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APPARATUS FOR TREATING WEBS OF FABRIC

2 SHEETS—SHEET 1

Filed Dec. 27, 1948

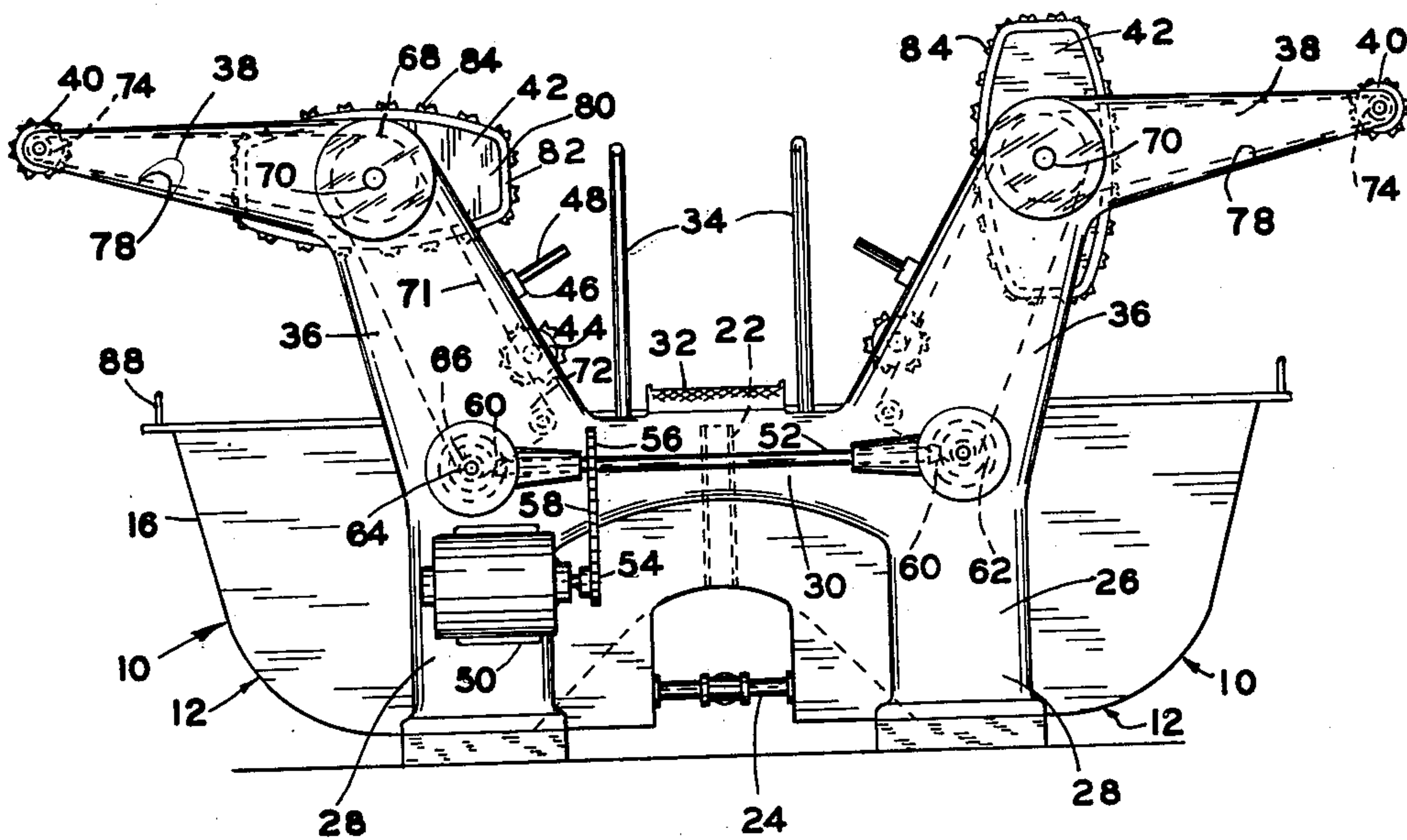


FIG. 1-

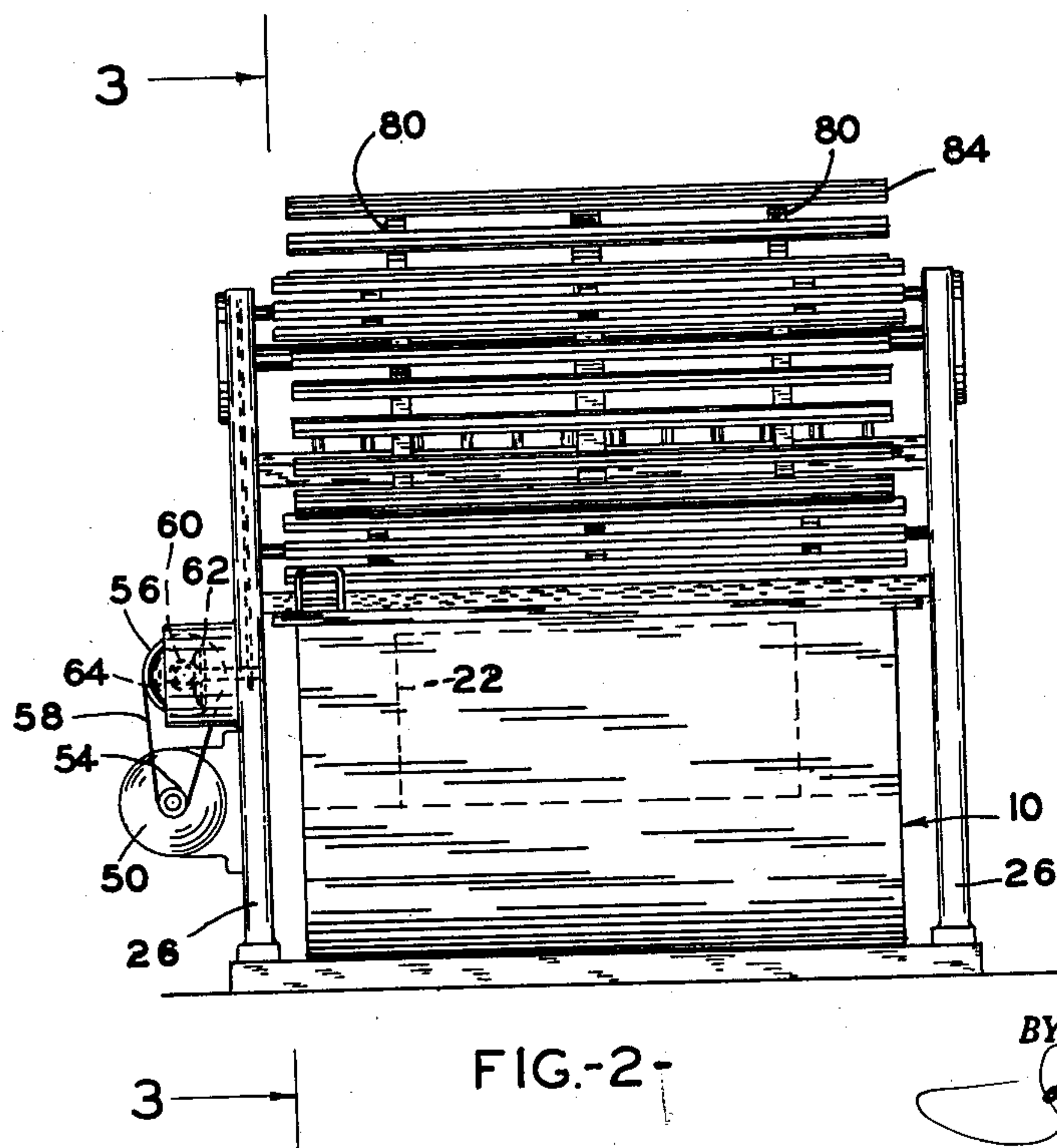


FIG. 2-

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2 SHEETS--SHEET 2

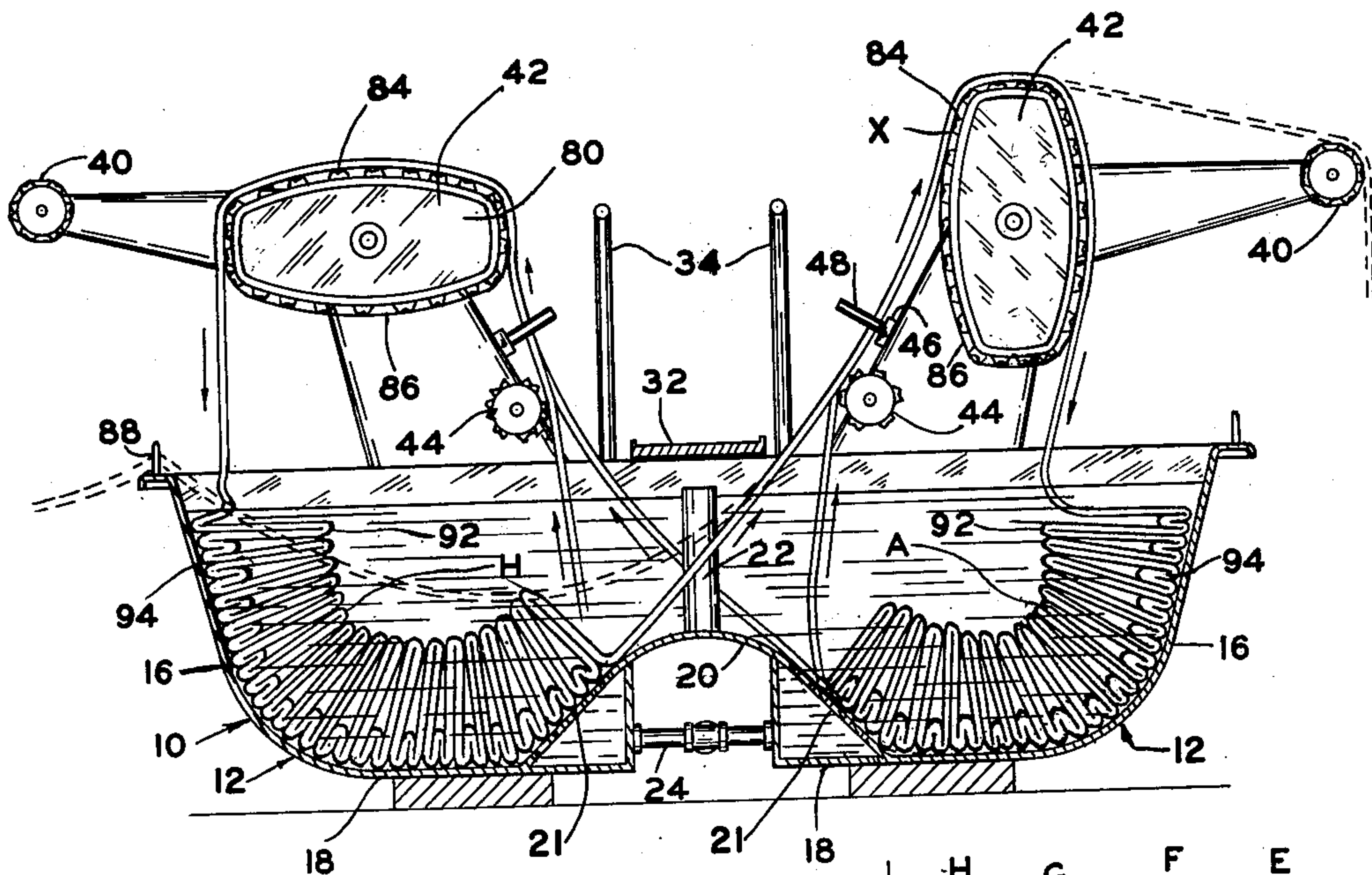


FIG. -3-

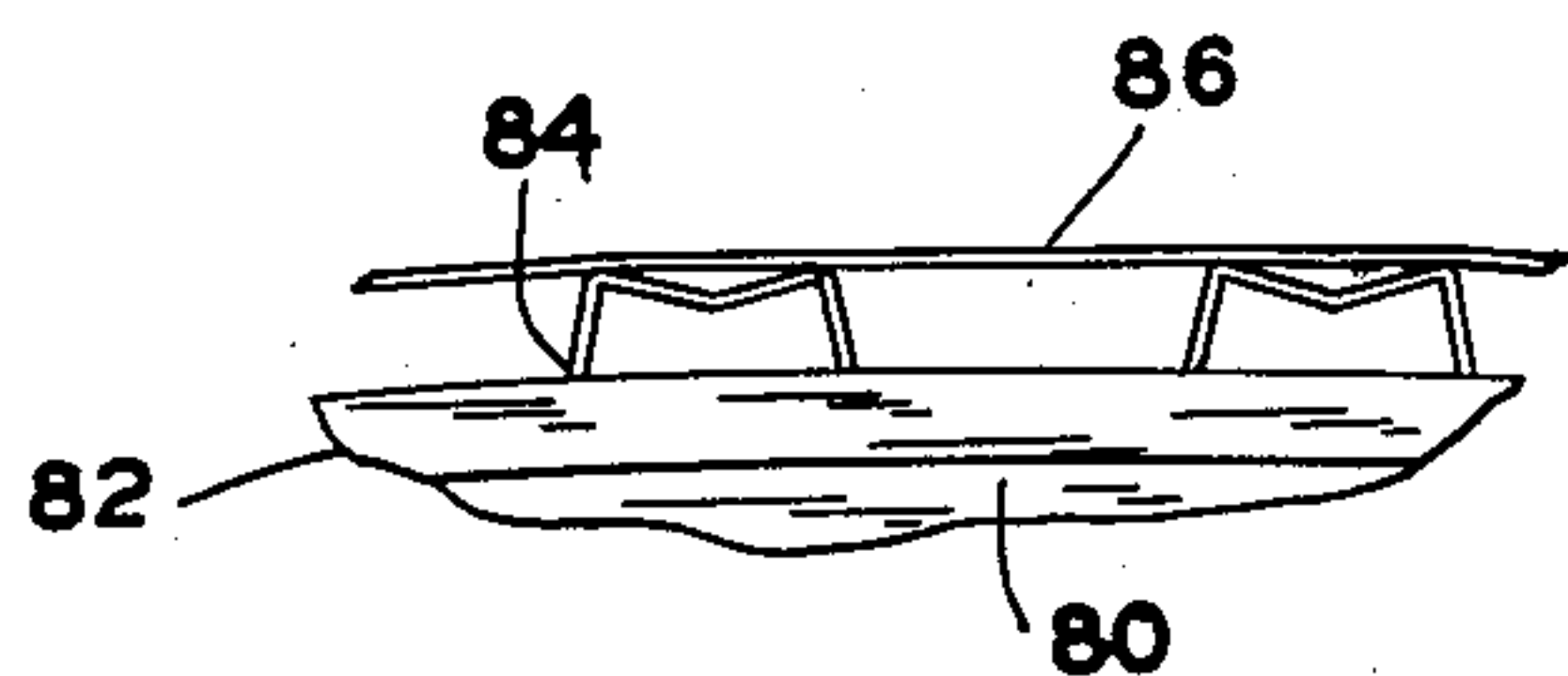


FIG.-4-

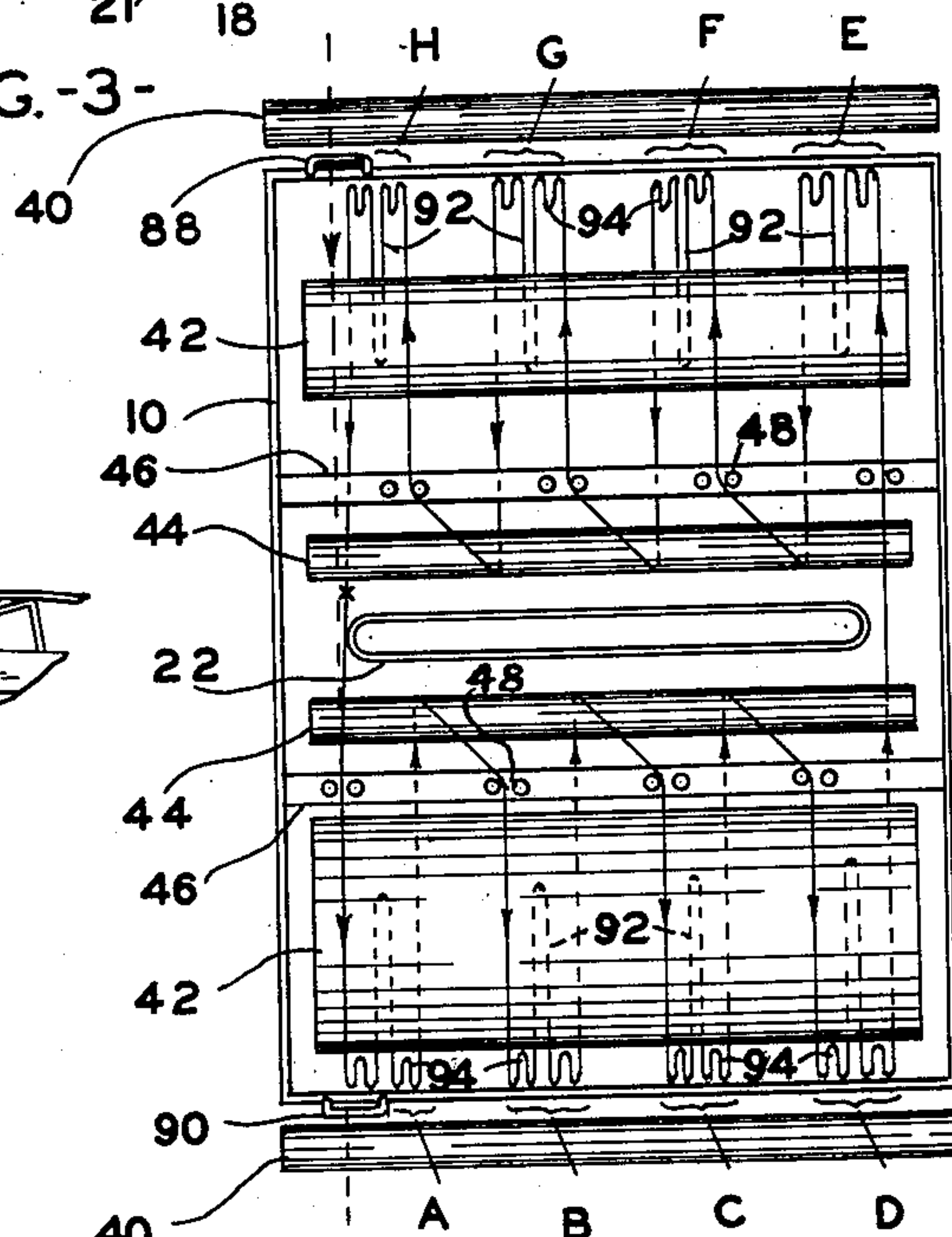


FIG. -5-

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APPARATUS FOR TREATING WEBS OF FABRIC

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5 Claims. (Cl. 68—176)

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This invention relates to improvements in apparatus for treating textiles and is particularly directed to apparatus for dyeing or otherwise treating webs of fabric or the like in a bath of liquid.

In apparatus of the character indicated, as heretofore employed, a continuous web of fabric is drawn over an alliptical or oval-shaped drum or reel and is stacked in pleats or folds of equal lengths in a tub containing a dye bath or other liquid disposed below the reel, the fabric being withdrawn from the lowermost layer or fold in the continuous operation of the apparatus. Because of the weight of the layers of wetted fabric superimposed on the lowermost layers, considerable drawing power or pull is necessary to withdraw the lowermost folds or layers, and, as a consequence of the friction incident to the pulling under the weight of the superimposed layers of fabric on the lowermost folds, the fabric becomes streaked or is otherwise impaired.

Accordingly, an object of the present invention resides in the provision of apparatus wherein a lesser pulling or drawing power is necessary than that required in prior apparatus to withdraw the fabric from the bottom of superimposed layers thereof whereby better treatment of the fabric is assured.

Another object resides in the provision of means for laying or folding the web of fabric to be dyed or otherwise treated in a manner to facilitate the drawing of the fabric through the bath of liquid in the tub.

A further object resides in the provision of apparatus of the character indicated wherein the fabric is folded or laid in alternate long and short folds in the tub, and wherein the first laid folds or layers are readily withdrawn regardless of the number of the folds or layers subsequently laid thereon.

A still further object resides in the provision of an improved drum or reel for apparatus of the foregoing type of apparatus to facilitate carrying out the foregoing objects.

Other and further objects of the present invention will be manifest from the following detailed description and the accompanying drawings, in which drawings:

Fig. 1 is a side elevational view of apparatus in accordance with the invention;

Fig. 2 is an end elevation thereof;

Fig. 3 is a view taken substantially on line 3—3 of Fig. 2;

Fig. 4 is an enlarged fragmentary elevational

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view of a portion of a drum or reel employed in the apparatus; and

Fig. 5 is a schematic plan view illustrating the course of the fabric through the machine.

Referring to the drawings in detail, dyeing apparatus is shown by way of illustration which comprises a dye tub 10 having a pair of tub sections 12 adapted to contain a liquid dye bath through which fabric to be dyed is continuously drawn as will be described hereinafter. The end walls 16 of the tub sections are curved as shown in Figs. 1 and 3 and the bottom walls 18 have an intermediate false bottom member 20 in the shape of a modified inverted U extending from the bottom wall of one section to the bottom wall of the other tub section, thereby providing a substantially arc-shaped or curved bottom for each of the tub sections, the advantage of which will become apparent from the description to follow. The bottom member 20 has perforations 21 in each of its side walls whereby to provide for drainage of the respective tub sections.

An open-top elongated overflow member 22 is mounted in upright position on the false bottom member 20 to divide the tub into equal sections 12 and extends transversely of the tub with its ends spaced from the side walls of the tub and extends vertically to a point adjacent the top of the tub to maintain the liquid dye bath at a predetermined level. A valve controlled drain pipe 24 may be provided intermediate, and in communication with, the tub sections for draining used liquid from both tub sections simultaneously.

The tub is supported between a pair of identical standards or side frame members 26 each having a pair of spaced leg portions 28 joined by a middle connecting portion 30 on which the ends of a cat-walk 32 extending across the tank may be mounted and on which upright hand rail supports 34 may be mounted at each side of the cat-walk. Each standard has a substantially upright portion 36 extending upwardly from its leg portions above the tub and has a substantially horizontal portion 38 extending from its upright portions 36 towards and beyond the end walls 16 of the tub. Each of the portions 36 and 38 of the standard at one side of the tub is opposite a portion 36 and 38 of the standard at the other side of the tub to serve as end supports for the shafts of drums, reels or rolls for moving fabric through the tub as about to be described.

Each pair of opposite horizontal portions 38 has a driven roll 40 mounted therebetween at its ends and each pair of opposite upright portions

36 has a drum or reel 42 mounted therebetween at its upper end, the drum being of special construction as will be described hereinafter in detail. Each pair of opposite upright portions has an idler roll 44 mounted therebetween at the lower portion thereof. The ends of a bar 46 are supported by the opposite upright portions 36 and positioned between the drum 42 and roll 44, which bar is provided with spaced apart posts 48 for guiding the fabric from the roll 44 to the drum 42.

The rolls 40 and the drums 42 are rotated simultaneously by a drive mechanism, herein shown more or less schematically since such mechanisms are generally known to those skilled in the art. Such a drive mechanism may comprise a motor 50, mounted on one of the standards, which drives a shaft 52 through sprockets 54 and 56 and a chain 58. The shaft 52 has a bevel gear 60 at each end which meshes respectively, with bevel gears 62 each mounted on a shaft 64 supported by the leg portions 28 of the standards 26. The shafts 64 effect rotation of the drums 42 by sprockets 66 and 68 on the shafts 64 and 70 of the drums 42, respectively, and a chain 71 one lead of which passes over an idler 72, and the sprockets 68 in turn effect rotation of the rolls 40 by sprockets 74 and a chain 78.

By reason of the disposition of the driving connections at each end of the shaft 52 for the drums 42, just described, the drum on the left hand side of the tub, as viewed in Figs. 1 and 3, will be driven in a counterclockwise direction, while the other drum on the right side of the tub will be driven in a clockwise direction.

The standards 26 are hollow and completely enclose and seal the respective sprockets and sprocket chains just described, whereby the sprockets and chains are completely protected from contact with the dye liquid or corrosive fumes given off by the liquid in the tub.

As previously mentioned, the drums 42 are of novel construction as will be seen from Figs. 1, 3 and 4 of the drawings. Since these drums are identical, a description of one only will suffice.

The drum 42 comprises a pair of spaced apart end plates 80 or the like which are mounted for rotation on the respective shafts 70 of the drum 42, and have a rim 82 on which are secured a plurality of peripherally spaced cross bars 84. The cross bars are M-shaped in cross section and the legs of the M are welded to the rims 82, as shown in Fig. 4. A cloth covering 86, such as canvas, cotton or the like, is mounted over the cross bars 84 for engaging the fabric to be handled by the drum.

As will be seen from the drawings, the rims 82 have a generally rectangular periphery which governs the cross-sectional shape of the drum. More specifically, the rims are in the form of a rectangle having unequal adjacent sides but equal opposite sides which are curved outwardly slightly to form a drum having arcuate sides, one pair of opposite sides being in the shape of an arc of circles of equal radii, and the other pair of opposite sides also being arc shaped and of equal radii but of different radii from the first pair. Preferably, the longer sides of the drum have a peripheral length at least about twice that of the shorter sides, whereby the drum is adapted to lay the fabric in the tub in alternate long and short folds, substantially as shown in Fig. 3.

Each of the drums is so disposed above its respective tub section that its shorter peripheral

wall is substantially in vertical alignment with the top of the end wall 16 when the drum is in the position of the left hand drum, as viewed in Fig. 3, that is, when the longer side of the drum is substantially horizontal whereby a short fold will be laid. When the shorter side of the drum is in horizontal position and the longer side is in vertical position, which is the position of the right hand drum, as viewed in Fig. 3, the longer side is substantially in parallel alignment with the end wall of its tub section, and is spaced from the end wall a distance at least equal to one-half of the maximum diameter of the drum whereby a long fold will be laid.

In operation, to load the tub with the fabric to be dyed or otherwise treated, the fabric is folded crosswise or bundled into "rope" formation to materially reduce its width and is fed or passed through an eye 88 at the upper edge of the side wall 16 of the tub. The fabric is then led manually under the roll 44, through guide posts 48, as indicated in dotted lines in Fig. 3, and is fed over the drum 42 which in the course of its rotation lays the fabric in a stack A of alternate long and short folds 92 and 94, respectively.

As the stack is built up, the lower folds are pushed or slide towards the center of the tub by superimposed layers or folds, and by reason of the substantially arc-shaped bottom, the first laid or leading folds are guided into substantially horizontal position, from which the folds are withdrawn, whereby to facilitate removal of the first laid folds.

When the stack A has been completed as shown in Fig. 3, the forward end of the fabric is led manually under the roll 44, through the next space provided by the posts 48 and again over the drum. The drum now operates to build up stack B (Fig. 5) while continuously building up stack A and removing the leading folds to build up stack B. When stack B is built up stack C is started manually and stacks A, B, C and D are built up simultaneously from successive portions of the fabric.

When the entire width of the tub has stacks laid therein, for example, assuming stack D is the last stack, the forward end of the fabric is led manually over the drum 42 at the left of the apparatus as viewed in Fig. 3, and stacks E, F, G and H are provided, with manual aid, by the drum 42 and the roll 44, guided by the posts or guides 48 in the same manner as described in connection with stacks A, B, C and D.

When the last stack, herein shown as stack H, has been completed, the forward end of the fabric is manually led towards the center of the tub and is sewed to the tail end of the fabric at x, whereupon the apparatus is adapted to continuously move the fabric through the tub without manual attendance.

After the fabric has been processed for the desired length of time and the forward end is moving from the stack H towards the center of the tub, the sewed connection x is severed and the forward end of the fabric is led manually over the roll 40, at the right hand end of the apparatus, as shown in dotted lines. The roll 40 effects removal of the fabric from the apparatus into a transfer receptacle or to rolls for delivering the fabric to other apparatus (not shown) for further processing, while the fabric in the apparatus continues its cycle therethrough until the stacks A to H, inclusive, are depleted one by one in the order named and the tail end of the fabric

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passes over the roll 40 at the right hand end of the apparatus, as viewed in Fig. 3.

From the foregoing description, it will be seen that the layers or folds deposited by the longer wall of the drum 42 will be of a length predetermined by the depth of that wall, and the layers or folds deposited by the shorter wall will be of a lesser length predetermined by the depth of the latter wall, the length of each fold or pleat will be substantially equal to one half of the depth of the wall by which it is deposited. As the drum is rotated in the manner previously described, the fabric, by reason of the form and the previously described disposition of the drum, will be deposited in folds or pleats of alternate lengths on the end wall of the tub as shown in Fig. 3, and as subsequent folds or pleats are deposited the leading folds or pleats are forced downwardly, but by reason of the alternate arrangement of the long and short folds or pleats the greater weight will be on the portion adjacent the curved wall of the tub so that as the subsequent folds or pleats are deposited by the drum the previously deposited folds or pleats tend to first assume a substantially vertical position, and then to assume a substantially horizontal position, whereby the first deposited folds or pleats can readily be withdrawn without regard to the number of subsequently deposited folds or pleats. The entire weight of the superimposed folds or pleats is not imposed on the first deposited folds or pleats as in previous apparatus of this character, at the instant of withdrawal of the fabric.

In this manner the present invention provides improved apparatus for dyeing or otherwise treating fabric in a bath of liquid in a simple, practical and economical method, whereby better processing of the fabric is assured and the difficulties heretofore encountered are overcome.

It is to be understood that while I have schematically illustrated and described eight stacks, A to H, inclusive, of the fabric being treated, the number of stacks will vary depending on the width of the tub and the associated drums and rolls.

While I have illustrated and described a preferred embodiment of my invention, it is to be understood that I do not wish to be limited to that specific structure and arrangement of parts, as obviously various modifications and changes may be made therein without departing from the spirit and scope of my invention.

What I claim is:

1. In apparatus for treating webs of fabric and the like; the combination of a tub for containing a bath of liquid and including a bottom wall, oppositely inclined and upwardly diverging end walls and upwardly converging wall sections extending from the central portion of said bottom wall to divide the tub into two sections; a drum rotatably mounted above each of said tub sections; and means for rotating said drums to continuously draw a web of fabric over said drums and through the liquid in the tub; each of said drums being substantially four-sided in cross-section and having adjacent sides of unequal lengths for stacking the fabric in superimposed folds of alternating relatively long and short lengths, each of said drums being positioned so that the paths of travel of the sides thereof of shorter length extend between the vertical projections of the top and bottom of the related inclined end wall so that the folds of fabric are deposited against said related end wall and the stacked folds are guided

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by the latter and by said bottom wall and the related wall section so that the end fold of the stack rides up said related wall section and is relieved of the weight of the remaining folds in the stack for easy withdrawal from the latter by the drum over which the fabric web next runs.

2. In apparatus for treating webs of fabric and the like; the combination of a pair of drums mounted for rotation about parallel and spaced apart axes; a tub for containing a bath of liquid and including a bottom wall, upwardly diverging end walls and upwardly converging wall sections extending from the central portion of said bottom wall to define a tub section underlying each of said drums; and means for rotating said drums to continuously draw a web of fabric over said drums and through the liquid in said tub; each of said drums being substantially four-sided in cross-section and having adjacent sides of unequal length for stacking the fabric in superimposed folds of alternating relatively long and short lengths; each of said drums being positioned and having a direction of rotation for depositing the long and short folds of fabric against the end wall of the related tub section so that the stacked folds are guided by said end wall and by said bottom wall and the related wall section into an upwardly concave arrangement with the end fold riding on said related wall section for easy withdrawal from the stack by the drum over which the fabric web next runs.

3. In apparatus for treating webs of fabric and the like; the combination as set forth in claim 2 wherein the axial meeting lines between said adjacent sides of unequal lengths are spaced radially from the axis of rotation of the related drum further than any other points on the periphery of the drum.

4. In apparatus for treating webs of fabric and the like; the combination as set forth in claim 3; wherein said adjacent sides of unequal lengths are curved and have different radii of curvature.

5. In apparatus for treating webs of fabric and the like; the combination of a tub for containing a bath of liquid and including oppositely inclined upwardly diverging end walls, a bottom wall and oppositely inclined upwardly converging wall sections extending from the central portion of said bottom wall to define two tub sections of upwardly concave configuration; drums rotatably mounted above said tub sections; and means for rotating said drums to draw a continuous web of fabric over said drums and through the liquid in said tub sections; each of said drums being substantially rectangular in cross-section with adjacent sides of unequal lengths for stacking the fabric in superimposed folds of alternating long and short lengths; each of said drums being positioned to deposit the stacked long and short folds against the inclined end wall of the related tub section so that the short folds provide a greater stack height at the side adjacent said end wall than at the side facing away therefrom whereby the stacked folds conform to the upwardly concave configuration of the related tub section to position the end fold of the stack on the inclined wall section thereof free of the weight of the remaining folds and disposed for easy withdrawal from the stack by the drum over which the fabric web next runs.

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