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PAPER MAKING MACHINE PRESS ROLL ASSEMBLY

Filed Dec. 3, 1943 2 Sheets-Sheet 1

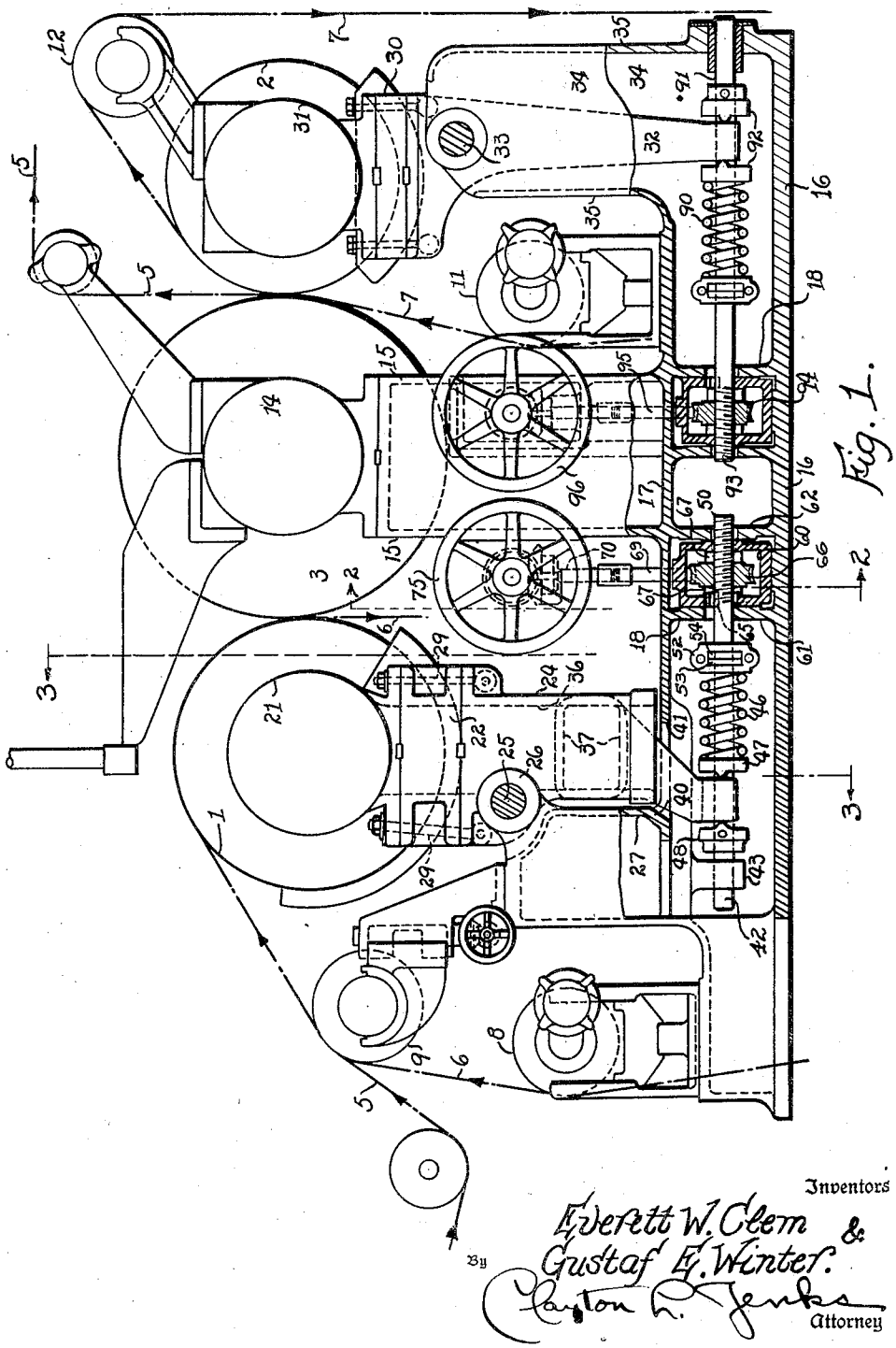


Fig. 1.

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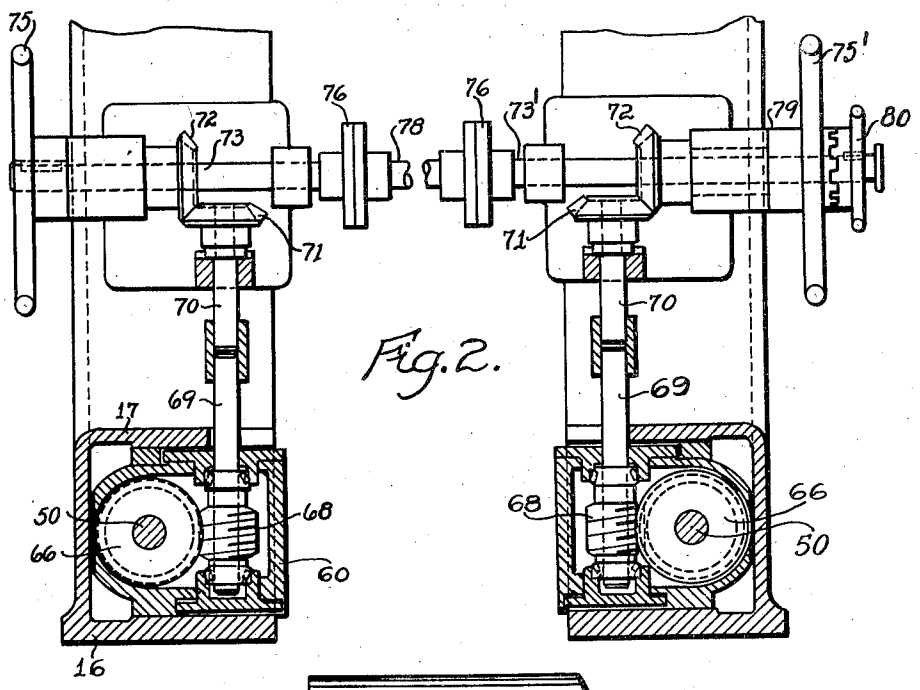


Fig. 2.

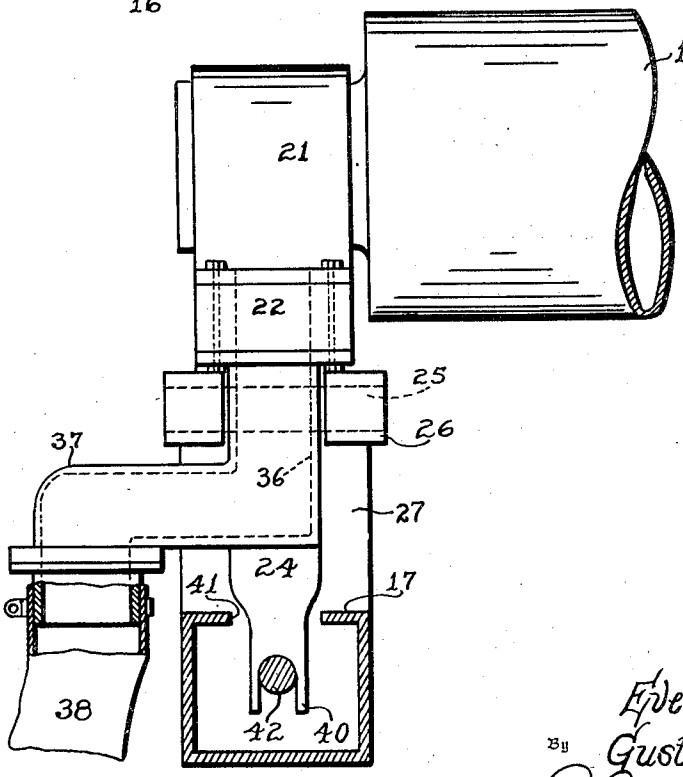


Fig. 3.

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PAPERMAKING MACHINE PRESS ROLL ASSEMBLY

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5 Claims. (Cl. 92—49)

This invention relates to the press section of a paper making machine, and more particularly to the construction of a press having press rolls arranged in axial parallelism to remove water from a paper pulp web passing therebetween.

A dual press assembly, as heretofore made, comprises three rolls arranged side by side with their axes substantially in horizontal alignment. The central roll is mounted on a stationary axis, and each of the two end rolls is held thereagainst by manually adjustable springs mounted above the roll bearings and arranged to rock two pivoted levers carrying the bearing housings. The paper web is carried into the two nips between the pairs of rolls by means of two endless felts which serve as a cushioning medium and prevent the paper web from being crushed under the high pressure involved. The two felts pass downwardly from the end roll through the machine base to a space in the room below. These felts must be replaced frequently; and to do so, it is necessary to move each end roll away from the central roll and to lift it from one of its bearings so as to pass the endless felt over the roll.

The springs for the rocking levers employed in such a press for holding the rolls under pressure have been mounted in such positions that they have had to be disassembled and various parts of the machine removed before the felt could be changed. Such constructions have endangered the operator because of the possibility of the pressure roll housing and associated parts falling outwardly when the spring assembly has been removed and the pressure roll raised. Moreover, the two springs at the opposite ends of the roll are separately adjusted, and it is difficult to obtain the same pressure simultaneously at the two ends or to control the pressure as needed for the paper making operation.

Also, the pivot of the movable pressure roll has been so located so that the weight of the roll tends to relieve the pressure, and spring compression must be used to hold the rolls even in the slightest contact. The springs required for normal press uses are however, so heavy or rigid and insensitive that the pressure cannot be adjusted to a low enough degree to prevent the felt from being cut or crushed when it is roped or interfolded during a washing operation. That is, the felt is customarily washed by passing it through the press rolls while subjected to a suitable soap solution and water; and the felt is narrowed down in that roped condition to a small fraction of its former width where the roll pressure is concentrated to a dangerous extent. It is desirable to avoid using the springs and to have only a moderate pressure on the felt at such a time.

It is the primary object of this invention to overcome such problems and to provide a press section for a paper making machine wherein the movable pressure roll is so mounted and the pressure mechanism so arranged that the pressure required for squeezing water from the paper pulp web may be properly controlled at both ends of the roll.

A further object of the invention is to provide manually adjustable springs for imparting a required pressure to the movable pressure roll and to so arrange the springs and the associated adjusting mechanism that they need not be removed and will not interfere with the replacement of the endless felt passing around the pressure roll.

A further object of the invention is to provide a press of this type in which two springs employed to move the two ends of the pressure roll may be adjusted either separately or simultaneously and with a desired or uniform pressure at the opposite ends of the roll.

A further object of the invention is to so locate the pressure roll pivot and arrange the parts that the rolls are maintained in contact with a low pressure suitable for a felt washing operation and the operator is not endangered when the pressure roll is moved away from the other. Further objects will be apparent in the following disclosure.

Referring to the drawings which illustrate a preferred embodiment of this invention:

Fig. 1 is a side elevation of a dual press assembly with parts broken away and in section in order to show the constructional features of the spring pressure mechanism.

Fig. 2 is a section on the line 2—2 of Fig. 1; and Fig. 3 is a section on the line 3—3 of Fig. 1.

This invention, which applies to a single pair of rolls, is shown in the drawings as applied to a dual press assembly comprising two movable pressure rolls 1 and 2 arranged in peripheral contact with and on opposite sides of a central roll 3. The axes of the rolls are parallel and may lie in substantially horizontal alignment or close to a horizontal plane so as to form two substantially vertical pressure nips therebetween. The paper web coming from a Fourdrinier machine or a cylinder machine is led over the top of the first roll 1 by means of an endless woolen felt 6 or other suitable medium. The web then passes on top of this felt downwardly into the nip beneath the rolls 1 and 3 and finally travels with a second endless felt 7 of wool or other material upwardly into

the nip between the rolls 1 and 3. The first endless felt 6 passes over guide roll 8 and felt roll 9, which are adjustably mounted on the framework of the machine; and after leaving the pressure roll 1, the felt passes vertically downwardly through an opening in the building to a room below, where the felt goes around a tension roll arranged for its return to the press. Similarly, the endless felt 7 passes over guide roll 11 and felt roll 12 to a space beneath the machine for its return travel. It will be understood that other constructional arrangements may be employed for leading the paper web from above or below into the nip between each pair of press rolls that may be used.

The roll 3 may be mounted on the framework of the machine in accordance with standard construction. Each end of the journal which carries the roll may be suitably supported on roller bearings carried in the bearing housing 14. Each housing is removably mounted on a hollow pedestal 15. The two pedestals are located on opposite sides of the machine, and each projects upwardly from a horizontal box-like structure formed by the base plate 16 and a second wall 17 spaced thereabove which are connected by vertical walls 18.

The first pressure roll 1 is usually a suction roll. The second pressure roll 2 may be a plain roll. Each roll may be constructed and arranged in accordance with standard practice. The mounting of each pressure roll is substantially the same. The journals which support roll 1 are each mounted in roller bearings of suitable construction and arrangement held within a housing 21, which is removably mounted on the supporting lever, or as shown on a cricket 22. This cricket, which is keyed to the housing, is in turn removably mounted on and keyed to a substantially vertical rocking lever 24. The keys serve to align the two bearing housings after changing the felt. Each lever 24 has a bearing pivotally carried on a pivot pin 25 which passes through two spaced ears 26 projecting laterally from the vertical wall 27 of a standard carried by the base wall 17. The journals carrying the roll 1 are similarly mounted, and the pivot pins 25 are in alignment so that the roll 1 may be swung about the horizontal axis of the pins.

Two clamping bolts 29 having nuts on their upper ends are suitably pivoted on lugs on the side of each rocking lever 24; and they pass through open slots in the cricket 22 and the base of the housing 21 and are arranged to removably secure the housing and the cricket in place. The nuts may be readily removed and the swinging bolts swung out of the way so as to release the bearing housing and the cricket from the rocking lever 24. This permits removal of the cricket, after roll 1 has been supported by a crane or other suitable construction. Then an endless felt may be passed through the opening left by the cricket, or by moving the roll bearing upwardly, and thus be removed from or looped around the end of the roll.

The other pressure roll 2 is similarly supported on two spaced crickets 30 which carry the bearing housings 31 on the opposite ends of the roll. Each of the crickets 30 is supported on a swinging lever 32 likewise carried on the pivot pin 33 supported by the two parallel end walls 34 forming a standard at each side of the machine. This standard has front and rear walls 35 which are spaced apart far enough to permit the lever 32 to swing as required to move the roll toward and from the central roll for either pressing the paper web or for removal from contact therewith.

Since the roll 1 is a suction roll, the swinging lever 24 at the front of the machine (Figs. 1 and 3) is made as a hollow piping at its upper end and shaped and arranged to be connected to a rubber hose for transmission of water and the exhaustion of air from the interior of the roll, in accordance with standard practice. That is, the upper portion of the lever 24 is formed of four spaced walls which provide a passage 36 leading upwardly through the cricket and the bearing housing to the interior of the roll 1. This passage at its lower end turns outwardly below the point of suspension of the lever on the pivot pin 25, and the outwardly extending walls 37 are connected to a flexible rubber hose 38 connected with a suction device. The rear lever arm 24 may be made as a solid metal body similar to the part 32 at the right-hand end of the machine.

It will be observed that the pivot pins 25 and 33 are outside of a vertical plane passing through the centers of gravity of the rolls 1 and 2 and the associated parts, so that each of these rolls tends to move inwardly towards the central roll 3. This prevents the roll from swinging outwardly and possibly injuring the operator of the machine when the pressure of the springs is completely removed. The axis of each of the pivot pins 25 and 33 is located only slightly outside of that vertical plane, so that each pressure roll is held against the central roll 3 under a low pressure, such as a few hundred pounds, when the springs are not tightened. This pressure is sufficient for washing the felt, which becomes roped or interfolded during the washing operation, and it will not cut or crush the felt. If the normally heavy springs used to hold the rolls in contact had to be adjusted to provide the required pressure for the washing operation, it would be found that a very slight adjustment of the spring might give, say 50 or 75 pounds of pressure per inch of roll face, and if that pressure on a roll having a nip of 150" length were concentrated in ten or fifteen inches where the felt is roped, this would present a dangerously high pressure and tend to injure the felt. In our construction, it is desirable not to employ any spring pressure during the washing operation and to depend solely on gravity to hold the rolls in contact.

A primary feature of this invention resides in the construction of the mechanism which serves to move each pressure roll 1 and 2 towards and from the central roll 3 and to control the pressure therebetween. To this end, we move each of the swinging levers 24 independently by a separate spring, and we employ two separate manually operated mechanisms to control the springs, so as to vary the pressure imparted by each spring to the pressure roll. The operating mechanism is so constructed and arranged that both of the springs may be adjusted to the same degree of pressure simultaneously or each spring may be separately adjusted as deemed necessary by the machine operator. These springs and the operating mechanisms are so located that there is no interference with the replacement of the endless felts 6 and 7.

The construction is substantially the same for moving each of the two rolls 1 and 2 and but one need be described. The lower portion 40 of each of the depending levers 24 projects downwardly through a slot 41 in the casing wall 17. This lever end is forked or shaped as a yoke which

straddles the longitudinally movable rod 42. One end of the rod 42 is slidably mounted in a stationary lug 43 depending from the casing wall 17. The other end of the rod is connected to a push and pull shaft 50 which is moved by the control mechanism. A heavy helical spring 46 surrounds the rod 42. One end of the spring engages a plate 47 loosely mounted on the rod 42 and provided with a lug on its inner face contacting with the yoke 40 of the lever 24. A second plate 48 is threaded on the rod 42 in engagement with the opposite side of the yoke, so that the end of the lever is held securely between the two plates and is moved in accordance with movement of the rod 42. The other end of the spring 46 engages the clamp 52 which connects the push rod with the shaft 50. This removable clamp 52 is of suitable construction for connecting the two heads 53 and 54 of the rod 42 and the screw 50 respectively. The roll 1 is held under adjustable pressure against the roll 3 by forcing the push rod 42 towards the left and compressing the spring 46 to the desired extent.

The threaded push and pull shaft 50 is mounted in a removable box shaped gear housing 60 which is slidably insertable from within the base into the space between the walls 16 and 17 and the vertical walls 61 and 62. These latter walls are slotted so that the shaft 50 may be slid into place without disassembling the parts, except that of removing the clamp 52 and thus separating the shaft 50 from the rod 42.

The shaft 50 slides freely longitudinally through the end walls of the housing 60, and the key 65 in the shaft 50 engages a suitable keyway in the associated vertical wall and prevents the shaft from turning. In order to move the shaft 50 longitudinally, it is provided with a screw thread which is threaded into a worm gear 66. Suitable thrust bearings 67 are mounted on each side of the worm gear 66, so that when the gear is rotated the shaft 50 is moved longitudinally. The gear 66 is turned by means of a worm 68 mounted on the lower end of the vertical shaft 69 suitably supported in bearings in the housing. This shaft 69 is connected through a coupling with a further shaft 70 which carries a bevel gear 71 fixed on its upper end. The gear 71 meshes with a bevel gear 72 on a short shaft 73 suitably mounted on the framework of the machine. A hand wheel 75 secured to the shaft 73 turns the bevel gear 72 and thus serves through the gear mechanism to compress the spring 46 and thrust the roll 1 against the roll under the desired pressure, or to remove the roll 1 from contact with the roll 3 and hold it in any desired position relative thereto.

It will be observed by reference to Fig. 2 that the mechanisms for operating the front and the rear rocking levers 24 are substantially the same and may be identified by the same reference numerals. Each shaft has a flanged collar 76, and the latter are connected to flanged collars on a coupling shaft 78 suitably secured thereto, so that the two shafts rotate together. The left-hand shaft 73 is keyed directly to the hub of the hand wheel 75, while the right-hand shaft 73' is secured to the associated hand wheel by means of a suitable clutch mechanism. As shown, the hub 79 of the hand wheel 75' is freely rotatable on the shaft 73'. A suitable clutch sleeve 80 is slidably keyed to the shaft 73' and clutch teeth on the face of this clutch sleeve 80 and the front face of the hub 79 serve to connect the shaft 73' with the hand wheel 75' or to leave the parts disconnected, as desired, in accordance with the movement of the clutch collar 80. When the clutch 80 is disconnected, then the hand wheels are operated separately to adjust the pressures of the springs at the opposite ends of the roll 1 as desired. When the clutch 80 is connected, then turning either of the hand wheels serves to compress both springs at the opposite ends of the roll 1 to the same extent.

The roll 2 is similarly forced against the roll 3 by a like construction comprising the spring 90 on the slidable rod 91 which has the collars 92 thereon engaging the opposite sides of the swinging lever 32. The rod 91 is moved longitudinally by means of the screw threaded push and pull rod 93 which is similarly keyed in the housing walls. The rod 93 is moved endwise by means of the worm gear 94 and a worm on the vertical shaft 95 that is manually operated by means of the hand wheel 96. Thus, by means of the two hand wheels 96 at the opposite sides of the machine, the roll 2 may likewise be adjusted separately at its opposite ends, or its two ends may be pressed simultaneously and under the same pressure against the central roll 3. The rear hand wheel may be omitted, if desired, and the adjustments made wholly from the front of the machine. It will also be appreciated that any of the hand wheels 75 and 96 may be adjusted to give a greater pressure at either end of the associated roll than at the other and that when the clutch is engaged any further compression of the springs will supplement equally the pressures previously applied.

Since the gear boxes 60 and the associated operating mechanisms are located within the base of the machine and outside of vertical planes passing through the end faces of the pressure rolls, there is nothing in this construction which will interfere with removal of the felts. The swinging levers 24 and 32 are likewise located outside of these same vertical planes. To replace either of the endless felts, it is merely necessary to support the roll 1 or the roll 2 from above and to remove the associated cricket. The roll 1 or 2 is held out of contact with the central roll 3 by suitable adjustment of the pressure mechanism in the base of the machine. If the springs had to be removed together with the associated operating mechanism, then they could not be used to hold the pressure roll stationary, as is accomplished by the above described construction. All of the parts remain assembled except the cricket, or the bearing housing, if it is mounted directly on the lever without the use of an intermediate cricket. Thus, the replacement of the felt is a simple matter.

The operation of the mechanism has been fully described in the above disclosure. A primary purpose of this invention is to provide a mechanical construction including adjustable springs for moving a pressure roll in either direction and holding it remote from or peripherally engaging an associated roll, and wherein the springs may be adjusted either separately or simultaneously and equally. Furthermore, the springs and associated operating mechanisms are so located and constructed that they may remain fully assembled while an endless felt is replaced around the movable pressure roll. In particular it is desirable that the springs and operating mechanisms be connected directly to the rocking levers and independent of the crickets, so that the crickets may be readily removed without disturbing the pressure mechanisms. The levers may be ar-

ranged either vertically or at any other desired angle, and the operating mechanisms may be connected to any suitable portion of the lever except the end carrying the roll and its supporting cricket. Although the cricket has been shown as a separate part, it may be a part of the bearing housing or other roll supporting unit, provided it may be separated from the lever so as to permit a felt to be passed around the pressure roll. It will be apparent that many modifications may be made by one skilled in the art in the construction and arrangement of the parts. The invention applies equally to a two roll press or to a three roll assembly as described. Hence, the above disclosure is to be interpreted as setting forth the principles of this invention and a preferred embodiment thereof and not as imposing limitations on the appended claims.

We claim:

1. A paper making machine press roll assembly comprising a movable pressure roll and a second roll mounted in parallel axial arrangement with their axes near a horizontal plane for pressing a paper web therebetween, two separate levers pivoted below and carrying the opposite ends of the pressure roll, two separate springs, one associated with each lever and located below the pressure roll axis, which urge the pressure roll towards the other roll, means for leading an endless felt around and beneath the pressure roll, mechanism for independently adjusting the force applied by each of said springs, and mechanism associated therewith for adjusting the springs simultaneously and moving the levers in unison, said springs being so located that the pressure roll may be removed and the felt replaced without disassembling the springs and their adjustment mechanism.

2. A paper making machine press roll assembly comprising a movable pressure roll and a second roll mounted in parallel axial arrangement with their axes near a horizontal plane for pressing a paper web therebetween, two separately pivoted levers carrying the opposite ends of the pressure roll, two separate springs, one associated with each lever and located below the pressure roll axis, which urge the pressure roll towards the other roll, separate push and pull mechanisms for adjusting the tensions of the springs independently of another and for positively moving the associated lever in either direction and holding it in a desired position, and means for interconnecting said mechanisms so that the springs may be adjusted simultaneously and equally.

3. A paper making machine press roll assembly comprising a base, a press roll rotatably mounted thereon, a pair of opposed substantially vertical rocking levers pivotally mounted on the base, a pressure roll, roll supporting means for removably mounting the ends of the pressure roll on the ends of said levers and substantially above their pivots and in peripheral contact with the press roll, the axes of said rolls being near a horizontal plane, means for leading an endless felt around and beneath the pressure roll, and separately operating mechanisms including springs for moving said levers positively in either direction and urging the pressure roll toward the other, each mechanism being connected directly to the lever independently of and below said roll supporting means so that the pressure roll may be removed and the felt replaced without disassembling said mechanism.

4. A paper making machine press roll assembly comprising a base, a press roll rotatably mounted on said base, a pair of substantially vertical rocking levers pivotally mounted on the base, a removable cricket on the upper end of and above the pivot of each lever, a pressure roll mounted on said cricket, means for leading an endless felt around and beneath the pressure roll, a push and pull mechanism including a spring connected to each lever independently of and below the cricket and arranged to move the pressure roll toward and from the other roll and to hold it under an adjusted pressure and means for interconnecting said mechanisms so that the two ends of the pressure roll may be moved simultaneously and equally, said springs and operating mechanisms being located below the pressure roll and outside of the path of the endless felt and not requiring disassembly to permit replacement of said endless felt.

5. A paper making machine press roll assembly comprising a base having two pairs of opposed standards thereon, a roll rotatably mounted on one pair of standards, a pair of substantially vertical levers of the first class pivotally mounted centrally on the other pair of standards, a pressure roll having its ends removably mounted on the upper end of said levers and arranged to carry an endless felt passing around it, the other end of each lever projecting downwardly beneath its pivot, said pivots supporting the pressure roll and being so arranged that the pressure roll tends normally to move under the influence of gravity towards the other roll, and mechanism including springs connected with the lower ends of the levers which serves positively to move the pressure roll toward and from the other and to hold it under a desired pressure, said springs and associated mechanism lying outside of the path of the endless felt and not requiring disassembly for replacement of the pressure roll or felt.

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