Oct. 11, 1960 H. C. NOE 2,955,897

WARPING MACHINE

Filed Oct. 1, 1956 3 Sheets-Sheet 1

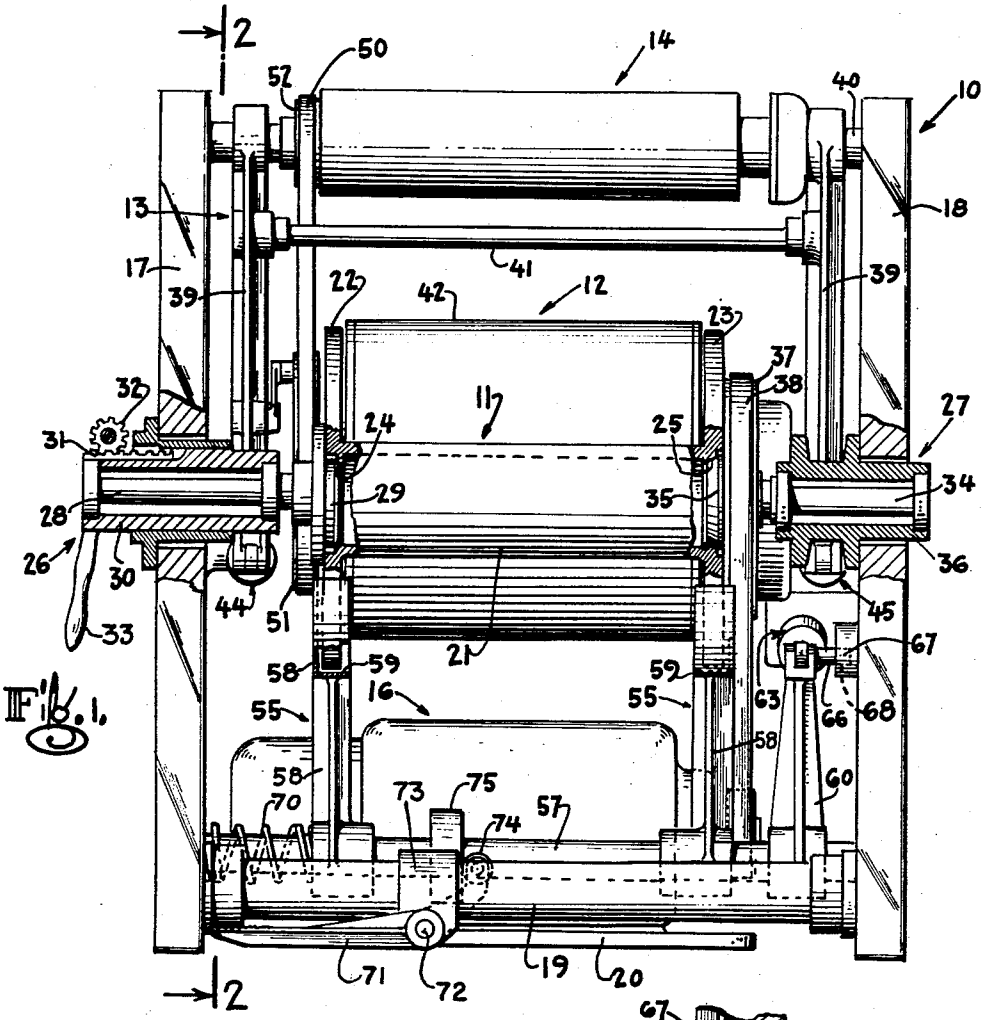


Fig. 1.

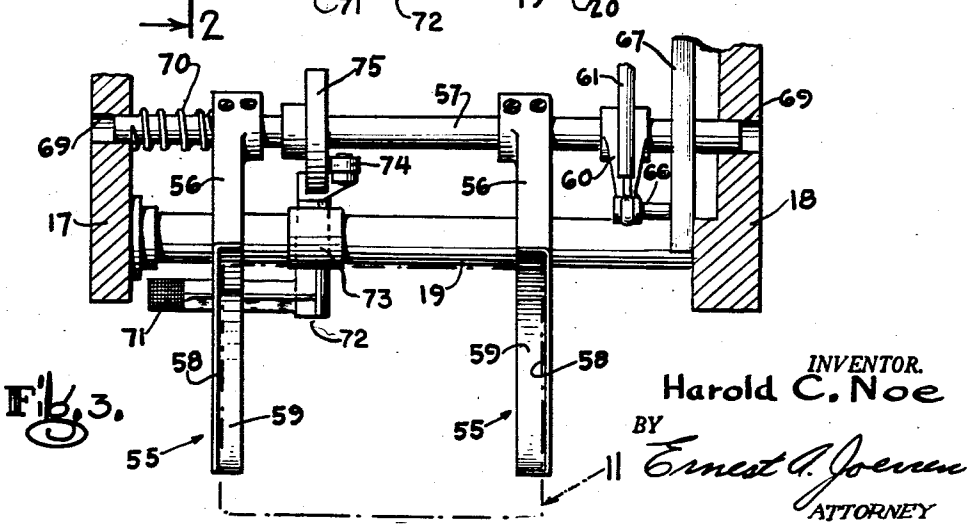


Fig. 3.

INVENTOR.
Harold C. Noe
BY
Ernest A. Jones
ATTORNEY

Oct. 11, 1960 H. C. NOE 2,955,897

WARPING MACHINE

Filed Oct. 1, 1956 3 Sheets-Sheet 2

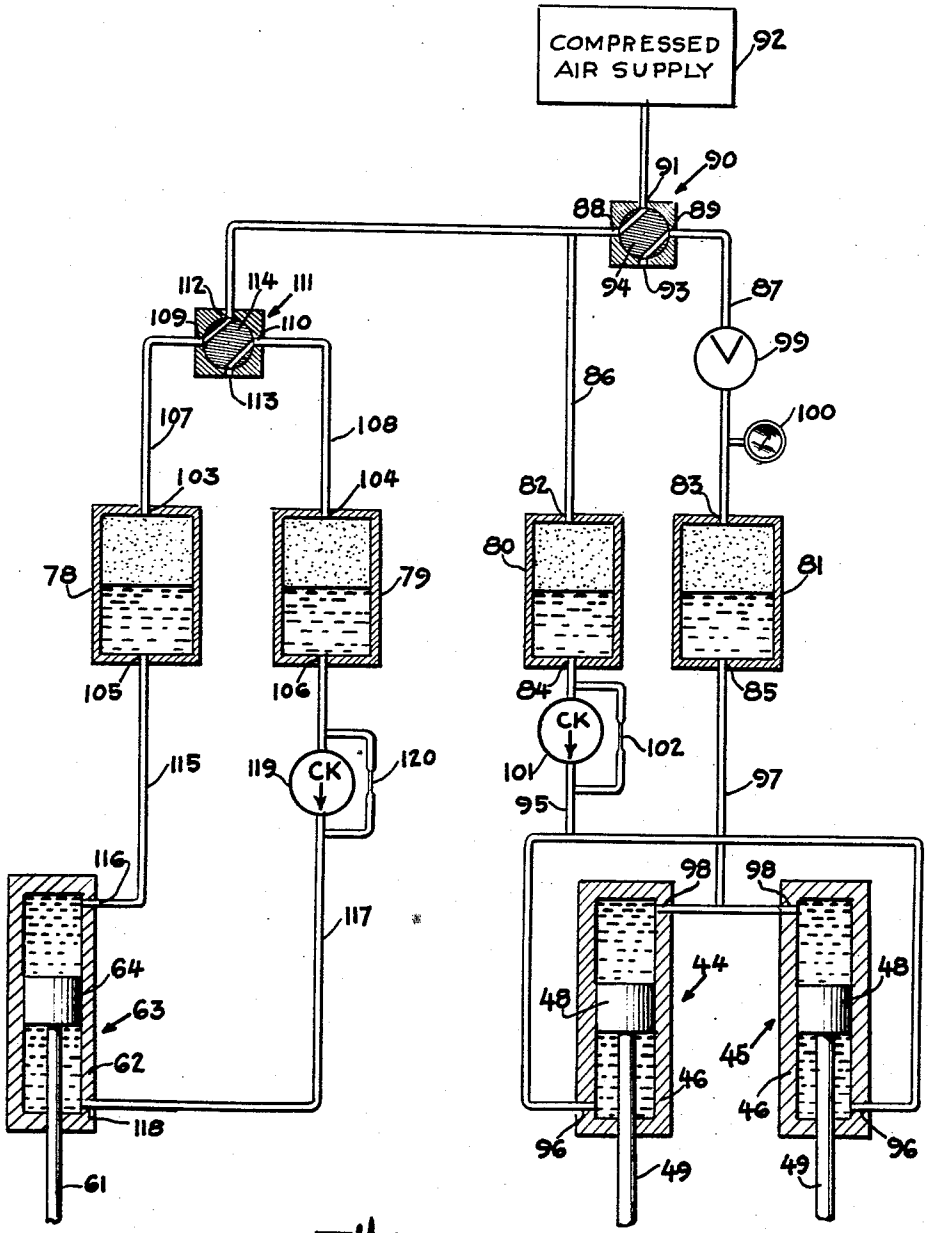


Fig. 4.

INVENTOR.
Harold C. Noe

BY
Ernest A. Joerren
ATTORNEY

Oct. 11, 1960 H. C. NOE 2,955,897

WARPING MACHINE

Filed Oct. 1, 1956 3 Sheets-Sheet 3

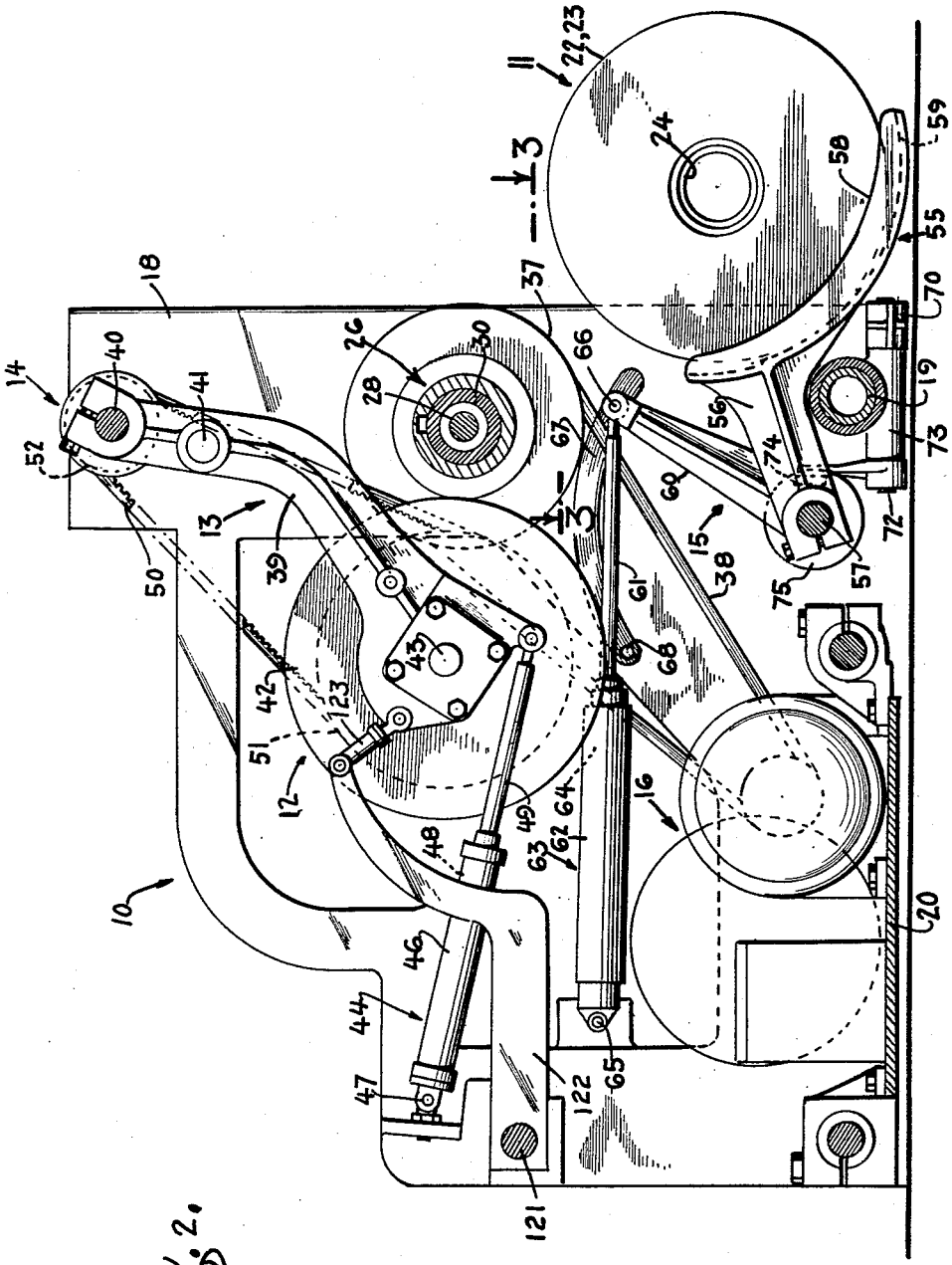


Fig. 2.

INVENTOR.
Harold C. Noe

BY
Ernst A. Joerren

ATTORNEY

United States Patent Office 2,955,897 Patented Oct. 11, 1960

2,955,897

WARPING MACHINE

Harold C. Noe, Upper Montclair, N.J., assignor to Kidde Textile Machinery Corporation, Bloomfield, N.J., a corporation of Delaware

Filed Oct. 1, 1956, Ser. No. 613,156

11 Claims. (Cl. 28—38)

The present invention relates to textile machines, and, more particularly, to improvements in machines ordinarily known as beamers or warpers which are utilized to wind a warp of yarn onto a beam for thereafter supplying the warp threads to a knitting or weaving machine.

Such machines generally comprise a warp beam, means for rotating the warp beam, a pressure roll for engaging the warp beam, mechanism under the control of hydraulic fluid pressurized by a pump for moving the pressure roll into and out of engagement with the warp beam, a guide roller and, in some cases, mechanism for facilitating doffing of the warp beam.

One of the objections to such machines has been that the pump motor must be operated continuously to maintain the fluid under pressure while the fluid is being bypassed to the reservoir when it is not required for operation of the pressure roll moving mechanism. Since the latter mechanism is used rather infrequently, constant pumping of the fluid results in a waste of power, and unnecessary wear of the pump and the motor driving the same. Attempts have been made to utilize compressed air, but air, being a highly compressible fluid, is too elastic and causes the pressure roll to move so rapidly into contact with the warp beam that in some instances the warp sheet is smashed or otherwise distorted. While various damping or dash pot means may be utilized to reduce the speed of movement of the pressure roll and minimize bouncing thereof, such means unduly complicate the machine and introduce other factors which interfere with the proper functioning of the pressure roll when it is urged against the warp sheet during the winding thereof on the beam.

Another objection to such machines is that the mechanism for doffing the warp beam is so arranged to make transfer of the warp beam from the warping machine to apparatus for transporting the same elsewhere rather cumbersome. Also, the doffing mechanism in some cases could operate independently of the pressure roll, whereby, if the doffing mechanism were operated inadvertently while the warp sheet is being wound onto the beam or while the pressure roll is in contact with the warp beam, the warp threads may be damaged or the lay thereof may be disturbed.

Accordingly, an object of the present invention is to provide an improved warping machine which overcomes the foregoing difficulties and disadvantages.

Another object is to provide an improved pressure operated system for effecting movement of the pressure roll mechanism and/or doffing mechanism.

Another object is to provide such a system which is operated by a supply of compressed air usually available in a factory or readily provided by a small compressor unit but utilizes hydraulic fluid to effect the movement of the mechanisms.

Another object is to provide such a system wherein

the doffing mechanism can be operated only when the pressure roll is clear of the warp beam.

Another object is to provide an improved doffing mechanism for warping machines.

A further object is to accomplish the foregoing in a simple, practical and economical manner.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings, forming a part of the specification, wherein:

Fig. 1 is a front elevational view, partly in section, of a warping machine in accordance with the present invention with the warp beam in place.

Fig. 2 is a side view, taken substantially along the line 2—2 on Fig. 1, with the warp beam removed.

Fig. 3 is a fragmentary plan view taken on Fig. 1 illustrating details of the doffing mechanism.

Fig. 4 is a schematic view of the system for operating the pressure roll and doffing mechanisms.

Referring to the drawings in detail and more particularly to Figs. 1 to 3 thereof, a warping machine is shown which includes a frame **10**, a warp beam **11**, a pressure roll assembly **12**, mechanism **13** for moving the pressure roll into and out of engagement with the warp beam, a yarn measuring roll **14** driven by the pressure roll, mechanism **15** for doffing the warp beam, and a main drive **16** for the warp beam.

The frame comprises a pair of spaced apart upright side members **17** and **18**, a number of cross bars or tubes connecting the side members including a tube **19**, and a platform or support **20** for the main drive. The side members **17** and **18** are provided with bearings, journals and the like for supporting shafts and the like which will be described hereinafter with reference to the particular mechanisms with which they are associated.

The warp beam **11**, as shown in Fig. 1, is a spool-like structure which comprises a hollow cylindrical section **21**, and a pair of side flanges **22** and **23** formed with annular openings **24** and **25**, respectively. The opening **24** has a cylindrical zone of considerable width, whereas the opening **25** has a narrow cylindrical zone and a flared zone located axially outwardly thereof for the purpose about to be described. The warp beam is rotatably supported by a bearing assembly **26** on the frame member **17** and a bearing assembly **27** on the frame member **18**.

The bearing assembly **26** includes an axle **28** which has an inner end element **29** adapted to fit into the opening **24** of the warp beam and which is rotatably mounted in a sleeve **30**. This sleeve is slidably mounted in the frame member **17** and is adapted to be moved inwardly and outwardly to insert and withdraw the element **29**. To accomplish this, the sleeve **30** has a gear rack **31** which is engaged by a gear **32** adapted to be manually rotated by a lever or handle **33**. Although not shown, conventional means are provided for locking the sleeve sliding arrangement when the element **29** is inserted into the warp beam opening **24**.

The bearing assembly **27** includes an axle **34** which has an inner end element **35** adapted to fit into the opening **25** of the warp beam in driving connection, an outer section rotatably mounted in a sleeve **36** fixed in the frame member **18**, and an intermediate pulley **37** or the like adapted to be driven by a belt **38** or the like from the main drive **16**. The support for the warp beam just

described facilitates mounting and unmounting of the warp beam as will be made apparent hereinafter.

The pressure roll assembly 12, as shown in Figs. 1 and 2, comprises a yoke including a pair of side members 39 pivotally suspended at their upper ends from a shaft or rod 40 supported by bearings in the frame members 17 and 18, a cross bar 41 connecting the members 39 for swinging movement in unison, and a pressure roll 42 freely rotatable on a shaft 43 supported by the members 39 at the lower ends thereof.

The mechanism 13 for moving the pressure roll into and out of engagement with the warp beam includes a pair of hydraulic motors 44 and 45 each comprising a cylinder 46 (Fig. 2) having one end pivotally mounted on the frame at 47, a piston 48, and a piston rod 49 extending outwardly of the other end of the cylinder and having its free end linked to one of the side members 39 of the yoke.

The yarn measuring roll 14 is freely rotatable on the shaft 40 and is positively driven by the pressure roll, for example, by a timing belt 50, driven by a timing wheel 51 rotated by the pressure roll and driving a timing wheel 52 for rotating the measuring roll. Since the pressure roll is driven by the warp beam by being in frictional contact with the warp sheet wound thereon and the measuring roll is driven by pressure roll, the linear speed of the yarn at the measuring roll and the warp beam is the same, whereby the measuring roll will demand from the creel and supply to the warp beam the exact amount of yarn required by the warp beam to provide a uniformly wound warp of yarn thereon. Since the measuring roll 14 is mounted for rotation on the shaft 40 about which the pressure roll swings, movement of the pressure roll from one position to another will not disturb the relation of the measuring roll to the warp beam.

The doffing mechanism 15, as shown in Figs. 1 to 3, includes a cradle provided by two spaced arcuate members 55 which are L-shaped in section and are constructed to receive and support the flanges 22 and 23 of the warp beam. These members are mounted by arms 56 on a shaft 57 supported by the frame members 17 and 18. The cradle is so arranged that, when the warp beam is mounted for rotation, the vertical sections 58 of the members 55 are closely adjacent the outer sides of the flanges and the horizontal sections 59 of these members are closely adjacent the periphery of the flanges. The manner in which the warp beam is placed on the cradle and removed therefrom will be described shortly hereinafter.

The cradle is adapted to be moved from its normal position, that is, under the warp beam, to the position downwardly and outwardly of its normal position as shown in Fig. 2, whereby the free ends of the cradle members 55 are positioned to enable the warp beam to be rolled therefrom and another beam to be rolled thereon for insertion into the machine. Such movement of the doffing cradle is effected by a lever 60 having one end secured to the shaft 57 and having its other end linked to a piston rod 61 extending out of one end of a cylinder 62 of a hydraulic motor 63. A piston 64 in the cylinder 62 operates the piston rod, and the other end of the cylinder is pivotally mounted on the frame at 65.

Provision is made for locking the cradle in its normal position during operation of the machine by securing a lateral pin or stud 66 to the outer side of the lever 60 which rides on an arcuate block 67 (Figs. 1 and 2) formed with a hole 68 for receiving the pin when the cradle is in normal position, rotatably and slidably mounting the shaft 57 in bearings 69 in the frame members (Fig. 3), and placing a spring 70 on the shaft 57 between the frame member 17 and the clamp of the arm 56 adjacent thereto, whereby the spring is effective to move the shaft towards the right (as viewed in Fig. 3) as the pin enters its hole.

The pin is adapted to be withdrawn from its hole when the cradle is to be lowered by mechanism which includes a foot treadle 71 mounted on one end of a shaft 72 supported by a bracket 73 on the tube 19. The other end of the shaft 72 is adjacent the shaft 57 and carries a roller 74 for engaging a flange 75 secured to the shaft 57, whereby, when pressure is exerted on the treadle, the shaft 72 rotates counterclockwise, as viewed in Fig. 3, and the shaft 57 is moved towards the left to effect removal of the pin from its hole.

The elements of the doffing mechanism and the mounting elements for supporting the warp beam cooperate in the manner about to be described. Assuming, that a warp beam has been wound and removed, the cradle will be in its doffing position as shown in Fig. 2, and the element 29 will be in its outer position. An empty beam is rolled onto the cradle and the hydraulic motor 63 is operated to lift the cradle until the pin 66 enters its hole 68 whereupon the shaft 57 moves towards the right and causes the section 58 of the cradle member 55 at the left to engage the flange 22 of the beam and move the same a short distance towards the right so that the element 35 extends partially into the opening 25 of the beam. The mechanism under the control of the lever 33 is then operated to insert the element 29 into the beam opening 24 which shifts the beam further towards the right to fully insert the element 35 into the beam opening 25, whereby the flared zone of the opening 25 causes the beam to be raised off the horizontal cradle sections 59 and the beam flanges are laterally spaced from the vertical cradle sections 58.

After the warp beam has been wound, the lever 33 is operated to withdraw the element 29 from the beam opening 24, and pressure is applied on the foot treadle 71 to withdraw the pin 66 from its hole 68 and to shift the cradle towards the left, whereby the cradle member 55 at the right moves the beam towards the left to slide the flared zone defining the beam opening 25 over the element 35 and thereby enable the beam to drop onto the cradle. The hydraulic motor 63 is operated, while pressure is maintained on the treadle until the pin 66 clears the hole 68 and rides on the block 67, to swing the cradle outwardly and downwardly for removal of the beam.

In Fig. 4, a system is shown for operating the hydraulic motors 44, 45 and 63, the pistons of the motors being shown in an intermediate position as they are being operated respectively to move the pressure roll away from the warp beam and to swing the cradles downwardly and outwardly.

This system includes a pair of reservoirs 80 and 81 for the motors 44 and 46 which reservoirs at all times are only partially filled with a hydraulic fluid to provide a space above the fluid and which respectively have upper openings 82 and 83 and lower openings 84 and 85. The upper openings 82 and 83 respectively are connected by conduits 86 and 87 to outlets 88 and 89 of a valve 90 which has an inlet 91 connected to a supply of compressed air 92 and has a vent 93.

The source of the compressed air supply 92 may be a compressed air line usually installed in factories and mills or may be a small motor-compressor unit having an accumulator and on and off control responsive to the pressure of the air within the accumulator.

The valve 90 has a movable member 94 for providing two open and venting positions with the inlet 91 connected to the outlet 88 and the outlet 89 connected to the vent 93, and vice versa, and a closed position, as shown.

The lower openings 84 and 85 respectively are connected by a conduit 95 to an opening 96 at one end of each of the cylinders 46 and by a conduit 97 to an opening 98 at the opposite end of each of the cylinders 46, so that the pistons 48 in these cylinders move back and forth together to operate the pressure roll assembly.

As shown herein, the cylinders and the connections thereto are arranged to move the pressure roll into engagement with the warp beam when the air inlet 91 is connected to the valve outlet 89 in communication with

the reservoir opening 83 and to move the pressure roll out of engagement with the warp beam when the air inlet 91 is connected to the valve outlet 88 in communication with the reservoir opening 82.

Since the pressure roll, when in engagement with the warp beam is intended to exert pressure on the warp sheet being wound thereon, it is important and desirable to adjust such pressure to make it sufficient, but without damage to the warp. Such pressure adjustment can be made by placing a pressure regulating valve 99 and a pressure gauge 100 in the compressed air conduit 87 leading to the opening 83 of the reservoir 81. Also, it is desirable to slowly move the pressure roll into engagement with the warp beam to prevent damage to the warp sheet. Such slow movement can be attained by placing a check valve 101 in the conduit 95 and by-passing the check valve by a flow restricting tube 102.

The system further includes a pair of reservoirs 78 and 79 for the motor 63 which at all times are only partially filled with a hydraulic fluid to provide a space above the fluid and which respectively have upper openings 103 and 104 and lower openings 105 and 106. The upper openings 103 and 104 respectively are connected by conduits 107 and 108 to outlets 109 and 110 of a valve 111 which has an inlet 112 and has a vent 113.

The valve 111 has a movable member 114 for providing two open and venting positions with the inlet 112 connected to the outlet 109 and the outlet 89 connected to the vent 113, and vice versa, and a closed position, as shown.

The lower openings 105 and 106 respectively are connected by a conduit 115 to an opening 116 at one end of the cylinder 62 and by a conduit 117 to an opening 118 at the opposite end of the cylinder 62 so that the piston 64 can be moved back and forth.

As shown herein, the cylinder and its connections are arranged to move the cradle downwardly and outwardly when the air inlet 112 is connected to the valve outlet 109 in communication with the reservoir opening 103. Thus, to prevent the cradle from moving down too rapidly and possibly jarring the warp beam to cause the same to roll off the cradle and inflict personal injury or property damage, a check valve 119 is connected in the conduit 108 and a flow restricting tube 120 by-passes the check valve.

In order to prevent the cradle from being operated while the pressure roll bears against the warp beam, the air inlet 112 of the valve 111 is connected to the outlet 88 of the valve 90, whereby air is admitted to the valve 111 only when the inlet 91 is connected to the outlet 88 of the valve 90 and the pressure roll is fully retracted.

In the event of failure of the pressure system, it is desirable to move the pressure roll 42 away from the warp beam 11. A conventional mechanism, such as a counterpoise assembly, is used for this purpose which comprises a shaft 121 urged in a counter-clockwise direction by a weight or spring (not shown), a pair of arms 122 each having one end secured to the shaft for pivotal movement therewith, and an adjustable link 123 for connecting the other end of each arm to one of the members 39, whereby the counterpoise assembly tends to move the pressure roll 42 away from the warp beam 11. However, such movement is prevented by the hydraulic motors 44 and 45 while medium under pressure is supplied thereto.

In operation, when air is admitted to one of the reservoirs of a pair, the other reservoir of that pair is vented, whereby the air pressurizes the hydraulic fluid and causes it to operate the piston in one direction while the fluid in back of the piston is returned to the vented reservoir.

From the foregoing description, it will be seen that the present invention provides an improved warping machine which is simple, practical and economical in construction, is safe and reliable in operation, and prevents damage to parts of the machine or the warp being wound.

As various changes may be made in the form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in any limiting sense.

I claim:

1. In a warping machine, the combination of an element mounted for movement from one position to another; a cylinder having an opening adjacent each end thereof; a piston in said cylinder having a rod connected for moving said element from one position to the other; a pair of reservoirs partially filled with hydraulic fluid to provide a space above the fluid and each having an upper and a lower opening; means for connecting one of said lower reservoir openings in fluid flow communication with one of said cylinder openings and the other of said lower reservoir openings with the other of said cylinder openings; a valve having means providing two open and venting positions, and a closed position including an inlet for compressed air, a pair of outlets and a vent; and means for connecting one of said valve outlets in fluid flow communication with one of said upper reservoir openings and the other of said valve outlets with the other of said upper reservoir openings to pressurize the space above the fluid.

2. A warping machine according to claim 1, including a warp beam and wherein said element is a pressure roll for said warp beam.

3. A warping machine according to claim 1, including a warp beam and wherein said element is a doffing cradle for said warp beam.

4. In a warping machine, the combination of an element mounted for movement from one position to another; a cylinder having an opening adjacent each end thereof; a piston in said cylinder having a rod connected for moving said element from one position to the other; a pair of reservoirs partially filled with hydraulic fluid to provide a space above the fluid and each having an upper and a lower opening; means for connecting one of said lower reservoir openings in fluid flow communication with one of said cylinder openings and the other of said lower reservoir openings with the other of said cylinder openings; a valve having an air inlet, a pair of outlets and a vent and means to provide two open and venting positions; and a closed position; a supply of compressed air connected to said valve inlet; and means for connecting one of said valve outlets in fluid flow communication with one of said upper reservoir openings and the other of said valve outlets with the other of said upper reservoir openings to pressurize the space above the fluid.

5. In a warping machine, the combination of a warp beam; a pressure roll mounted for movement into and out of engagement with said warp beam; a cylinder having an opening adjacent each end thereof; a piston in said cylinder having a rod connected for moving said pressure roll into and out of engagement with a pair of reservoirs partially filled with hydraulic fluid to provide a space above the fluid and each having an upper and a lower opening, means for connecting the lower opening of one of said reservoirs in fluid flow communication with said cylinder opening for admitting fluid to effect movement of said pressure roll into engagement with said warp beam and the lower opening of other of said reservoirs with said cylinder opening for admitting fluid to effect movement of said pressure roll out of engagement with said warp beam; a valve having means providing two open and venting positions, and a closed position including an inlet for compressed air, a pair of outlets and a vent; means for connecting one of said valve outlets in fluid flow communication with one of said upper reservoir openings and the other of said valve outlets with the other of said upper reservoir openings to pressurize the space above the fluid; a doffing cradle mounted for movement from one position to another while supporting said warp beam; a second cylinder having an opening adjacent each end thereof; a piston in said second

cylinder having a rod connected for moving said cradle from one position to the other; a second pair of reservoirs partially filled with hydraulic fluid to provide a space above the fluid and each having an upper and a lower opening; means for connecting the lower opening of one of said second reservoirs in fluid flow communication with one of said second cylinder openings and the lower opening of the other of said second reservoirs with the other of said second cylinder openings; a second valve having means providing two open and venting positions, and a closed position including an air inlet, a pair of outlets and a vent; means for connecting one of said second valve outlets in fluid flow communication with the upper opening of one of said second reservoirs and the other of said second valve outlets with the upper opening of the other of said second reservoirs to pressurize the space above the fluid; and means for connecting said second valve inlet in fluid flow communication with said first mentioned valve outlet which is connected to the upper opening of said reservoir for admitting fluid to said first cylinder to effect movement of said pressure roll out of engagement with said warp beam, whereby said cradle is operable only when said pressure roll is out of engagement with said warp beam.

6. In a warping machine, the combination of a removably mounted warp beam, a pressure roll mounted for movement into and out of engagement with said warp beam, means for effecting such movement of said pressure roll, a doffing cradle adapted to support said warp beam and arranged for movement with the beam thereon from a position beneath said warp beam to another position outwardly and downwardly of the region where said warp beam normally is mounted, means for effecting such movement of said cradle, and control means for said pressure roll and said cradle moving means arranged to prevent operation of said cradle moving means unless said pressure roll is out of engagement with said warp beam.

7. In a warping machine, the combination of a removably mounted warp beam having side flanges, a doffing cradle arranged for movement with the beam thereon from a position beneath said warp beam to another position outwardly and downwardly of the region where said warp beam normally is mounted, means for effecting such movement of said cradle, and control means for said cradle moving means, said cradle having a pair of curved members constructed to receive and support the flanges of said warp beam when positioned beneath said warp beam and said warp beam is unmounted and to deliver said warp beam in its other position with one end of said cradle tangentially disposed to floor surface on which the machine is supported, whereby removal of said warp beam from said cradle to the floor is facilitated.

8. In a warping machine, the combination of a removably mounted warp beam, a pressure roll mounted for movement into and out of engagement with said warp beam, means for effecting such movement of said pressure roll, a doffing cradle adapted to support said warp beam and arranged for movement with the beam thereon from a position beneath said warp beam to another position outwardly and downwardly of the region where said warp beam normally is mounted, means for effecting such movement of said cradle, means for releaseably locking said cradle in its position beneath said warp beam, and control means for said pressure roll and said cradle moving means arranged to prevent operation of said cradle moving means unless said pressure roll is out of engagement with said warp beam.

9. In a warping machine, the combination of a warp beam having central openings at the sides thereof, means for rotatably mounting said warp beam including an element extending into each of said openings one of which is retractably mounted, means for retracting said last mentioned element, a doffing cradle adapted to support said warp beam and arranged for movement with the beam thereon from a position beneath said warp beam to another position outwardly and downwardly of the region where said warp beam is rotatably mounted, means for effecting such movement of said cradle, means for releaseably locking said cradle moving means to position said cradle beneath said warp beam, and means operable, when said element retracting means have been operated to retract said retractable element from its warp beam opening, for axially shifting said warp beam to withdraw the same from said other mounting element to deposit said warp beam on said cradle.

10. In a warping machine, the combination of a warp beam having central openings at the sides thereof, means for rotatably mounting said warp beam including an element extending into each of said openings one of which is retractably mounted, means for retracting said last mentioned element, a doffing cradle adapted to support said warp beam and arranged for movement with the beam thereon from a position beneath said warp beam to another position outwardly and downwardly of the region where said warp beam is rotatably mounted, means for releaseably locking said cradle moving means to position said cradle beneath said warp beam, means for effecting such movement of said cradle, and means operable, when said element retracting means have been operated to retract said retractable element from its warp beam opening, for axially shifting said warp beam to withdraw the same from said other mounting element to deposit said warp beam on said cradle, and means for rendering said locking means ineffective after said warp beam has been deposited on said cradle, whereby said cradle moving means are rendered ineffective unless said warp beam is supported thereon.

11. In a warping machine, the combination of a warp beam; a pressure roll mounted for movement into and out of engagement with said warp beam; a cylinder having an opening adjacent each end thereof; a piston in said cylinder having a rod connected for moving said pressure roll from one position to the other; a pair of reservoirs partially filled with hydraulic fluid to provide a space above the fluid and each having an upper and a lower opening; means for connecting one of said lower reservoir openings in fluid flow communication with one of said cylinder openings to cause said pressure roll to move into engagement with said warp beam; means for connecting the other of said lower reservoir openings with the other of said cylinder openings to cause said pressure roll to move out of engagement with said warp beam; a valve having means providing two open and venting positions, and a closed position including an inlet for compressed air, a pair of outlets and a vent; means for connecting one of said valve outlets in fluid flow communication with one of said upper reservoir openings and the other of said valve outlets with the other of said upper reservoir openings to pressurize the space above the fluid; and an air pressure regulating valve in the said last mentioned means connected to said reservoir for causing said pressure roll to move into engagement with said warp beam.

References Cited in the file of this patent

UNITED STATES PATENTS

497,301	Buchel	May 16, 1893
1,960,399	Taylor	May 29, 1934
2,098,418	Francis	Nov. 9, 1937
2,204,434	Munson	June 11, 1940
2,572,904	Bauer	Oct. 30, 1951
2,635,321	Bauer et al.	Apr. 21, 1953
2,663,067	Roughsedge et al.	Dec. 22, 1953
2,756,481	Bauer	July 31, 1956