Nov. 2, 1965 SYUNICHIRO FUKUDA 3,214,945

APPARATUS FOR INTERMITTENTLY LEADING A CLOTH INTO OR OUT OF A PRESSURE-TREATING CHAMBER

Filed April 22, 1964

5 Sheets-Sheet 1

Fig. 1

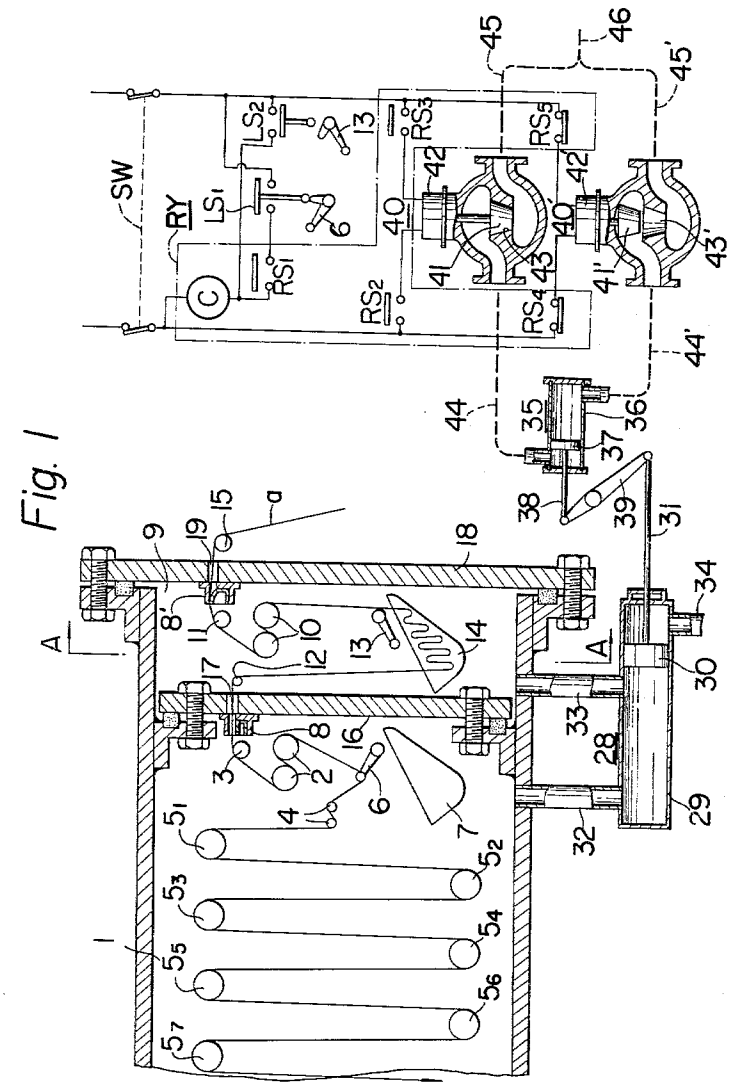

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Fig. 2

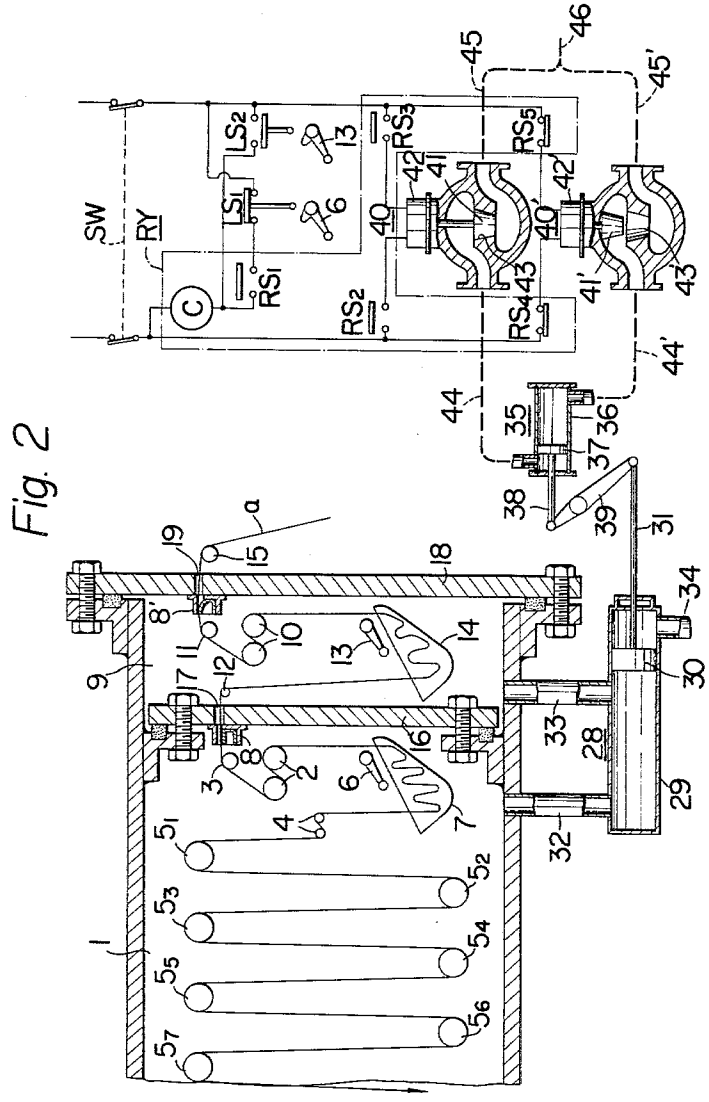

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Fig. 3

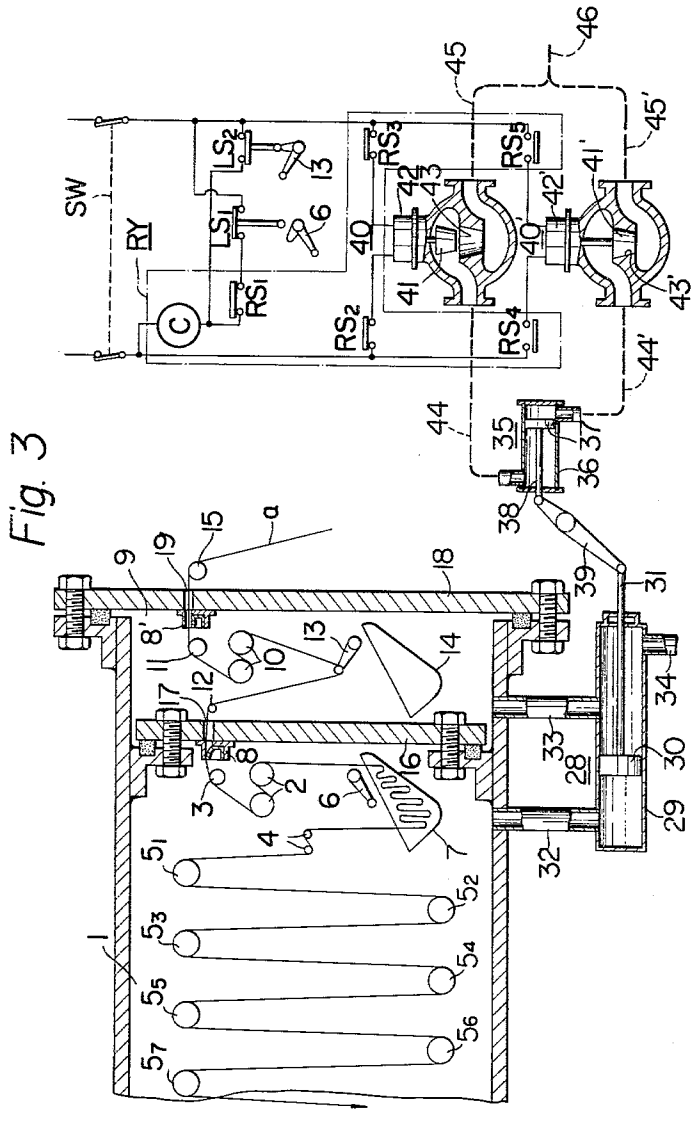

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Fig. 4

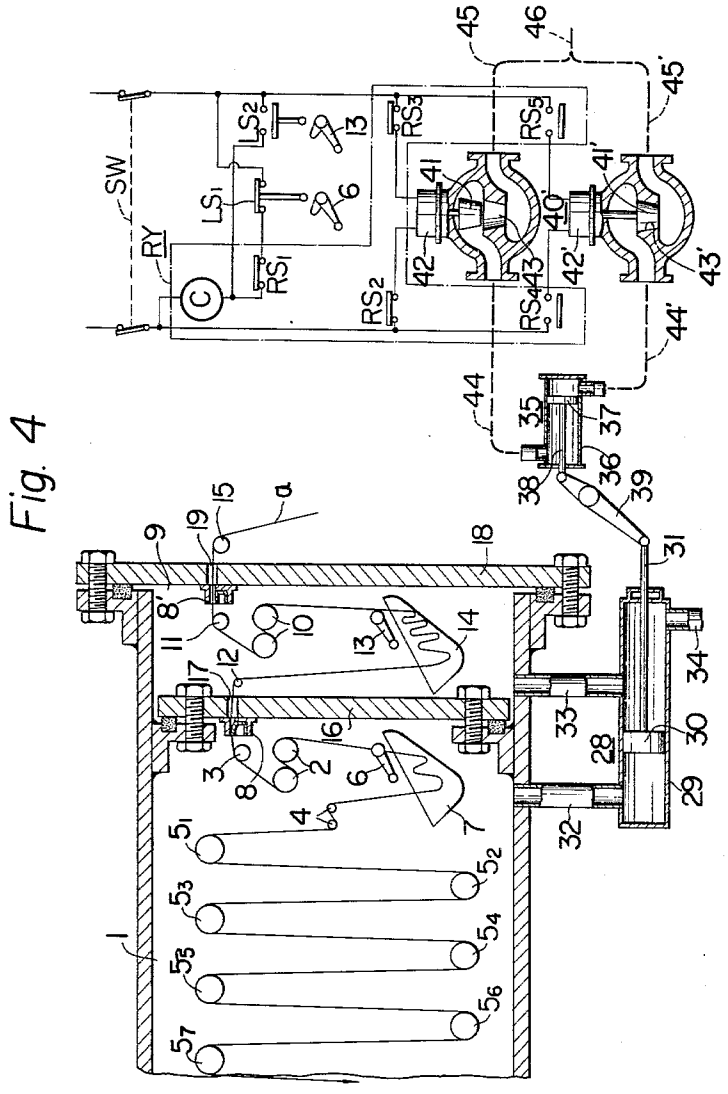


Fig. 5

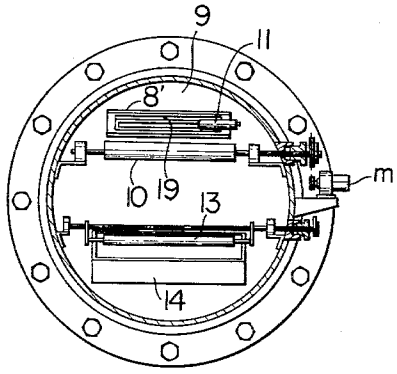


Fig. 6

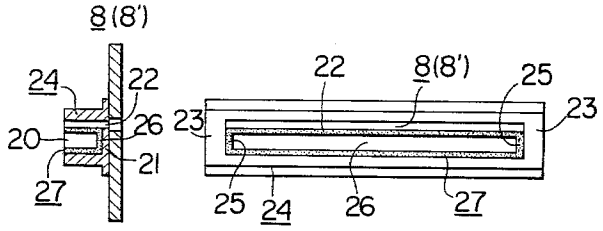
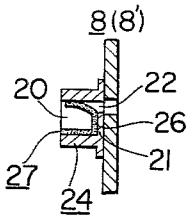


Fig. 7



United States Patent Office 3,214,945
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3,214,945

APPARATUS FOR INTERMITTENTLY LEADING A CLOTH INTO OR OUT OF A PRESSURE-TREATING CHAMBER

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Claims priority, application Japan, Nov. 7, 1963, 38/60,830
1 Claim. (Cl. 68—5)

This invention relates to improvements in an apparatus for leading a cloth into or out of a pressure-treating chamber without impairing the sealing effect for the pressure in applying such treatment as, for example, dyeing or refinement to the cloth under a high pressure.

An objection of the present invention is to provide an apparatus for leading a cloth into or out of a pressure-treating chamber without impairing the cloth and sealing packings with friction and while effectively keeping the treating chamber air-tight.

FIGURE 1 is a vertically sectioned view of an embodiment of the apparatus of the present invention.

FIGURES 2, 3 and 4 are views for explaining the operation.

FIGURE 5 is a sectioned view on line A—A in FIGURE 1.

FIGURE 6 shows an elevation and sectioned view of a sealing packing for the apparatus of the present invention.

FIGURE 7 is a view for explaining the operation.

An embodiment of the present invention shall be explained in the following with reference to the drawings.

1 is a pressure-treating chamber provided with feed rolls 2, guide rolls 3, 4, 5_1, 5_2, 5_3, 5_4, 5_5, 5_6, 5_7, etc., a detecting lever 6, a cloth reservoir 7 and a sealing packing 8. 9 is an operating chamber provided with feed rolls 10, guide rolls 11 and 12, a detecting lever 13, a cloth reservoir 14 and a sealing packing 8'. 15 is a guide roll provided outside. A partition wall 16 between the pressure-treating chamber 1 and the operating chamber 9 is provided with a cloth inlet port 17 opposite the above mentioned sealing packing 8. Further, the side wall 18 of the operating chamber 9 is provided with a cloth inlet port 19 opposite the above mentioned sealing packing 8'. As evident from FIGURE 6, each of said sealing packings 8 and 8' is made by inserting a packing 27 made of an elastic rubber of a channel section closed on both sides 25 and a back surface 26 into a case 24 opened on the front surface 20, provided with a narrow long cloth inlet port 22 horizontally on the back surface 21 and closed on both sides 23. 28 is a switching device comprising a cylinder 29, a piston 30, a piston rod 31, a connecting pipe 32 connecting the cylinder 29 and pressure-treating chamber 1 with each other, a connecting pipe 33 connecting the cylinder 29 and the operating chamber 9 with each other and an atmosphere connecting pipe 34. 35 is an oil pressure device comprising a cylinder 36, a piston 37 and a piston rod 38. The piston rods 38 and 31 are connected with each through a lever 39. 40 and 40' are oil pressure switching electromagnetic valves comprising valves 41 and 41', electromagnets 42 and 42' for operating said valves and valve ports 43 and 43', respectively. 44, 44', 45, 45' and 46 are oil leading pipes. The oil leading pipe 44 connects the left chamber of the cylinder 36 and the left port of the oil pressure switching electromagnetic valve 40 with each other. The oil leading pipe 44' connects the right chamber of the cylinder 36 and the left port of the oil pressure switching electromagnetic valve 40' with each other. The oil leading pipes 45 and 45' connect the respective right ports of the oil pressure switching electromagnetic valves 40 and 40' with each other. The oil leading pipe 46 connects to the oil leading pipes 45 and 45'. RY is a relay comprising an operating coil C and contacts RS_1, RS_2, RS_3, RS_4 and RS_5. LS_1 is a limit switch operated by the detecting lever 6. LS_2 is a limit switch operated by the detecting lever 13. SW is an electric source switch. *a* is a cloth to be treated.

The apparatus illustrated in these drawings operates as follows. That is to say, FIGURE 1 shows a state in which the cloth *a* stays as folded in the entire cloth reservoir 14 in the operating chamber 9 and the cloth reservoir 7 in the pressure treating chamber 1 has just been emptied of the cloth. In such state as is shown in FIGURE 1, the pressure-treating chamber 1 and the operating chamber 9 will communicate with each other through the connecting pipe 32, cylinder 29 and connecting pipe 33 and therefore the pressure in the pressure-treating chamber 1 and the pressure in the operating chamber 9 will be identical with each other.

Therefore, as evident from FIGURE 6, the sealing packing 8 will open the cloth inlet port 22 and the cloth in the cloth reservoir 14 will be able to move into the pressure-treating chamber 1 through the cloth inlet ports 17 and 22. Further, at this time, in the sealing packing 8' in the operating chamber 9, as evident from FIGURE 7, the rubber packing 27 will be pushed by the pressure in the operating chamber 9 so as to close the cloth inlet port 22, to keep the operating chamber air-tight and to prevent the cloth *a* from being led into the operating chamber 9. Therefore, in such state as is shown in FIGURE 1, if the feed rolls 2 are rotated by a motor *m* and the same time the rotation of the other feed rolls 10 is kept stopped, the cloth *a* in the cloth reservoir 14 will be fed into the pressure-treating chamber 1 from the operating chamber 9 through the guide roll 12, cloth inlet ports 17 and 22, guide roll 3 and feed rolls 2, will gradually come to stay as folded in the cloth reservoir 7 and will at the same time gradually decrease in the cloth reservoir 14 until it is in such state as is shown in FIGURE 3 through the state shown in FIGURE 2. Thus, in the state shown in FIGURE 3, the detecting lever 13 in the operating chamber 9 will be rotated clockwise by the tension of the cloth *a*, the limit switch LS_2 will be closed and the coil C of the relay RY will be operated to thereby close the contacts RS_1, RS_2, and RS_3 and open the contacts RS_4 and RS_5. Then the electromagnet 42 of the electromagnetic switching valve 40 will operate to open the valve port 43, the pressure oil will be led into the left chamber of the cylinder 36 of the pressure oil device 35 through the oil leading pipe 44, the piston 37 and piston rod 38 will be pushed rightward and the piston 30 of the switching device 28 will be pushed leftward through the lever 39 and piston rod 31. Therefore, the operating chamber 9 will be connected to the atmosphere through the connecting pipe 33, the right chamber of the cylinder 29 and the atmosphere connecting pipe 34. Thus the pressure in said operating chamber 9 will become the atmospheric pressure, the sealing packing 8' will be opened and at the same time the sealing packing 8 will be closed by the pressure in the pressure-treating chamber 1. Then the feed rolls 10 will be rotated by the motor *m* and the cloth *a* outside the operating chamber 9 will be led into the operating chamber 9 through the inlet ports 19 and 22 through the guide rolls 15 and 11 and will again gradually come to stay in the cloth reservoir 14. At this time, the rotation of the feed roll 2 will stop and the cloth staying in the cloth reservoir 7 will gradually move leftward within the pressure-treating chamber 1 through the guide rolls 4, 5_1, 5_2, 5_3, 5_4, 5_5, 5_6, 5_7, etc. During this movement, such treatment as,

for example, dyeing or refinement is applied to the cloth. Thus the cloth *a* will gradually move leftward within the pressure-treating chamber **1** and will return to the state shown in FIGURE 1 through the folded state in the cloth reservoir **7** in FIGURE 4. When the cloth reservoir **7** is thus emptied of the folded cloth, the detecting lever **6** will be rotated clockwise by the tension of the cloth so as to open the limit switch LS_1. As the limit switch LS_2 will remain open at this time, the circuit of the coil C of the relay RY will open, the contacts RS_1, RS_2 and RS_3 will open, the contacts RS_4 and RS_5 will close, the electromagnet **42'** of the electromagnetic valve **40'** will be excited to open the valve port **43'** of said electromagnetic valve and at the same time the valve port **43** of the electromagnetic valve **40** will be closed. The pressure oil will enter the right chamber of the cylinder **36** of the pressure oil device **35**. The piston **37** and piston rod **38** will be pushed leftward. Therefore the piston **30** will be pulled rightward through the lever **39** and piston rod **31**, the pressure-treating chamber **1** and the operating chamber **9** will again communicate with each other through the connecting pipe **33**, the left chamber of the cylinder **29** and the connecting pipe **32** and the pressure in the pressure-treating chamber **1** and that in the operating chamber **9** will be made identical with each other. Thus the sealing packing **8'** will be closed. At the same time, the feed rolls **10** will stop, the other feed rolls **2** will rotate and the cloth in the cloth reservoir **14** will come to stay in the cloth reservoir **7**. Thereafter, such operation as has been described above is repeated so that the cloth *a* may be intermittently led into the pressure-treating chamber kept air-tight through the operating chamber from outside the pressure-treating chamber and may be continuously treated as required. It is needless to say that the apparatus of the present invention can be used in leading a cloth not only into but also out of the pressure-treating chamber.

As explained above, in the apparatus of the present invention, an operating chamber is provided as connected with a pressure-treating chamber and each chamber is provided with a sealing packing which will be closed by the pressure difference in case the pressure in the chamber is higher than the outside atmospheric pressure and will be opened in case the pressure in the chamber and the outside atmospheric are identical with each other so

that, when the pressure in each chamber is intermittently made different from or identical with the outside atmospheric pressure, said sealing packings may close or open and a cloth may be intermittently successively led into or out of the pressure-treating chamber through the sealing packings. Therefore, the cloth can be continuously led into or out of the pressure-treating chamber without imparing the air-tightness of the treating chamber and without hurting the cloth and sealing packings with friction in the operation.

What is claimed is:

An apparatus for intermittently leading a cloth into or out of a pressure-treating chamber comprising a pressure-treating chamber, an operating chamber provided as connected with said pressure-treating chamber, a sealing packing provided between said operating chamber and pressure-treating chamber so as to open when the pressures in both chambers are identical with each other and to close when said pressures are different from each other, a sealing packing provided between said operating chamber and the outside so as to open when the pressure in said operating chamber and the outside atmospheric pressure are identical with each other and to close when the pressure in said operating chamber is identical with the pressure in said pressure-treating chamber, a device to intermittently make the pressure in said operating chamber identical with the outside atmospheric pressure or with the pressure in said pressure-treating chamber, a cloth reservoir provided in each of said pressure-treating chamber and operating chamber, a device to lead a cloth to be treated into or out of the cloth reservoir in said operating chamber through the sealing packing between said operating chamber and the outside only when the pressure in said operating chamber is identical with the outside atmospheric pressure and a device to lead the cloth to be treated and staying in the cloth reservoir in said operating chamber into or out of said pressure-treating chamber through the sealing packing between said operating chamber and pressure-treating chamber only when the pressure in said operating chamber is identical with the pressure in said pressure-treating chamber.

No references cited.

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keyed one to each of said intermediate forward and rearward shafts and shiftable in a particular axial direction into meshing relation to the first speed gear on the driven shaft, a further pair of gears keyed one to each intermediate shaft and shiftable in the aforesaid particular axial direction for meshing with the second speed gear on the driven shaft, and separate shifting means connected to each of such pairs of gears for selectively shifting the gears of that pair in opposed directions relatively to one another on their shafts, so that the shifting means by moving in one direction may mesh gears to effect driving in the same forward or rearward direction in each first and second speed.

2. A transmission as set forth in claim 1, in which the shifting means for each pair of gears include a double-ended lever pivoted at a medial point and connected through its opposed ends to the gears of the particular pair, and a pair of actuating levers connected each to one double-ended lever.

3. In a transmission of the class described, a driving shaft, a driven shaft, a pair of intermediate forward and rearward shafts each driven by said driving shaft, a first speed gear and a second speed gear mounted in spaced

relation to each other on said driven shaft, a pair of gears mounted one on each of said intermediate forward and rearward shafts for meshing with the first speed gear on the driven shaft, a further pair of gears mounted one on each intermediate shaft for meshing with the second speed gear on the driven shaft, a shiftable part controlling each gear of said pairs of gears and each effective when shifted in the same direction to place its gear in driving relation between the corresponding intermediate shaft and speed gear, and separate shifting means for selectively shifting the two shiftable parts for each pair of gears in opposed directions relatively to each other, so that the shifting means by moving in one direction may effect driving in the same forward or rearward direction in each first and second speed.

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DON A. WAITE, *Primary Examiner.*