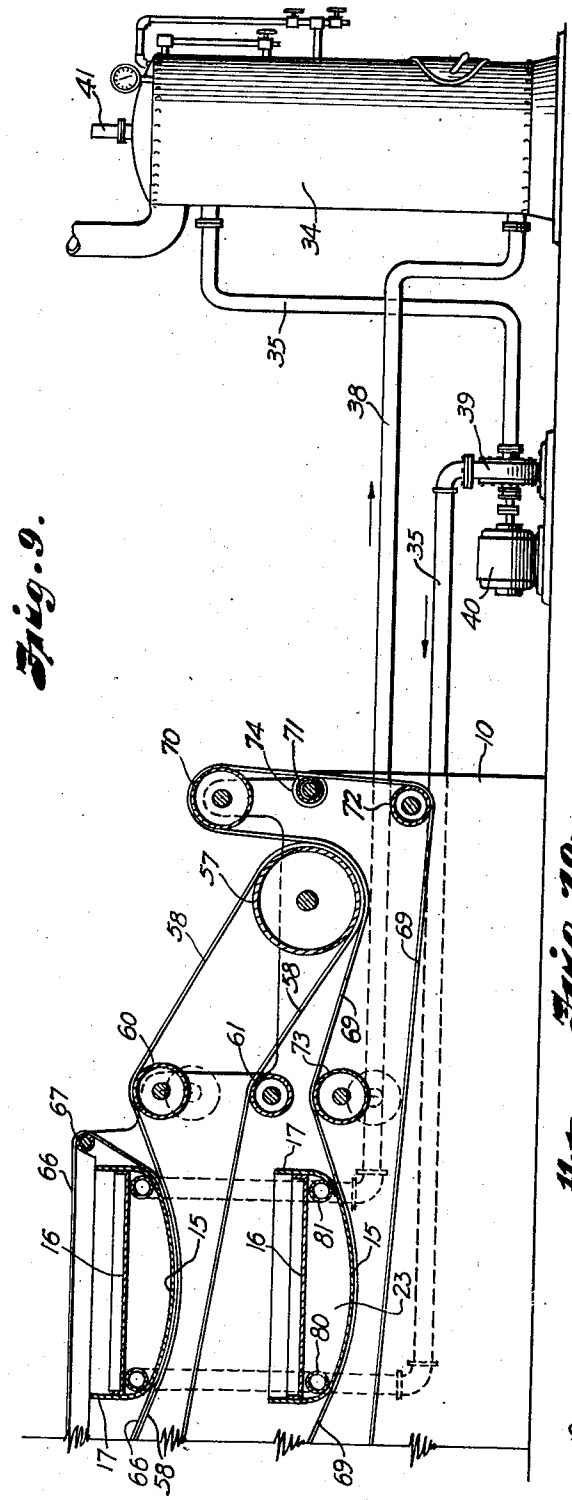

Fig. 9.

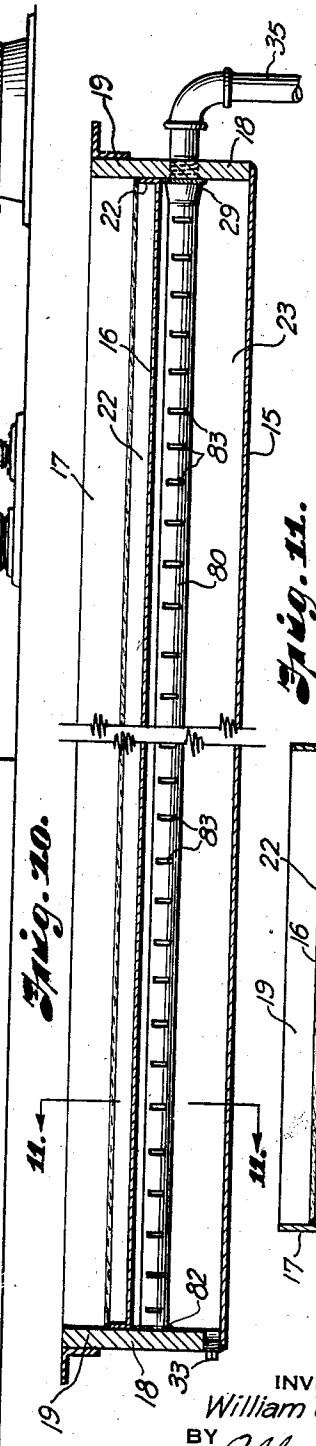

Fig. 10.

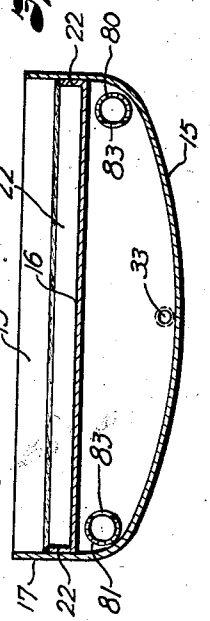

Fig. 11.

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UNITED STATES PATENT OFFICE

2,375,426

FLATWORK IRONER

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Application August 30, 1939, Serial No. 292,675

3 Claims. (Cl. 38—8)

My invention relates to laundry machinery, and more particularly to flat work ironers.

In laundry machinery requiring the use of heat in connection therewith, it is customary to do the heating by means of steam. A limit to the temperatures that can be reached safely in this manner exists, because, of course, in order to get the temperature of the heating fluid above 212 degrees F. it is necessary to increase the pressure, and temperatures such as are desirable in certain machinery cannot be reached without requiring excessively high steam pressures, which make the use of steam dangerous. Even with the temperatures which are obtained, which are too low for the most efficient results, dangerous situations often develop due to blowing out of steam lines and connections on machines that use steam at relatively high pressures, causing injuries and burns to those in proximity to such accidents.

It is an important purpose of my invention to provide means for heating laundry machinery that avoids all danger resulting from high pressures and which makes it possible to obtain a higher temperature than has been possible by means of steam, even at the highest pressures used, thus providing much more efficient operation of such machinery as flat work ironers, and other ironing machines. Temperatures around 500 degrees F. are often desirable in machinery of this character, and this can be easily obtained by my improved apparatus involving the use of an oil that does not deposit carbon at temperatures as high as that mentioned.

It is a further purpose of my invention to provide heating means for laundry machinery of the above mentioned character, which comprises a liquid that is fed into a chamber provided for heating the apparatus to which the heat is to be applied, and means for heating said liquid and circulating the same, which is so constructed and arranged that the liquid in the heating chamber is substantially at atmospheric pressure, and even if leakage at any point should occur, there will be no spurting or squirting of the hot oil that could in any manner endanger anyone.

It is still another purpose of my invention to provide an ironing machine that is comparatively light in construction, and particularly to provide a flat work ironer that is made of a light weight construction, being made principally of sheet metal, this being possible because there are no high pressures used in the ironing machine, which high pressures, as in the case of steam previously used, require the use of heavy castings, or similar heavy walled members, to withstand the pressures and prevent accidental blow-outs.

It is a specific purpose of my invention to provide an ironing machine made up of hollow convex stationary shoes and conveying means for conveying articles to be ironed into engagement with and over the convex surfaces of said shoes, comprising a plurality of flexible bands, or belt-like members, which are adjustable relative to the shoes to adjust the pressure for ironing the work, such as the ordinary flat work ironed in a laundry.

Other objects and advantages of my invention will appear as the description of the drawings proceeds. I desire to have it understood, however, that I do not intend to limit myself to the particular details shown or described, except as defined in the claims.

In the drawings:

Fig. 1 is a diagrammatic view of a laundry machine and one form of my improved heating apparatus therefor.

Fig. 2 is a vertical sectional view through my improved flat work ironing machine shown in Fig. 1.

Fig. 3 is a section thereof taken on the line 3—3 of Fig. 2, partly broken away.

Fig. 4 is a view partly in plan and partly in horizontal section of one of the shoes of my improved ironing machine shown in Fig. 1, the same being partly broken away.

Fig. 5 is a fragmentary top plan view of said ironing shoe.

Fig. 6 is an enlarged detail sectional view through one end of the tubes for conducting the heating liquid from the shoe.

Fig. 7 is a section taken on a line corresponding to the line 7—7 of Fig. 4.

Fig. 8 is a fragmentary section through one of the guide rollers.

Fig. 9 is a fragmentary vertical sectional view through a modified form of my improved flat work ironing machine and my improved heating apparatus therefor.

Fig. 10 is a longitudinal sectional view through one of the shoes of the machine shown in Fig. 9, partly broken away, and

Fig. 11 is a section taken on the line 11—11 of Fig. 10.

Referring in detail to the drawings, in Fig. 2 is shown an ironing machine, which may be provided with any suitable frame, the frame being shown merely conventionally as having a pair of side plates 10, which are secured together in any desired manner to form a rigid frame. Ex-

tending between the side plates are a pair of flat plate-like members 11 and 12, which may be made of metal, wood, or any other suitable material, that serve as a receiving table and as a guide plate, respectively, for the work as it enters the machine. A wooden-bin-like member having the bottom wall members 13 and the vertical wall member 14 is provided for receiving the work at the discharge end of the machine after it has been ironed.

Mounted between said side frame members 10 in any suitable manner are the hollow shoes, which have bottom convex walls 15. As shown in the drawings, said convex shoes each have a top wall 16 that is depressed below the top edges of the continuations of the convex wall 15, which form longitudinal side flanges 17, and below the top edges of the end walls 18 to form the end flanges 19. The end flanges 19 are secured to the side frame members by means of angle members 20, which are secured permanently to the end walls 18 of said shoes by welding or otherwise, and by means of cooperating angle members 21 on the side frame members 10, said members 21 being welded or otherwise permanently secured to said side frame members and the angles 20 and 21 being secured together in fixed position in any desired manner, as by means of bolts, as shown. The shoes are thus fixed in position on the frame of the machine with the convexly curved faces 15 thereof downwardly.

The top walls 16 are, preferably, flanged as at 22, and welded to the portions 17 of the wall 15 and to the end walls 18 so as to form a liquid tight chamber 23 within each of said shoes. It will be noted that all of the walls of said chamber are made of relatively light gauge sheet metal, but that the end walls 18 are made slightly heavier than the longitudinal convex walls having the upstanding flanges 17 and the top wall 16, so as to provide sufficient strength for mounting the shoes on the frame. One of the end walls 18 of each shoe is provided with a plurality of threaded openings 24 for receiving the heating oil feeding conduits 25 screw-threadedly, to provide a liquid tight connection between said conduits and the chamber 23 within said shoe.

It will be noted upon reference to Fig. 4 that a plurality of said conduits 25 is provided, and that these conduits are arranged in spaced relation along said end wall 18 so as to distribute the oil evenly into the chamber 23, three conduits 25 being shown in the arrangement disclosed, although it will be obvious that any desired number to get the desired even distribution can be provided. The shoe is constructed so as to get sufficient circulation of oil in the chamber 23 as to distribute the heat throughout the length of the shoe, as well as throughout the width thereof. In order to accomplish this, a pair of screw-threaded openings 26 is provided in one end wall 18, which openings 26 screw-threadedly receive the return oil conduits 27, and mounted in fixed position within the chamber 23 is a pair of oil return tubes 28, which have flared end portions 29 (see Fig. 6) that are welded to the end wall 18 having the openings 26 therein, in such a manner as to be in liquid tight connection therewith, but so as to discharge into said threaded openings 26 and thus into the tubes, or return conduits, 27.

The tubes 28 are mounted in fixed position by means of angle members 30 that are welded to the inner face of the convex wall 15 and to said tubular members 28, said angle members being merely short pieces that are provided near the end wall 18 opposite that having the tubes 25 and 27 connected therewith, as will be obvious from Fig. 4, said tubes 28 having open ends 31 spaced slightly from said other end wall 18. The tubes 28 further alternate with the openings 24 and all said openings are located closely adjacent the convex bottom wall 15 of each shoe, so as to introduce the hot oil as near the wall 15 as conveniently possible. Said other wall 18 may be provided with a drain opening 32 provided with a drain plug 33.

The hot oil is supplied to the chambers 23 in the shoes having the convex ironing surface 15 from a heating vessel 34, which may be of any desired character, such as a small steam or hot water boiler. An oil supply conduit 35 extends from said boiler, or heating vessel, 34 and is connected with the pipes, or conduits, 25 in any well known manner, such as by means of pipe fittings shown in Fig. 1 as being an elbow 36 and tees 37. A return pipe 38 extends from the pipes 27 to the heating vessel 34, a pump of suitable character 39, driven by any desired means, such as the motor 40, being provided for circulating the hot oil in the system. It is, of course, understood that the pipes 25 and 27 are provided with suitable fittings, such as shown, for connecting the same together and with the two shoes shown, or any number that may be utilized, so as to connect the chambers therein with the common source of hot liquid supply and with the return means to the heating vessel. A circulating hot liquid system comprising feed and return conduits, a heating chamber associated with the apparatus that is to be heated, such as the shoe of the ironing machine, and a vessel in which the liquid is heated, is thus provided. It is highly desirable to maintain this liquid at or near atmospheric pressure in the system, and this is done by providing a vent in the liquid heating system at any desired point therein to have the same open to the air, such as the vent tube 41 shown as being provided on the heating vessel 34.

Mounted on any suitable base 42, fixed relative to said framework, is a motor 43 controlled by any suitable switch 44 and provided with a reduction gear 45, which drives a sprocket wheel 46 over which operates a sprocket chain 47, which also operates over a sprocket wheel 48 mounted on a shaft 49, said shaft 49 being mounted in suitable bearings in the side members 10 of the frame and having a hollow roll 50 mounted thereon to rotate with said shaft. A countershaft 51 is also mounted in suitable bearings in the members 10 and is driven by means of a pair of gears on said countershaft and said shaft 49 to rotate the shaft 51 in the opposite direction to the direction in which said shaft 49 rotates, one of said gears being shown at 52. A sprocket wheel 53 is mounted on the shaft 51 to rotate therewith, and a sprocket chain 54 operates over said sprocket wheel and over a sprocket wheel 55 provided on a shaft 56, which is journaled in bearings in the frame members 10, and which has a hollow roll 57 mounted thereon to rotate therewith. The direction of rotation of the shaft 49 is such that the roll 57 rotates in a clockwise direction, as viewed in Fig. 2, and as indicated by the arrow thereon, while the roll 50 rotates in a counter-clockwise direction, as viewed in Fig. 2 and as indicated by the arrow provided thereon. The cylindrical rolls 50 and 57 thus act as driving drums, or rolls, for the conveyor

mechanism that is provided for the ironing machine.

Said conveyor mechanism comprises three sets of conveyors, made in the form of a plurality of flexible bands. One of said conveyors comprises a plurality of flexible bands 58, which operate over the roll 57, and also over the guide rollers 59, 60, 61, 62, 63 and 64. Said flexible bands 58 are made of a fabric material, similar to belting, and operate over said rolls, or rollers, in substantial parallelism, the same being guided to operate in parallel paths by means of the roller 63, which is provided with uniformly spaced flanges 65 thereon, that may be made up of washers mounted between spacing sleeves on the roller 63, as shown in Fig. 8, and that are so spaced as to receive the adjacent bands 58 between the same, this roller being arranged adjacent the roller 64, which provides the turn in the conveyor at the point where the work is fed onto the table 11 and onto said conveyor 58. The conveyor made up of the bands 58, due to the provision of the various guide rollers, follows a path over the members 11 and 12 and under the curved bottom face of the shoe 15. The roller 60, as will be evident from Figs. 1 and 2, is mounted so as to be vertically adjustable in the frame, so as to vary the tension on the bands, or parallel belts, 58, to vary the pressure of the work against the bottom surface of the shoe with which said conveyor made of said bands is associated.

In order to hold the work in proper position for engagement with the shoe to iron the same flat, a guide conveyor made up of a plurality of bands 66 is provided, these being similar in character to the bands 58, but being much lighter in weight and narrower. The bands 66 operate over guide rollers 67 provided near the top of the frame member 10 and freely rotatable in suitable bearings in the frame, and over a guide roller 68 mounted for free rotation in the frame adjacent the member 11. Thus the work is guided into position by means of the bands 66 and the flat members 11 and 12 to lie in proper position on the bands 58 to be ironed or smoothed by the shoe having the convex wall 15 as the work passes into engagement with the convex surface 15 of the shoe, between the bands 66 and the bands 58. The bands 66 are driven merely by friction, as will be evident from Figs. 1 and 2 of the drawings.

The conveyor made up of the bands 58 delivers the work after it has been ironed by the upper shoe of the machine, to a conveyor of a similar character, which is made up of the bands 69, which are similar to the bands 58 and which operate over the hollow rollers 70, 71, 72 and 73, as well as over the hollow roller, or drum, 50 and over the hollow roller, or drum, 57, in the manner shown in Figs. 1 and 2. The work being on top of the bands 58 as the bands 58 and 69 meet at the surface of the hollow roll 57, the work will be carried around said roll and will be on top of the conveyor bands 69 as it passes over the hollow roll 73, which is vertically adjusted in a similar manner to the hollow rolls 60 for the same purpose as disclosed in connection with the roller 60 in conjunction with the conveyor bands 58, and then into engagement with the lower convex wall 15 of the lower stationary shoe, then over the roll 50 and onto the delivery table 13. Thus both sides of the work are ironed, one side by the upper stationary shoe and the other side by the lower stationary shoe. The guide roll 71 is provided with spaced flanges 74, which serve the same purpose as the flanges 65 on the roller 63. It will, of course, be obvious that any arrangement of conveyors and any number of stationary shoes can be utilized, dependent upon the speed and capacity of the machine to get the desired ironing effect, as long as the relationship of the conveyors and the shoes to each other is substantially as described and shown herein.

In the form of the invention shown in Figs. 9 to 11, inclusive, the conveyor members, the heating apparatus and the external structure of the shoes is exactly the same as has been previously described in connection with the form of the invention shown in Figs. 1 to 8, inclusive, and the same reference numerals are applied to the corresponding parts in Figs. 9 to 11, and Figs. 1 to 8. The only material change in the construction shown in Figs. 9 to 11 from that shown in Figs. 1 to 8 is in the internal structure of the stationary shoe. From the inlet, or hot oil supply, conduit 35, a pipe 80 extends along the one side of the shoe in the chamber 23 adjacent the junction of the top wall 16 with the concave wall 15, said pipe being flared at 29 in a similar manner to the pipe 28 shown in Figs. 4 and 6, and the connection between the supply pipe 35 and the pipe 80 being similar to that between the pipe 27 and the pipe 28. The opposite end of the pipe 80 is welded, as at 82, liquid tight to the end wall 18 opposite that through which the pipe 35 is connected with the pipe 80. A similar pipe 81 is mounted in a similar manner and is connected with the return pipe 38 at the same end of the shoe as is the pipe 35 with the pipe 80.

Each of the pipes 80 and 81 is provided with a series of transverse slots 83, which are directed toward each other and which are so spaced as to supply a substantially uniform quantity of hot liquid, such as the hot oil, from the heating device 34 throughout the length of the pipe 80 to the chamber 23. The hot oil will travel crosswise of the chamber 23 to the slots 83 in the pipe 81 and back to the heating apparatus through the return pipe 38, the distribution of slots and the number thereof, as well as the size thereof, being such that there will be substantially a uniform discharge of oil from all of the slots along the length of the pipe 80 from the end thereof connected with the pipe 35 to the closed end thereof at the opposite end wall of the shoe. This arrangement will supply a substantially uniform flow of hot oil through the chamber 23 crosswise thereof from end to end of said chamber.

In operation the heating vessel 34 is set in operation to heat the oil or similar liquid having a higher boiling point than water to the desired temperature, and the pump 39 is set in operation to circulate the hot liquid between the chambers in the ironing shoes and said heating vessel. When the liquid reaches substantially the desired temperature the motor 43 driving the conveyor system for the flatwork ironer is set in operation and the pieces of flat work are placed upon the flat plate-like member 11 one at a time in a well known manner on top of the bands, or belt-like members 58. Said pieces of flat work are carried by means of the bands, or belt-like members 58 into position under the bands, or belt-like members 66 and carried along between said bands or belt-like members in a spread-out condition under the upper shoe having the convex ironing surface 15 and into sliding contact with said surface between adjacent bands 66 under a pressure determined by the adjustment of the ad-

justable rollers 60. The ironing or smoothing of the flat work is done entirely by cooperation between said bands or belt-like members and said convex ironing surface, the thin wall of the box-like shoe or chamber being in a highly heated condition, so as to immediately smooth and expel a large amount of the moisture from the flat work. The pieces of flat work, after passing under the upper shoe, pass along on the bands 58 around the roll 57 where the same are positioned between the bands 69 and the bands 58. The bands 69 carry the pieces of flat work under the lower shoe in contact with the convex ironing surface thereof in a similar manner to that described above, the pressure exerted by the bands and thus by the work on the shoe being obtained by adjustment of the roll 73. Said bands 69 carry the flat work around the roll 50 and drop the same into the bin 13 where the same is removed from the machine by hand.

What I claim is:

1. In a flat work ironer, a stationary hollow sheet metal shoe having a thin concavo-convex bottom wall providing an ironing surface on the under side of said shoe that is convexly curved throughout, distributing means extending into said shoe and lengthwise within the same adjacent said bottom wall substantially from end to end thereof, having means along the same for engaging a liquid, having a higher boiling point than water at a temperature above the boiling point of water, with the inner face of said bottom wall transversely of said shoe at a plurality of points lengthwise of said shoe, the liquid within said shoe being substantially at atmospheric pressure, and flexible conveyor members engaging the bottom wall of said shoe and moving transversely across said bottom wall to carry the work into engagement with and hold said work in ironing contact with said convex ironing surface while moving across the same.

2. In a flat work ironer, a stationary hollow sheet metal shoe having a concavo-convex bottom wall providing an ironing surface on the under side of said shoe that is convexly curved throughout, means within said shoe for heating said bottom wall, and means for moving work into ironing engagement with said shoe, transversely across the under side thereof, comprising an upper flexible conveyor member comprising a plurality of spaced flexible bands mounted to extend across the bottom surface of said shoe in sliding engagement therewith, and a lower flexible conveyor member comprising a plurality of spaced parallel flexible bands, said upper and lower conveyor members engaging the opposite sides of said work, means for positively moving said lower flexible member transversely under said shoe, and means exerting an upward pressure therewith on said work and said upper flexible conveyor to slide said work and upper member across said shoe to frictionally drive said upper conveyor at the same lineal speed as said work while in sliding contact with said shoe.

3. In a flat work ironer, a stationary hollow sheet metal shoe having a concavo-convex bottom wall providing an ironing surface on the under side of said shoe that is convexly curved throughout, means within said shoe for heating said bottom wall, and means for moving work into ironing engagement with said shoe transversely across the under side thereof, comprising an upper flexible conveyor member comprising a plurality of spaced flexible bands mounted to extend across the bottom surface of said shoe in sliding engagement therewith, and a lower flexible conveyor member comprising a plurality of spaced parallel flexible bands, said upper and lower conveyor members engaging the opposite sides of said work, means for positively moving said lower flexible member transversely under said shoe and means exerting an upward pressure therewith on said work and said upper flexible conveyor to slide said work and upper member across said shoe to frictionally drive said upper conveyor at the same lineal speed as said work while in sliding contact with said shoe, comprising means for supporting said lower flexible conveyor above said ironing surface on opposite sides of said shoe to tension said lower flexible conveyor and press it toward said bottom wall, and means for adjusting one of said supporting means vertically to adjust the upward pressure of the lower flexible conveyor member.

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