July 25, 1967 A. BISANG 3,332,260

APPARATUS FOR SQUEEZING OUT LIQUIDS FROM WEB-SHAPED TEXTILE MATERIALS

Filed June 4, 1965 3 Sheets-Sheet 1

Fig. 1

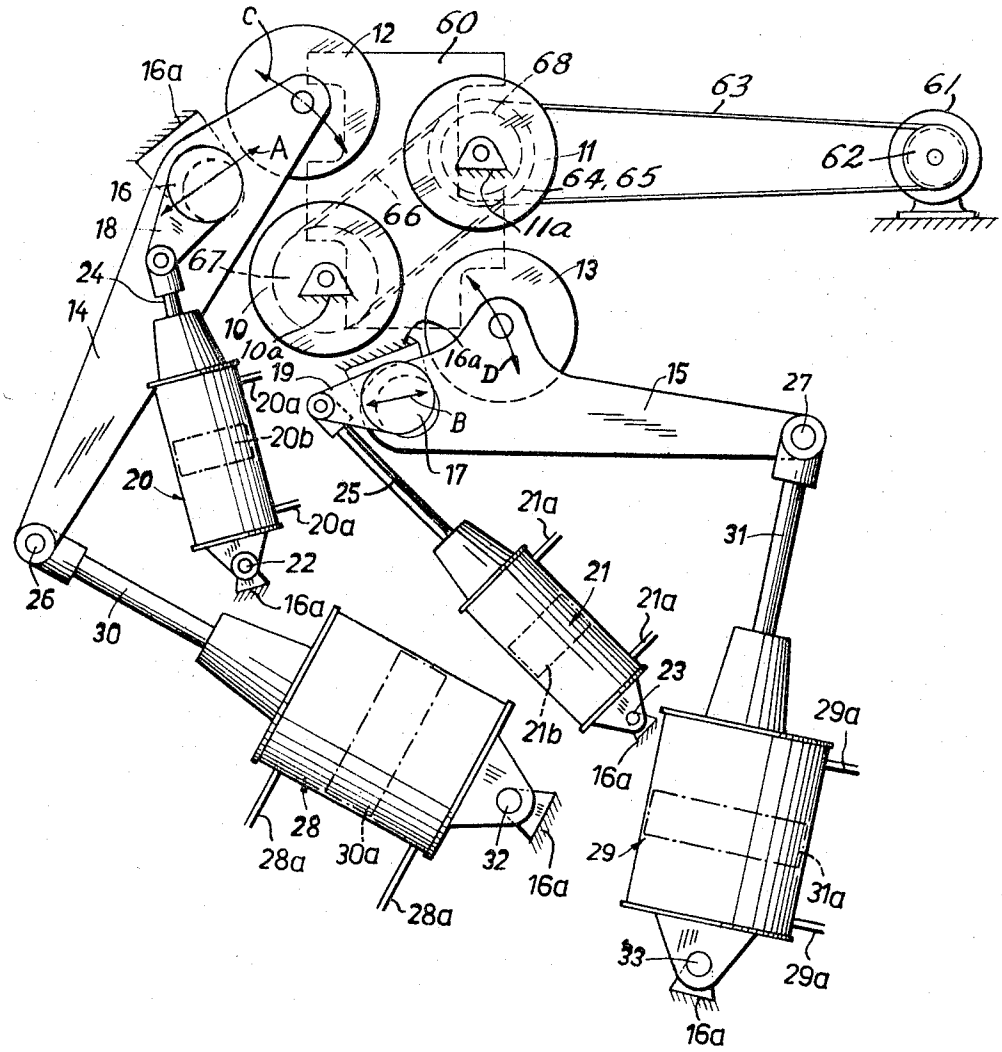

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Fig. 2

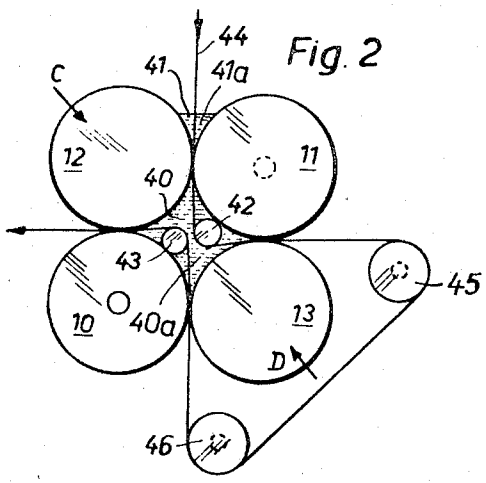


Fig. 3

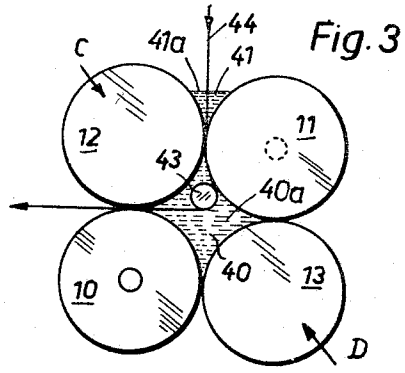


Fig. 4

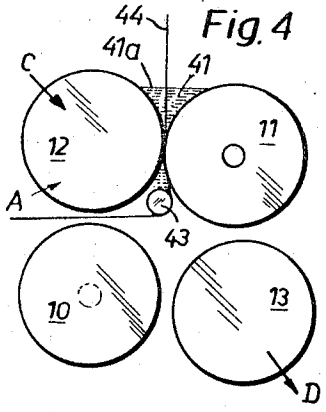


Fig. 5

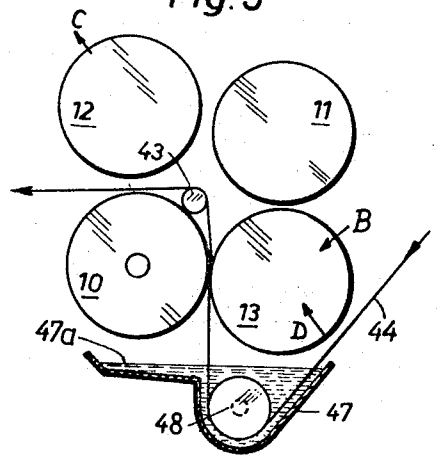


Fig. 6

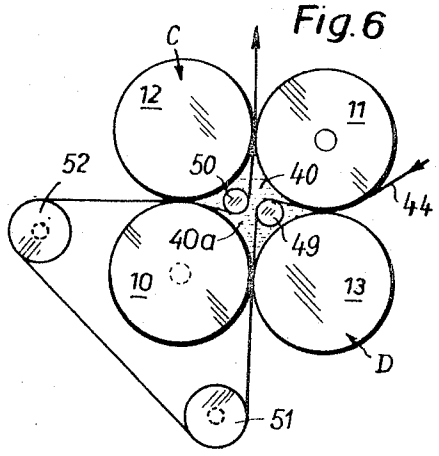
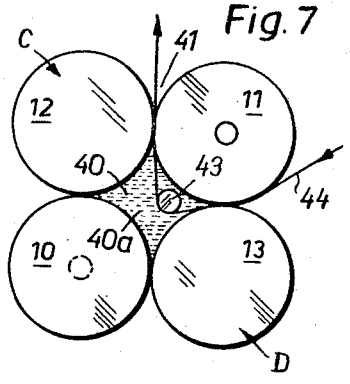


Fig. 7



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APPARATUS FOR SQUEEZING OUT LIQUIDS FROM WEB-SHAPED TEXTILE MATERIALS

Filed June 4, 1965 3 Sheets-Sheet 3

Fig. 8

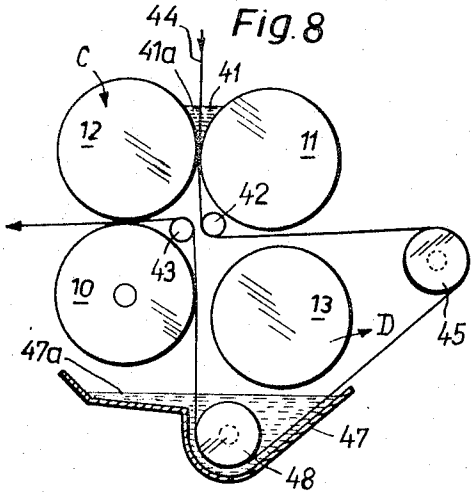


Fig. 9

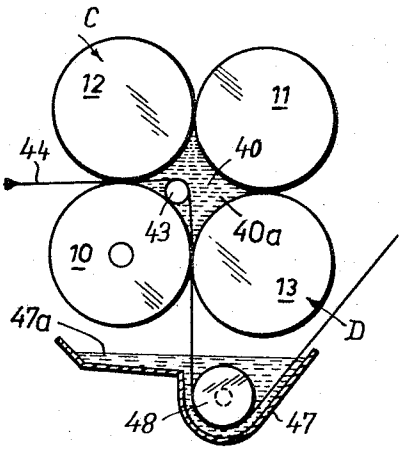


Fig. 10

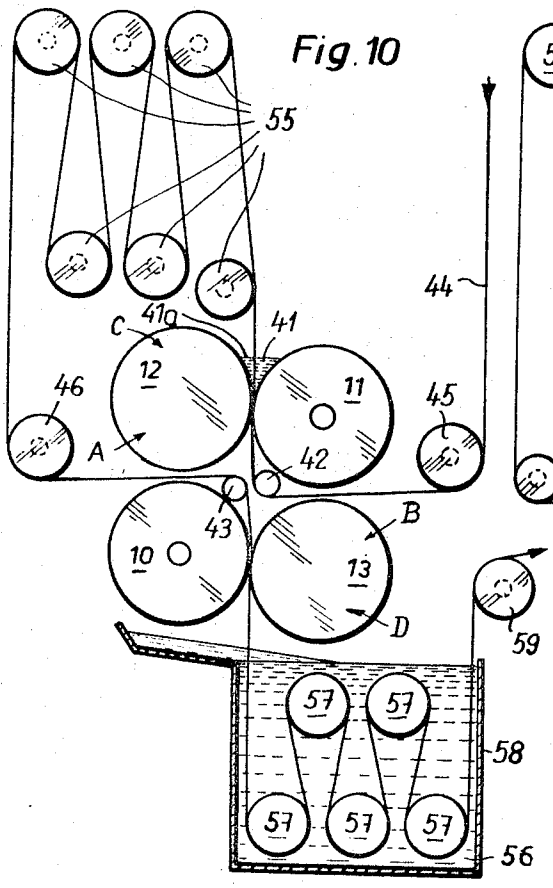
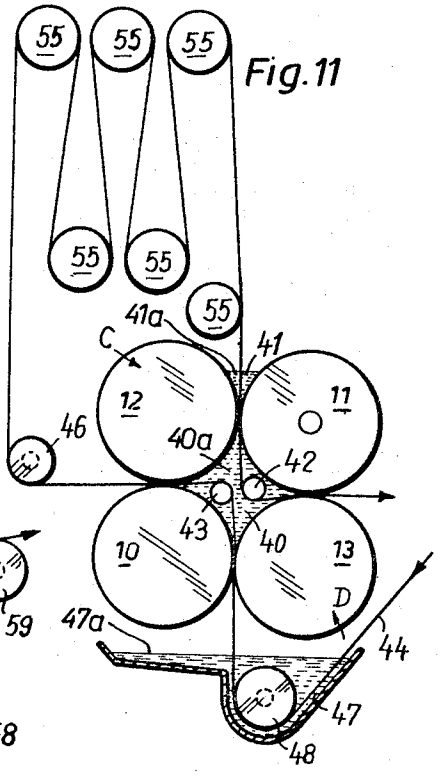


Fig. 11



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APPARATUS FOR SQUEEZING OUT LIQUIDS FROM WEB-SHAPED TEXTILE MATERIALS

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Claims priority, application Switzerland, June 16, 1964, 7,802/64
2 Claims. (Cl. 68—22)

ABSTRACT OF THE DISCLOSURE

By providing two stationary rollers which can be selectively driven, a variety of possibilities for the passage of a fabric web to be treated is secured and it is possible to pass such a web out of the roller assembly in vertical upward direction as well as in a horizontal direction which is advantageous with respect to certain new dyestuffs for textile materials which require the web to leave the dye bath vertically in order to obtain an absolutely uniform color on both sides of the fabric.

The present invention has reference to an improved apparatus for squeezing out liquids from web- or sheet-like textile materials incorporating four rollers having their axes substantially in parallelism, of which two drivable rollers are stationary and two rollers serving as pressure or squeezing rollers are displaceably arranged.

Such apparatuses typically embody two or more rollers, depending upon the operations to be carried out upon the textile material. The textile material is towed by at least one driven roller between the aforesaid two or more rollers. These known apparatuses comprise two roller stands or frames mounting the rollers. Supports can be arranged beneath the rollers which are configured in accordance with the arrangement of the rollers. Additionally, in the region of the supports and at other locations there are mounted deflecting rollers for the textile material.

Now, the present invention is directed to an improved apparatus for squeezing liquid from web-shaped textile materials and contemplates constructing the apparatus such that the roller arrangement can be accommodated to almost all operating conditions and is suitable for each type of dyeing and each finishing liquid, so that no compromise is necessary, on the one hand, between the roller arrangement most favorable for the dye and the fabric, and, on the other hand, the arrangement possible with the existing machine.

Generally speaking, the physical structure of inventive apparatus which enables this objective to be achieved is characterized by the feature that two rollers are vertically arranged above both of the other rollers.

More specifically, the inventive apparatus for squeezing out liquids from web-shaped textile materials or the like comprises four rollers arranged with their axes substantially in parallelism with one another, two of these rollers are drivable and fixedly mounted, and means are provided for mounting the other two of said rollers defining squeezing rollers so as to be displaceable. According to a very important aspect of the invention, a given two of the four rollers are disposed above both other rollers to provide two pairs of superimposed rollers. In one such pair of superimposed rollers the uppermost roller is stationarily mounted, whereas for the other pair of superimposed rollers the lowermost one is stationarily mounted. Such uppermost and lowermost rollers define the aforesaid two drivable and fixedly mounted rollers.

Accordingly, it is an important object of the present invention to provide an improved apparatus for squeezing out liquids from textile webs which is relatively simple in construction, highly reliable in operation, and enables accommodation to almost all operating conditions encountered in practise.

Other features, objects and advantages of the invention will become apparent by reference to the following detailed drawings in which:

FIGURE 1 schematically illustrates in side view a preferred embodiment of inventive apparatus for squeezing out liquid from web-shaped textile materials;

FIGURES 2 to 11 schematically depict different adaptations and possibilities of application of the basic inventive apparatus of FIGURE 1, with certain auxiliary structure shown in certain of these figures to enable performance of the described textile processing operations.

Considering now the drawings, and with attention initially directed to FIGURE 1, there is shown two stationary rollers **10** and **11** mounted in known manner to the schematically illustrated frame **10***a* and **11***a* respectively. Rollers **10** and **11** are operatively connected in suitable manner with drive motor means **61**. The arrangement is effected such that both rollers **10** and **11** can be driven dependently or independently of one another, so that either only one or only the other or both rollers **10** and **11** are driven. Drive arrangements suitable for this purpose are well known and, if necessary, can be also readily designed by one skilled in the art, so that further details can be readily omitted, particularly since such subject matter per se does not constitute part of the invention, nor are details thereof necessary for understanding the inventive concepts.

In the example illustrated, a drive pulley **62** of an electric motor **61** is connected by a belt **63** to a pulley **64** coaxial with the shaft of the roller **11**. A pulley **65** of the same diameter as pulley **64** and also coaxial with the shaft of roller **11** is connected by a belt **66** to a pulley **67** on the shaft of roller **10**. A clutch **68** on the shaft of roller **11** can be caused to selectively engage the pulley **64** with the shaft of the roller **11**, or with the pulley **65**, or simultaneously with both pulley **65** and the shaft of roller **11**.

Conventional roller sealing plates **60** are provided laterally of the four rollers at both ends thereof for liquid tight closure of the treatment space in between the rollers, as will be described later.

Additionally, two pivotable rollers **12** and **13** are provided which are mounted to double-arm levers **14** and **15** respectively. It will be understood that each roller **12, 13** is mounted at each end with a respective one of such double-arm mounting levers **14** and **15**, and for convenience in illustration in the drawing only one such lever associated with each roller **12, 13** is visible, and the description to follow will only concern itself with a given one of the levers for each roller. Double-arm lever **14** is mounted by means of an eccentric shaft **16** to schematically illustrated frame **16***a* whereas lever **15** is mounted to the same frame **16***a* by means of an eccentric shaft **17**. In order to turn both of the eccentric shafts **16** and **17** each are connected by a respective strap **18** and **19** or otherwise with a respective hydraulic or pneumatically operated work cylinder **20** and **21**. The work cylinders **20** and **21** are articulated via a hinge joint **22** and **23** respectively to the machine frame **16***a*, whereas the respective pistons **20***b* and **21***b* shown in phantom lines and located in these work cylinders **20** and **21** are hingedly connected via a respective piston rod **24** and **25** to the aforesaid straps **18** and **19**.

It will be understood that both work cylinders **20, 21** are double-acting so that the straps **18** and **19** respectively can be rocked both in clockwise and counterclockwise direction. The means for the inflow and out-

flow of an appropriate fluid medium to the work cylinders **20**, **21** is schematically depicted in the drawings by conduits **20***a* and **21***a* respectively. Rocking of the eccentric shafts **16** and **17** causes corresponding displacement of the double-arm mounting levers **14** and **15** in the direction of the double-head arrows A and B respectively, and laterally of the stationary rollers **10** and **11** respectively. It will also be recognized that the piston rods **30** and **31** of the pistons **30***a* and **31***a* of two further work cylinders **28** and **29** are hingedly connected with the hinge joints **26** and **27** respectively of the double-arm levers **14** and **15** respectively. These work cylinders **28** and **29** in turn are hingedly connected with the machine frame **16***a* via hinge joints **32** and **33** respectively. Work cylinders **28** and **29** are likewise double-acting so that the mounting levers **14** and **15** can be rocked in both clockwise and counterclockwise direction about the eccentric shafts **16** and **17** respectively, whereby the rollers **12** and **13** mounted upon the levers **14** and **15** respectively are pivotable in the direction of the arrows C and D respectively. The means for the inflow and outflow of fluid medium into and out of the work cylinders **28** and **29** is schematically depicted by conduit means **28***a* and **29***a* respectively. Pivotable movement of the rollers **12** and **13** in the direction of the arrows C and D respectively, can be carried out with displacement of the levers **14** and **15** in the direction of the arrows A and B respectively.

Briefly summarising the described arrangement of the rollers **10**, **11**, **12**, **13** it will be appreciated that the axes of these rollers are in substantial parallelism with one another. Two of the rollers, namely rollers **10** and **11** are drivable and fixedly mounted, whereas the other two rollers **12** and **13** provide squeezing rollers mounted so as to be displaceable. Moreover, these four rollers **10**, **11**, **12**, and **13** are arranged such that a given two rollers **12** and **11** are arranged above both other rollers **10** and **13** respectively, to provide two pairs of superimposed rollers **12**, **10** and **11**, **13**. For the pair of rollers **10**, **12** the lowermost roller **10** is stationary and for the other pair of rollers **11**, **13** the uppermost roller **11** is the one that is stationarily mounted. Finally, it will be observed that a respective one of each of the movable rollers **12**, **13** is mounted to a respective side of, and in overlying relationship with respect to, the stationarily mounted rollers **10**, **11**.

The mode of operation of the described apparatus will be more fully explained in conjunction with FIGURES 2 to 11 depicting different possibilities of use of the inventive apparatus. It will be understood that the basic physical structure of the embodiment of FIGURE 1 appears in each of the arrangements shown in FIGURES 2 to 11, yet whenever certain auxiliary physical structure is required in a given one of these FIGURES 2 to 11 for carrying out a desired treatment operation upon the textile material then such additional physical structure will be considered during the course of describing the corresponding figure.

Considering the arrangement of FIGURE 2, it will be recognized that both of the pivotable rollers **12** and **13** are uniformly pressed against both stationary rollers **10** and **11** in the direction of the arrows C and D respectively by means of the associated drive means i.e. work cylinders **28** and **29** and pistons **30***a* and **31***a* respectively. Only the lower loller **10** of the two stationary rollers **10** and **11** is driven. A suitable treatment liquid **40***a* is located in the hollow compartment **40** formed by the four rollers **10**, **11**, **12** and **13**, also in the trough **41** formed by both rollers **11** and **12**, as indicated at **41***a*. Liquids **40***a* and **41***a* can be the same or different. In order that these liquids cannot flow away at both ends of these rollers there are provided thereat in known manner suitable closure plates (not shown). Furthermore, two deflecting rollers **42** and **43** are provided within the hollow compartment **40** to enable contact of the treatment liquid **40***a* contained in the hollow compartment **40** with both faces of a textile web **44**. Textile web **44** is wound off a non-illustrated supply roller and guided vertically from above by suitable non-illustrated deflecting rollers between both of the upper rollers **11** and **12**. In so doing, the textile web **44** initially is immersed in the treatment liquid **41***a* located in the trough **41**. Such treatment liquid is again immediately squeezed out between both rollers **11** and **12**. The textile web **44** pretreated in this manner then arrives at the second treatment liquid **40***a* located in the hollow compartment **40**. The textile web **44** guided over the deflecting roller **42** then arrives between both rollers **11** and **13** between which the excess portion of the second treatment liquid **40***a* is squeezed out. Now textile web **44** is guided over further deflecting rollers **45**, **46** or other mechanism, for instance an illustrated dryer e.g. of the type later to be considered and shown in FIGURES 10 and 11, vertically from below between both lower rollers **10** and **13** arriving a second time in contact with the treatment liquid **40***a* located in the hollow compartment **40**. The textile web **44** is guided via the second deflecting roller **43** located in the hollow compartment **40** out of the latter and between both rollers **10** and **12**, again the excess portion of the treatment liquid is squeezed out. Textile web **44** treated in this manner can now be dried or otherwise further treated and wound onto a second non-illustrated supply roller.

In FIGURE 3 the rollers **12** and **13**, similar as with the previously described manner of use of the apparatus of FIGURE 2, are uniformly pressed against both stationary rollers **10** and **11**, whereby again only the work cylinders **28** and **29** and pistons **30***a* and **31***a* respectively rock the rollers **12** and **13** respectively, in the direction of the arrows C and D respectively. Once again, there is thus formed the hollow compartment **40** and the trough **41** in which either the same or two different treatment liquids **40***a* and **41***a* can be introduced. In this instance, only a single deflecting roller **43** is provided within the hollow compartment **40**, again having the function of enabling the treatment liquid **40***a* to contact both faces of the textile web **44**. The textile web **44** guided vertically from above between both rollers **11** and **12** is trained about the deflecting roller **43** and delivered between both rollers **10** and **12**. Analogous to the first described situation of FIGURE 2 the textile web **44** is initially immersed in the treatment liquid **41***a* located in the trough **41** and then freed of the surplus of this first treatment liquid between the rollers **11** and **12**, whereafter the textile web **44** immediately arrives at the second treatment liquid **40***a* and such excess second liquid is squeezed out between the rollers **10** and **12**. Further treatment and winding-up of the textile web can then take place in a similar manner as the first condition of use described in FIGURE 2.

FIGURE 4 depicts the situation where only the upper pivotable roller **12** is pressed against the upper stationary roller **11** while the other pivotable roller **13** does not contact either of both stationary rollers **10** and **11**. The piston **30***a* of work cylinder **28** (FIGURE 1) displaces the roller **12** in the direction of arrow C (FIGURE 4), whereas the piston **20***b* of the work cylinder **20** via eccentric shaft **16** at the same time displaces the roller **12** in the direction of arrow A. Due to displacement of roller **12** in two different directions A, C there results a horizontal displacement so that the roller **12** is only pressed against the stationary roller **11**, while the roller **13** is rocked in the direction of arrow D away from both stationary rollers **10** and **11**, of which only the upper roller **11** is driven. As clearly evidenced by referring to FIGURE 4, in this instance only trough **41** is formed. Trough **41** is filled with a suitable treatment liquid **41***a*. The textile web **44** guided vertically from above between both of the rollers **11** and **12** immerses in the treatment liquid **41***a* located in the trough **41**, thereafter the excess portion of this treatment liquid is squeezed out between the

rollers **11** and **12**. Such textile web **44** is then delivered via the deflecting roller **43** to any desired further treatment stations and the non-illustrated wind-up roller. As obvious from FIGURE 4 the roller **13** could serve as deflecting roller, however the textile web **44** can also be guided such that it is not contacted by such roller **13**.

In accordance with the arrangement of FIGURE 5 there is provided a special container or reservoir **47** for a treatment liquid **47***a* and in which there is arranged a deflecting roller **48**. The textile web **44** arrives directly from the supply roller into contact with the treatment liquid **47***a* contained in container **47**, is guided about the deflecting roller **48** vertically from beneath and passed between both rollers **10** and **13** between which the surplus portion of such treatment liquid is squeezed out. The textile web **44** is then delivered via the deflecting roller **43** to further possible treatment stations and the non-illustrated wind-up roller. In this case the work piston **31***a* of the work cylinder **29** displaces the roller **13** in the direction of arrow D while the work piston **21***b* of work cylinder **21** displaces the roller **13** in the direction of arrow *b* through the agency of the eccentric shaft **17**. Due to displacement of roller **13** in two directions B and D there results a horizontal displacement, so that the roller **13** is only pressed against the lower stationary roller **10** and not against the upper stationary roller **11**, whereas the roller **12** is rocked in the direction of arrow C away from both stationary rollers **10** and **11**.

In FIGURE 6, similar as in FIGURE 2, both pivotable rollers **12** and **13** are pressed against both stationary rollers **10** and **11** in the direction of arrows C and D respectively. The arrangement of FIGURE 6 differs from that of FIGURE 2 only insofar as the direction of movement of the textile web **44** is concerned. Here, textile web **44** is payed-off a non-illustrated supply roller and delivered horizontally from the side between both rollers **11** and **13** through the agency of likewise non-illustrated deflecting rollers arranged in suitable manner. As a result, textile web **44** is immersed in the treatment liquid **40***a* available between the four rollers **10**, **11**, **12** and **13**. The textile web **44** guided over a deflecting roller **49** then arrives between the rollers **10** and **13** where the excess portion of the treatment liquid **40***a* is squeezed off. Then, textile web **44** is guided over further deflecting rollers **51** and **52**, or other mechanism, a non-illustrated dryer for instance, horizontally from the left between both rollers **10** and **12** and arrives a second time in contact with the treatment liquid **40***a* located in the hollow compartment **40**. Next, textile web **44** is guided via the second deflecting roller **50** located in this hollow compartment **40** between both rollers **11** and **12**, where again the excess portion of the treatment liquid **40***a* is squeezed out. The thus treated textile web **44** which is discharged towards the top can now be dried or otherwise still further processed and wound upon a second nonillustrated supply roll.

According to FIGURE 7, and similar to the arrangement of FIGURES 2, 3 and 6, the rollers **12** and **13** are uniformly pressed against both stationary rollers **10** and **11**, as generally indicated by the arrows C and D respectively. Once again, hollow compartment **40** and trough **41** are formed, yet in this instance only the hollow compartment **40** is filled with treatment liquid **40***a*. Similar to the arrangement of FIGURE 3 only a single deflecting roller **43** is provided in the hollow compartment **40** which serves to render possible impingement of treatment liquid **40***a* with both faces or sides of the textile web **44**. The textile web **44** shown guided from the right side between both rollers **11** and **13** is trained about the deflecting roller **43** and delivered between both rollers **11** and **12**. Thus, in contrast with the embodiment of FIGURE 3, here the textile web **44** is squeezed between rollers **11** and **13** before it arrives at the treatment liquid **40***a* and any excess liquid is squeezed out between the rollers **11** and **12**. Further treatment and winding-up of the textile web then takes place analogous to the other previously considered examples.

In contrast with the arrangement of FIGURE 4, FIGURE 8 has the upper pivotable roller **12** pressed against both stationary rollers **10** and **11**, whereas the other pivotable roller **13** does not contact either of both rollers **10** and **11**. Displacement of both pivotable rollers **12** and **13** into the position depicted in FIGURE 8 is indicated by the arrows C and D respectively. By further referring to FIGURE 8 it will be seen that there is thus only formed the trough **41** filled with treatment liquid **41***a*. The textile web **44** guided vertically from above between both rollers **11** and **12** immerses in the treatment liquid **41***a* located in the trough **41** and subsequently the excess of this liquid is squeezed out between the rollers **11** and **12**. The textile web **44** is then delivered to a special container or reservoir **47** via the deflecting rollers **42** and **45**. In the reservoir **47** there is arranged the deflecting roller **48** which immerses the textile web **44** in a second treatment liquid **47***a* stored in reservoir **47**. After treatment of the textile web **44** with the second liquid **47***a* it arrives via the deflecting roller **43** between the rollers **10** and **12**, between which the excess component of the second treatment liquid **47***a* is squeezed out. The textile web **44** then arrives at further possible treatment stations, or is delivered to the non-illustrated wind-up roller.

According to FIGURE 9 both of the pivotable rollers **12** and **13** are pressed in the direction of the arrows C and D respectively, against the stationary rollers **10** and **11** respectively, so that again a hollow compartment **40** appears in which there is housed a treatment liquid **40***a*. Before the textile web **44** arrives in contact with the treatment liquid **40***a* in hollow compartment **40** it is freed of any excess portion of treatment liquid between both rollers **10** and **12**. The textile web **44** leaving between the rollers **10** and **13** arrives vertically from above about a deflecting roller **48** and comes into contact with a second treatment liquid **47***a* provided in a separate container **47**, from there is delivered to possible further treatment stations, for instance, a drying installation, and then to a non-illustrated wind-up roller.

In FIGURE 10 the one pivotable roller **12** is pressed, in the manner previously considered, against the stationary roller **11** as indicated by the arrows A and C, whereas the other pivotable roller **13** is pressed against the stationary roller **10** as indicated by the arrows B and D. The textile web **44** wound-off of a non-illustrated supply roll arrives over the deflecting rollers **45** and **42** from beneath between the rollers **11** and **12** and is squeezed by these rollers before it arrives in contact with the treatment liquid **41***a* located in the trough **41** formed by rollers **11**, **12**. After leaving this treatment liquid **41***a* the textile web **44** is dried. The drying installation is here schematically indicated by the rollers **55** over which the textile web **44** is guided in a substantially zig-zag shaped path. After drying textile web **44** is trained about the deflecting rollers **46** and **43**, arriving between the rollers **10** and **13** between which it is squeezed. Thereafter, this textile web **44** is immersed in a second treatment liquid **56** located in a container **58** in which, for instance, five deflecting rollers **57** are arranged in order to immerse the textile web **44** in the treatment liquid **56** over a large path. After leaving this treatment liquid **56** the textile web **44** is introduced to further possible treatment stations, then wound-up upon a suitable supply roller.

As can be clearly recognized by referring to FIGURE 11 the textile web **44** can initially be introduced into a treatment liquid **47***a* located in a separate container or reservoir **47** and, in so doing, textile web **44** travels over the deflecting roller **48**. Thereafter, the excess portion of this treatment liquid **47***a* is squeezed out between rollers **10** and **13**, whereupon textile web **44** arrives at a second treatment liquid **40***a* located in the hollow compartment **40** formed by the rollers **10**, **11**, **12** and **13**. The excess portion of this second treatment liquid **40***a* is squeezed

out between the rollers **10** and **12**, the textile web **44** then is delivered to a drying installation depicted in FIGURE 11 by the five deflecting rollers **55**. After drying the textile web **44** comes into contact with a third treatment liquid **41***a* located in the trough **41** formed by both rollers **11** and **12**. The excess portion of this third treatment liquid **41***a* is squeezed out by means of rollers **11** and **12**. Thereafter, the textile web **44** once again arrives in contact with the second treatment liquid **40***a* located in the hollow compartment **40**. Then, the excess portion of such second treatment liquid **40***a* is squeezed out between the rollers **11** and **13**, the textile web **44** then arrives at further possible treatment stations, and is finally wound onto a supply roller.

While there is shown and described present preferred embodiments of the invention it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practised within the scope of the following claims:

What is claimed is:

1. Apparatus for squeezing out liquids from web-shaped textile materials, comprising four parallel rotatable pressure rollers enclosing a treatment chamber, stationary mountings for two of said rollers, two pivoting levers each carrying one of the other two rollers, whereby said other two rollers are movable towards and away from said stationarily mounted rollers, said four rollers being mounted in pairs of two superposed rollers, one of said two stationary rollers being the lower one of one pair of rollers and the other stationary roller being the upper one of the other pair of rollers, driving means coupled with said stationary rollers for selectively driving one or the other or both of said rollers, eccentric means pivotally carrying said levers, and separate actuating means operatively connected with each lever and each eccentric means, whereby said movable rollers are displaceable independently of each other toward and away from said stationary rollers.

2. Apparatus as claimed in claim **1**, wherein said actuating means for each lever include a first actuating means operatively connected to one lever arm for pivoting said lever about said eccentric means, and a second actuating means for turning said eccentric means, whereby each of said movable rollers can be selectively displaced for cooperation with one or the other or both of said stationary rollers.

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IRVING BUNEVICH, *Primary Examiner.*