

Sept. 17, 1957

M. B. PENMAN
APPARATUS FOR GUIDING AND SPREADING A
MOVING WEB OF MATERIAL

2,806,694

Filed Dec. 8, 1953

6 Sheets-Sheet 1

Fig. 1.

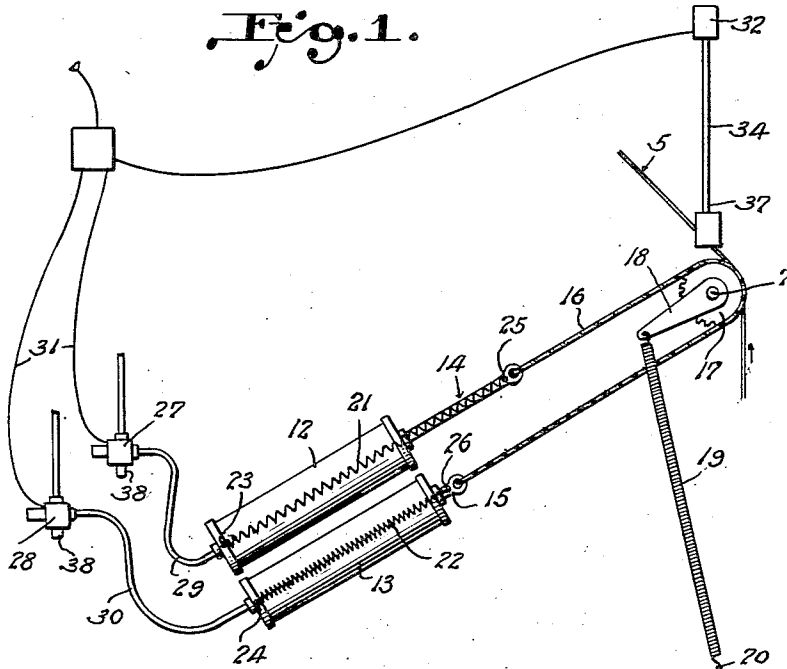
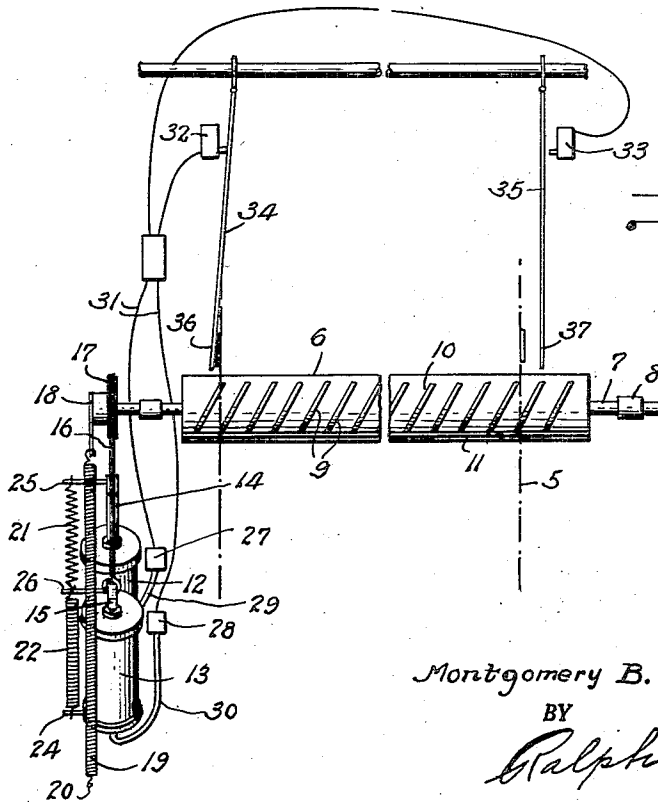


Fig. 2.



INVENTOR.
Montgomery B. Penman

BY

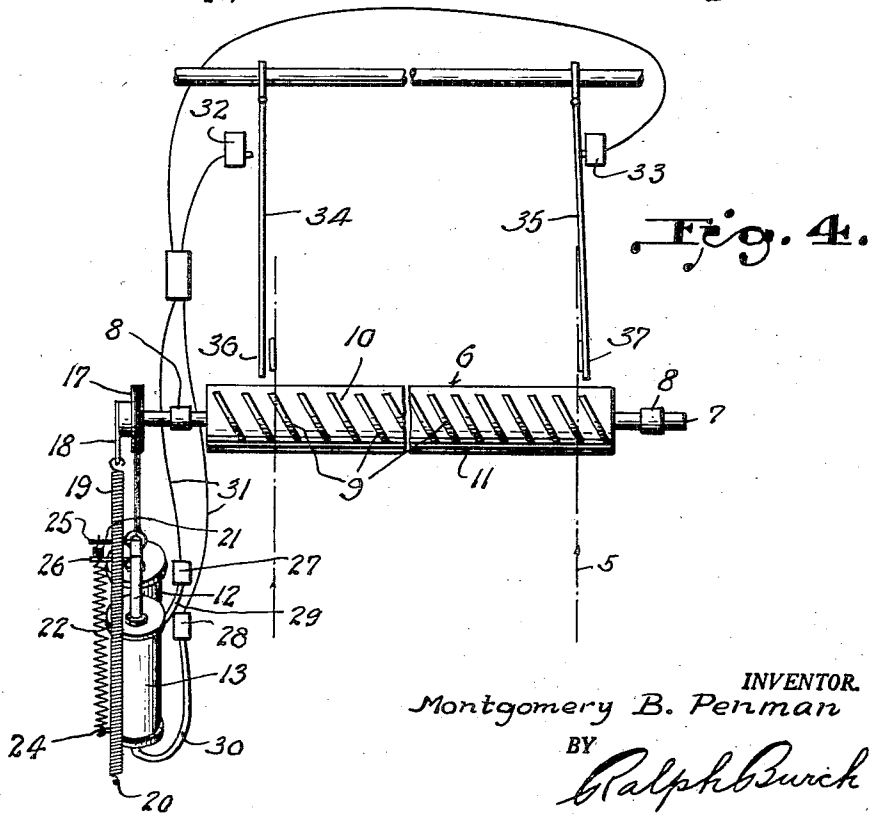
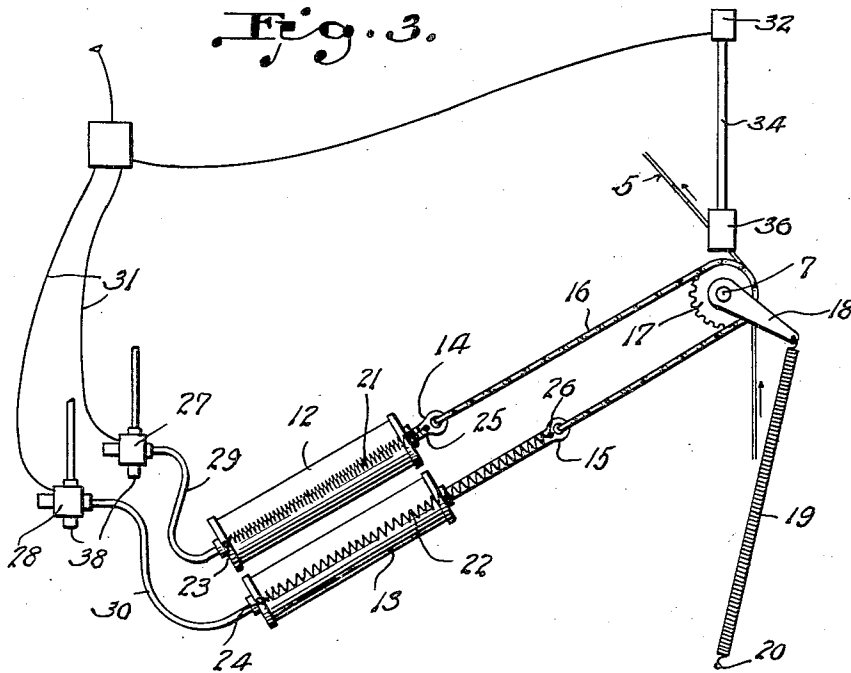
Ralph Burch

ATTORNEY.

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INVENTOR.
Montgomery B. Penman
BY
Ralph Burch
ATTORNEY.

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Fig. 5

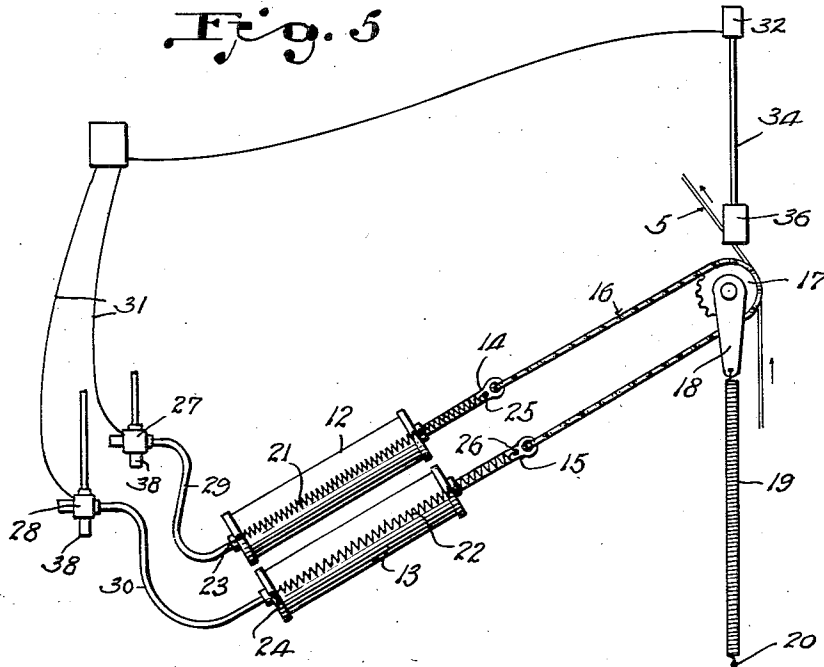


Fig. 6.

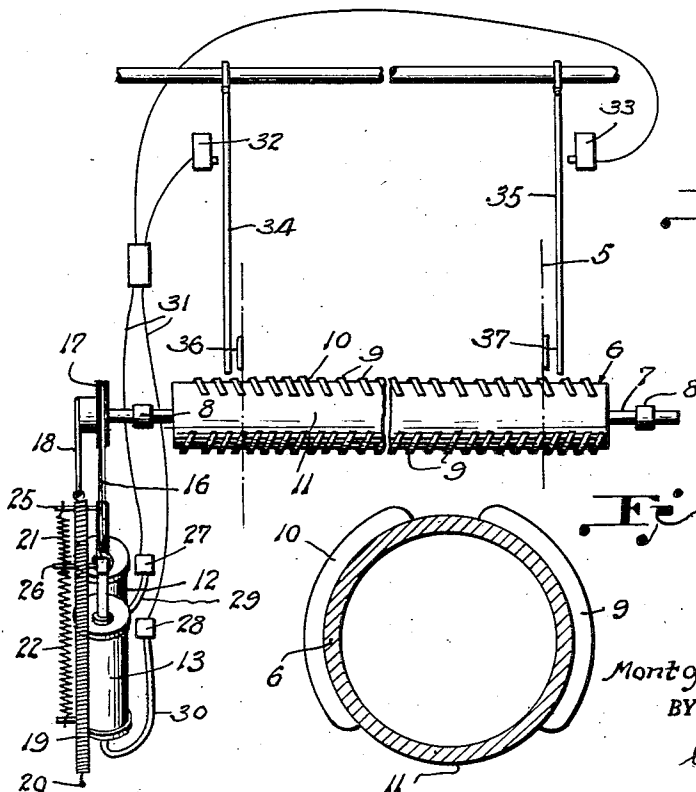
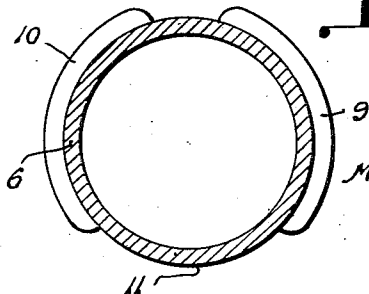


Fig. 7.



INVENTOR.
Montgomery B. Penman
BY
Ralph Burch
ATTORNEY.

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Fig. 8.

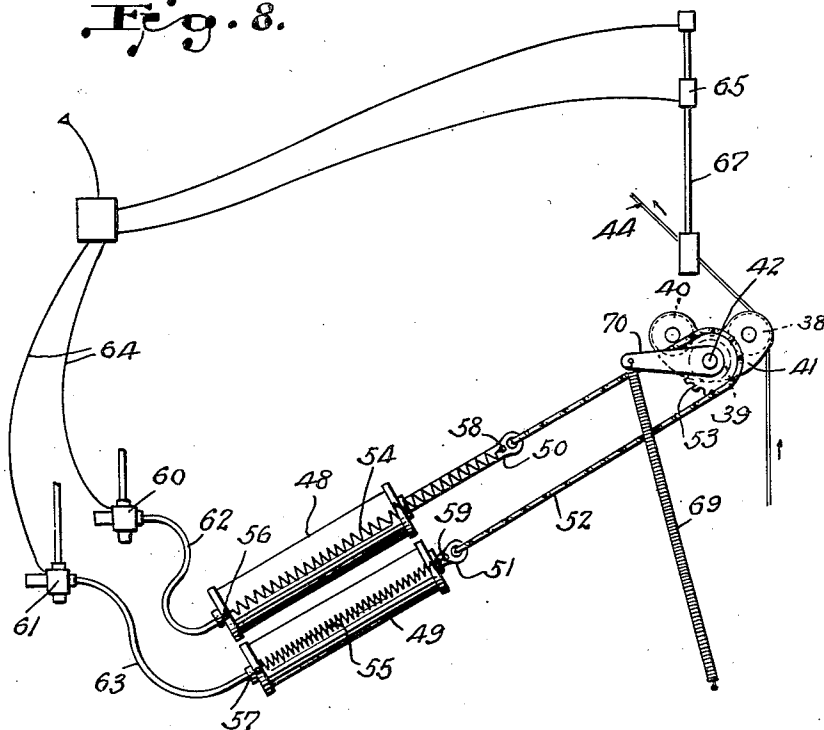
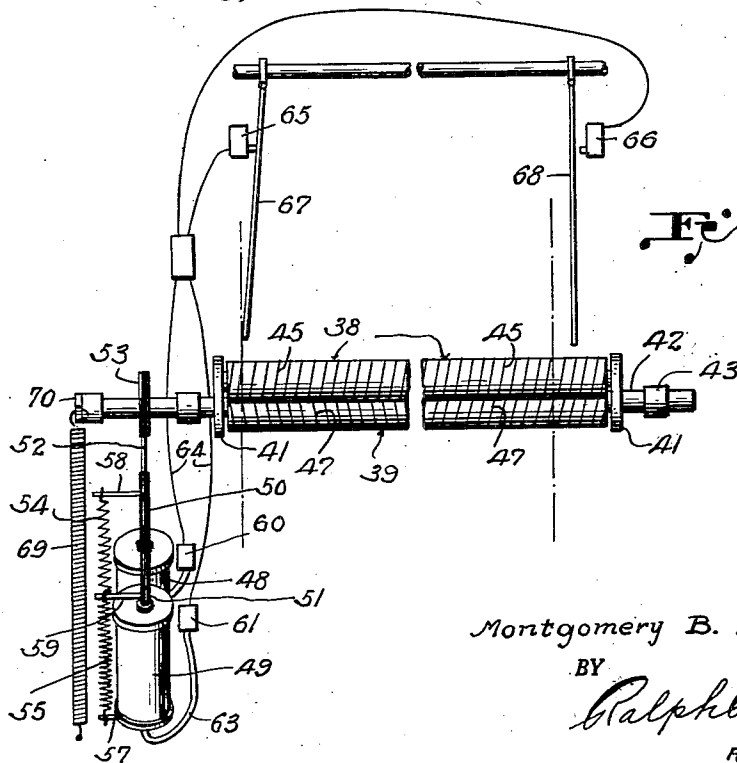


Fig. 9.



INVENTOR.
Montgomery B. Penman

BY
Ralph Burch
ATTORNEY.

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Fig. 10.

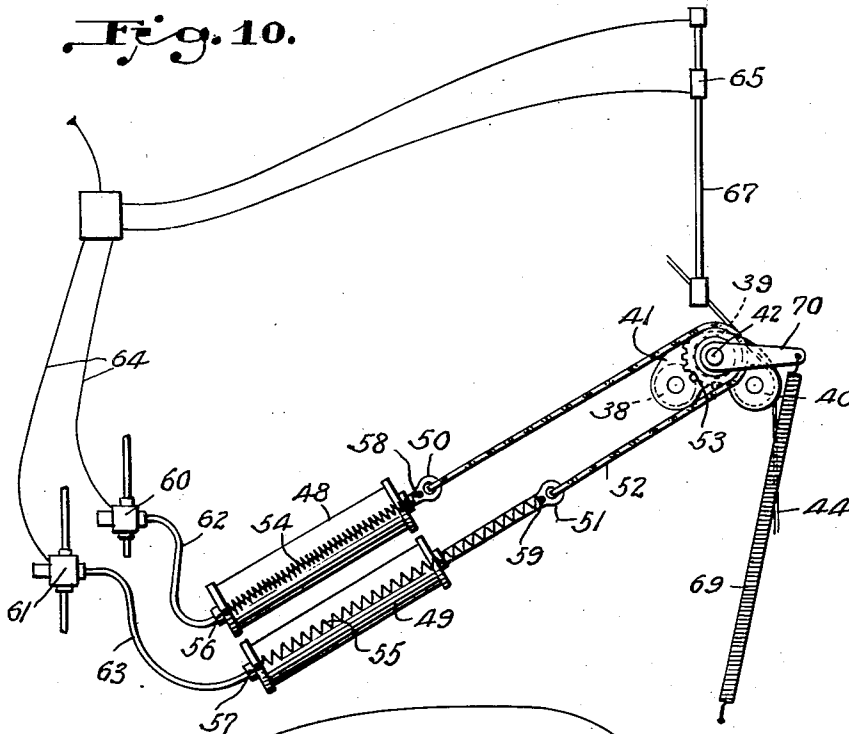
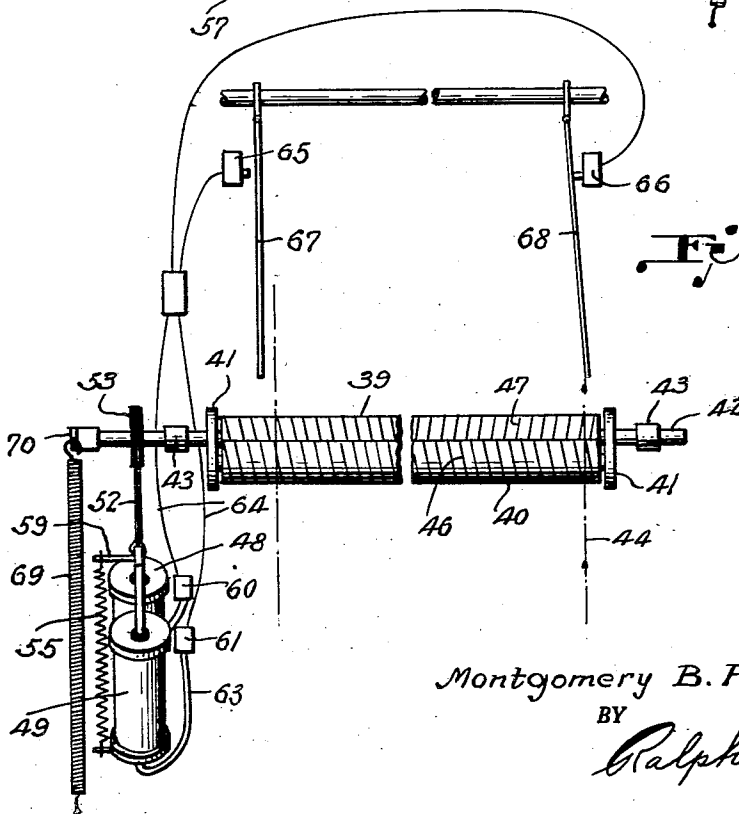


Fig. 11.



INVENTOR.
Montgomery B. Penman

BY

Ralph Burch

ATTORNEY.

Sept. 17, 1957

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Fig. 12.

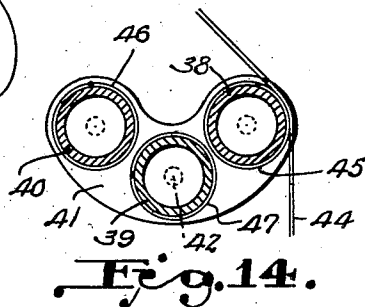
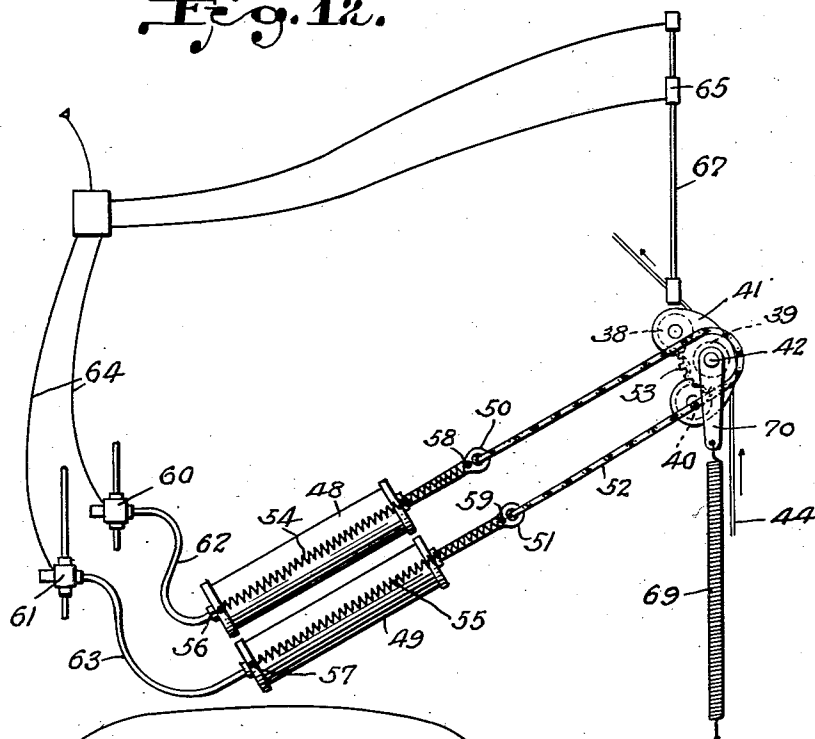


Fig. 14.

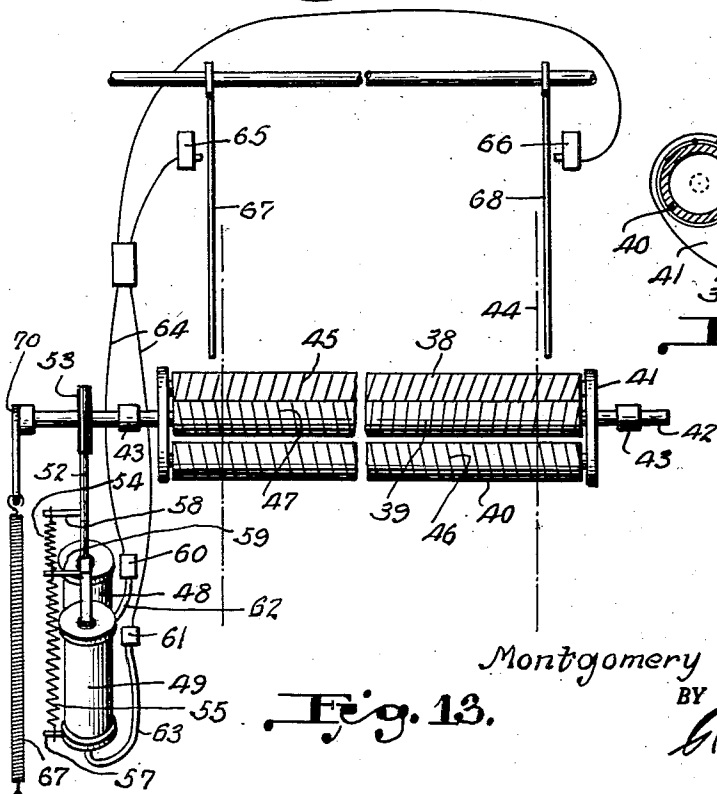


Fig. 13.

INVENTOR.
Montgomery B. Penman

BY
Ralph Burch

ATTORNEY.

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APPARATUS FOR GUIDING AND SPREADING A MOVING WEB OF MATERIAL

Montgomery B. Penman, Bloomsburg, Pa., assignor to The Magee Carpet Company, Bloomsburg, Pa., a corporation of Pennsylvania

Application December 8, 1953, Serial No. 396,990

14 Claims. (Cl. 271—2.6)

This invention relates to apparatus for guiding and spreading a moving web of material such as carpet, cloth or other like material and is particularly designed to guide a web of carpet while being fed to a piece dye machine.

In dyeing cotton carpet in open widths in a piece dye machine difficulty is experienced in keeping the moving carpet from moving from side to side on what is known as the large reel of the dye machine. In moving from side to side, folds are formed in the carpet with the result the carpet enters the dye machine in a lapped over condition which is highly undesirable.

It is an object of the present invention to provide automatic means for guiding and spreading a web of material such as cotton carpet as it is being fed to a dye machine so that it enters the dye machine in full open width and free of any distortions.

A further object of the invention resides in providing apparatus of the above-mentioned character which is simple and durable in construction, reliable and efficient in operation and inexpensive to manufacture.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same.

Fig. 1 is a side elevational view of the apparatus in position for moving the web of material to the right,

Fig. 2 is a front elevational view of the same,

Fig. 3 is a side elevational view of the apparatus in position for moving the web of material to the left,

Fig. 4 is a front elevational view of the same,

Fig. 5 is a side elevational view of the apparatus in position when the web of material is running straight,

Fig. 6 is a front elevational view of the same,

Fig. 7 is an enlarged cross sectional view of the guide roll,

Fig. 8 is a side elevational view of a modified form of the apparatus showing the position of the guide rolls for moving the web of material to the right,

Fig. 9 is a front elevational view of the apparatus shown in Fig. 8,

Fig. 10 is a view like Fig. 8 showing the guide rolls in position for moving the web of material to the left,

Fig. 11 is a front elevational view of the apparatus shown in Fig. 10,

Fig. 12 is a side elevational view of the apparatus when the web of material is running straight,

Fig. 13 is a front elevational view of the apparatus shown in Fig. 12, and,

Fig. 14 is a cross sectional view of the modified form of guide rolls.

Referring to the drawings, the numeral 5 designates a web of material such as cotton carpet which is being fed into a piece dye machine, not shown. The material 5 passes over a guide roll 6 having a shaft 7 extending from each end that is rotatably mounted in suitable bearings 8 forward of the large reel of the dye machine. The peripheral surface of the roll 6 is divided circum-

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ferentially into three sections one of which is provided with a series of raised ribs 9 spaced apart longitudinally of the roll which are inclined with respect to the direction of rotation in an upwardly and outwardly direction towards the right end of the roll. Another section of the surface has second series of raised ribs 10 inclined in the opposite direction towards the left end of the roller and the section between the two ribbed sections is smooth, as at 11. When the roll 6 is rotated to bring the ribbed section 9 in contact with the material 5, the material is moved towards the right side of the roll and when it is desired to move the material towards the left side, the roll is rotated to bring the ribbed section 10 in contact with the material. The smooth section 11 is brought into contact with the material when the material is moving in a straight course.

The mechanism for turning the roll 6 to bring the desired section of its surface in contact with the material consists of a pair of pneumatic cylinders 12 and 13 having reciprocating pistons with piston rods 14 and 15 extending from one end of the cylinders. The cylinders are disposed in parallel relation and the piston rod 14 of cylinder 12 is connected to one end of a roller chain 16 which is trained around a sprocket wheel 17 and has its opposite end connected to the piston rod 15 of cylinder 13. The sprocket wheel 17 is fixed on one end of the shaft 7 of roll 6 and adjacent the sprocket wheel is an arm 18 affixed to the shaft which is normally moved by spring 19 to rotate the roll to bring and hold the smooth section 11 in contact with the material. The spring 19 has one end attached to the arm 18 and its opposite end to a fixed point 20. The piston rods of the cylinders 12 and 13 are moved towards the lower end of the cylinders by coil springs 21 and 22 having one end affixed to laterally extending pins 23 and 24 at the lower end of the cylinders and their opposite ends to pins 25 and 26 extending from the upper ends of piston rods 14 and 15. When the piston rods of both cylinders are in retracted position the smooth section 11 of roll 6 is in contact with the material and is held in this position by the pull of spring 19 on arm 18, as shown in Fig. 5. Solenoid air valves 27 and 28 control the admission of compressed air to the cylinders through conduits 29 and 30 connected to the lower ends of the cylinders. The electric circuit 31 of the solenoid air valves having micro switches 32 and 33 interposed in the circuit for controlling the air valves 27 and 28, respectively. The switches 32 and 33 are disposed above the material on opposite sides thereof and pivotally suspended adjacent the switches are feeler arms 34 and 35 having their lower ends 36 and 37 disposed adjacent the opposite edges of the material for contact therewith if the material moves towards the right or left. When the material diverges from a straight course and moves to the left the feeler arm 34 will swing outwardly and close the micro switch 32 to actuate the solenoid air valve 27 to admit air to the cylinder 12 and thereby extend the piston rod 14 to move the chain 16 and thus rotate the roll to bring the ribbed surface 9 into contact with the material. Owing to the inclination of the ribs on the surface 9 the material will be moved towards the right of the roll and as it moves to the right the feeler arm 34 will move out-of contact with the switch 32, opening the circuit of the solenoid valve 27 to close the valve and allow the air in cylinder 12 to be exhausted through the exhaust port 38 of the valve. As the air exhausts from cylinder 12 spring 21 retracts piston rod 14 which moves chain 16 to rotate roll 6 and bring the smooth surface 11 in contact with the material in which position it is held by the tension of spring 19 on the arm 18. Likewise if the material moves to the right the feeler arm 35 closes switch 33 to open air valve 28, admitting air to cylinder 13 to extend the piston rod 15

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to move chain 16 to rotate roll 6 to bring the ribbed surface 10 into contact with the material and thus cause the material to move to the left. Thus, it will be seen that any deviation of the moving material from a straight course will result in either of the feelers 34 or 35 being actuated to close the circuits to the solenoid valves 27 or 28 to admit air to the pneumatic cylinders 12 or 13 for operating the roll 6 to bring the ribbed surfaces 9 or 10 into contact with the material and thereby direct the material back to a straight course so it will be fed to the dye machine in full open width.

A modified form of guide roll is shown in Figs. 8 to 14, inclusive, and comprises a plurality of rolls 38, 39 and 40 fixedly mounted in arcuate brackets 41. The shaft 42 of the center roll 39 extends beyond the brackets and is rotatably mounted in suitable bearings 43 and as the brackets 41 are fixed on shaft 42 rotation of the shaft will swing the brackets to bring the rolls 38, 39 and 40 selectively into contact with the material 44 being fed to the dye machine. The roll 38 has a spiral rib 45 formed thereon which may be formed by spirally winding a piece of wire around the roll with the spirals extending in a direction towards the right hand end of the roll. When this roll contacts the material the material is guided towards the right. The roll 40 is likewise provided with a spiral rib 46 with the spirals extending in a direction towards the left hand end of the roll and when this roll is in contact with the material the material is guided towards the left. The center roll 39 is provided with a spiral rib 47 with the spirals extending from the center of the roll in opposite directions and when this roll is in contact with the material, the material is guided in a straight course.

The mechanism for selectively bringing the rolls in contact with the material is the same as the mechanism employed in the form of the invention shown in Fig. 1. It comprises pneumatic cylinders 48 and 49 having piston rods 50 and 51 connected to the ends of a roller chain 52 that is trained over a sprocket wheel 53 fixedly mounted on shaft 42. The piston rods are normally retracted by springs 54 and 55 connected at one end to pins 56 and 57 extending from the bottom of the cylinders and at their opposite ends to pins 58 and 59 extending from the piston rods. Air for operating the piston rods is admitted to the cylinders by solenoid valves 60 and 61 connected by conduits 62 and 63 with the cylinders. The solenoid valves are controlled by an electric circuit 64 having micro switches 65 and 66 interposed in the circuit which are actuated by the pivotally suspended feeler arms 67 and 68 having their lower ends disposed on opposite sides of the material so as to be engaged by the edge of the material if it moves to the right or left. Air admitted to cylinder 48 will rotate shaft 42 to bring roll 38 into contact with the material and air admitted to cylinder 49 will reverse the rotation of shaft 42 to bring the roll 40 into contact with the material. When the air valves 60 and 61 are closed, the springs 54 and 55 retract the piston rods and rotate shaft 42 to bring the roll 39 into contact with the material in which position it is held by the tension of spring 69 on the arm 70 affixed to shaft 42.

From the foregoing it is apparent the mechanism provided will spread and guide the moving web of material in a straight course and will prevent any deviation of the material to the right or left so that it will be fed to the dye machine in full open width and which is completely automatic in operation.

Having thus described my invention, I claim:

1. Apparatus for guiding a moving web of material comprising a rotatable member disposed transversely beneath the web of material, said member having circumferentially spaced ribbed surfaces and an intervening smooth surface, the ribs on said ribbed surfaces being raised above the surface and obliquely disposed in opposite directions to the longitudinal axis of said member,

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means for rotating said member to selectively bring the said ribbed and smooth surfaces into contact with the moving web to control the direction of travel of said web, and means for holding the selected surface in contact with the web.

2. Apparatus for guiding a moving web of material comprising a rotatable member having circumferentially spaced portions of its surface provided with a series of upstanding ribs for contact with the web of material, the ribs of each portion being disposed at a different angle to the normal direction of travel of said web for directing its course of movement in various directions, means for rotating said rotatable member to successively bring the ribbed portions into contact with the web of material, and means actuated by the lateral movement of the web of material to control said rotating means.

3. Apparatus for guiding a moving web of material comprising a rotatable member disposed transversely beneath the web of material, said member having on its peripheral surface circumferentially spaced guide means for moving said web at different angles to its normal direction of travel upon contact with the material, pneumatic means for rotating said rotatable member including a pair of cylinders, reciprocating piston rods mounted in said cylinders, means connected to said piston rods and said rotatable member for rotating said member in opposite directions upon reciprocating of said piston rods whereby the guide means of said member are successively brought into contact with the web of material, valves for admitting air to said cylinders, and means actuated by the lateral movement of the web of material for controlling said valves.

4. Apparatus for guiding a moving web of material comprising a rotatable roll disposed transversely beneath the web of material, said roll having its periphery divided circumferentially into a smooth section and ribbed sections, with the ribs of the ribbed sections being raised from the peripheral surface of the roll and obliquely disposed in opposite directions to the axis of said roll, means for rotating said roll to successively bring the smooth and ribbed sections of said roll into contact with the web of material, and means actuated by the lateral movement of said web of material to control said last-mentioned means.

5. Apparatus for guiding a moving web of material comprising a rotatable roll disposed transversely beneath the web of material, said roll having on its peripheral surface circumferentially spaced apart ribbed sections and an intervening smooth section, the ribs of the ribbed sections being raised above the peripheral surface of the roll and obliquely disposed in opposite directions to the axis of the roll, means normally holding said roll with the smooth section in contact with the moving web, means for rotating said roll in opposite directions to selectively bring the ribbed sections into contact with the moving web and means actuated by the lateral movement of said web to control said last-mentioned means.

6. Apparatus for guiding a moving web of material comprising a rotatable roll disposed transversely beneath the web of material, said roll having on its peripheral surface circumferentially spaced apart ribbed sections and an intervening smooth section, the ribs of the ribbed sections being raised above the peripheral surface of the roll and obliquely disposed in opposite directions to the axis of the roll, an arm extending from the shaft of said roll, a spring connected to said arm normally holding said roll with the smooth section in contact with the moving web, means for rotating said roll in opposite directions to selectively bring the ribbed sections into contact with the moving web and means actuated by the lateral movement of said web to control said last-mentioned means.

7. Apparatus for guiding a moving web of material comprising a rotatable roll disposed transversely beneath the web of material, said roll having on its peripheral surface circumferentially spaced apart ribbed sections and

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an intervening smooth section, the ribs of the ribbed sections being raised above the peripheral surface of the roll and obliquely disposed in opposite directions to the axis of the roll, an arm extending laterally from the shaft of said roll, a spring connected to said arm normally holding said roll with the smooth section in contact with the moving web, pneumatic means for rotating said roll in opposite directions including a pair of cylinders, reciprocating pistons mounted in said cylinders, connecting means between said pistons and said roll for rotating said roll in opposite directions upon reciprocation of said pistons whereby the ribbed sections of said roll are selectively brought into contact with the moving web, valves for admitting air to said cylinders and means actuated by the lateral movement of the web for controlling said valves.

8. Apparatus for guiding a moving web of material comprising a rotatable member disposed transversely beneath the web of material, said member having on its peripheral surface circumferentially spaced guide means, each guide means being adapted to move said web of material at different angles to its direction of travel upon contact with said web, means for rotating said rotatable member to successively bring said guide means into contact with the web and means actuated by the lateral movement of the web to control said rotating means.

9. Apparatus for guiding a moving web of material as described in claim 8 wherein said means for rotating said rotatable member is pneumatic means.

10. Apparatus for guiding a moving web of material comprising a cylindrical member disposed transversely beneath the web of material with its peripheral surface in contact with the web of material, a series of raised ribs spaced longitudinally of said member and obliquely disposed to the longitudinal axis of said member in one direction covering one side of said member, a second series of raised ribs obliquely disposed to the longitudinal axis of said member in a direction opposite to that of the first series of ribs covering the opposite side of said member, said member having a smooth surface between the first and second series of ribs, and means for rotating said cylindrical member in either direction to selectively bring the ribbed and smooth surfaces of said member into contact with the web of material.

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11. Apparatus for guiding a moving web of material comprising a series of rolls disposed transversely beneath the web of material is spaced apart parallel relation, said rolls having ribbed surfaces with the ribs disposed so that each roll guides the web of material in a different course upon contact with the material, arcuate brackets fixedly supporting the ends of the rolls, and means for turning said brackets to selectively bring said rolls into contact with the web of material.

12. Apparatus of the character described in claim 11 including means actuated by the lateral movement of the web of material to control said last-mentioned means.

13. Apparatus for guiding a moving web of material comprising a series of rolls disposed transversely beneath the web of material in spaced apart parallel relation, said rolls having ribbed surfaces with the ribs disposed so that each roll guides the web of material in a different course upon contact with the material, means for fixedly mounting said rolls for selective contact of the rolls with the web of material, and means for actuating said last-mentioned means.

14. Apparatus for guiding a moving web of material comprising a series of rolls disposed transversely beneath the web of material in spaced apart parallel relation, said rolls having ribbed surfaces with the ribs disposed so that each roll guides the web of material in a different course, arcuate brackets fixedly supporting the ends of said rolls with the axes of the rolls arranged in an arcuate path, means for oscillating said brackets to selectively bring said rolls into contact with the web of material, and means actuated by the lateral movement of the web of material to control said oscillating means.

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