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PAPER MAKING MACHINE PRESS SECTION

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2 Sheets-Sheet 1

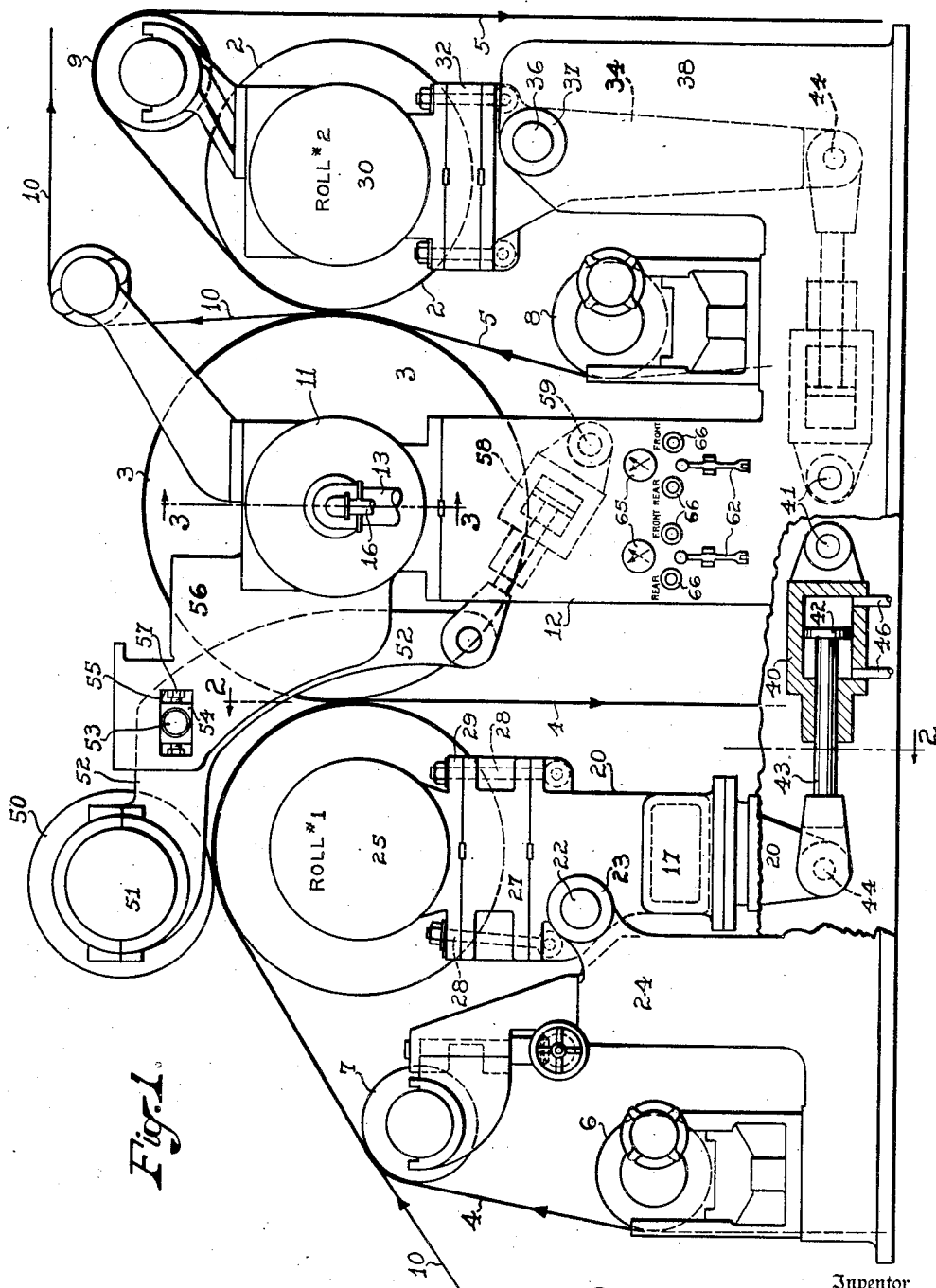


Fig. 1.

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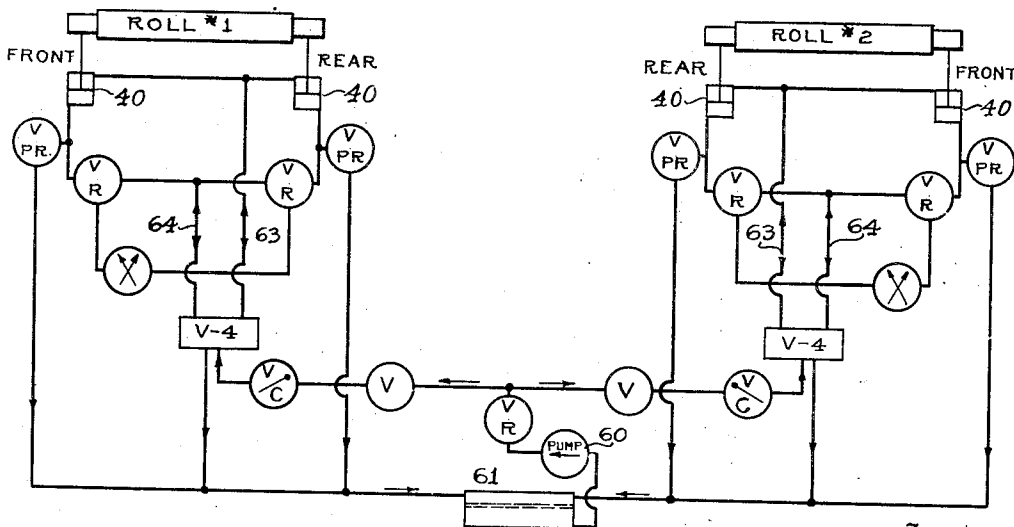
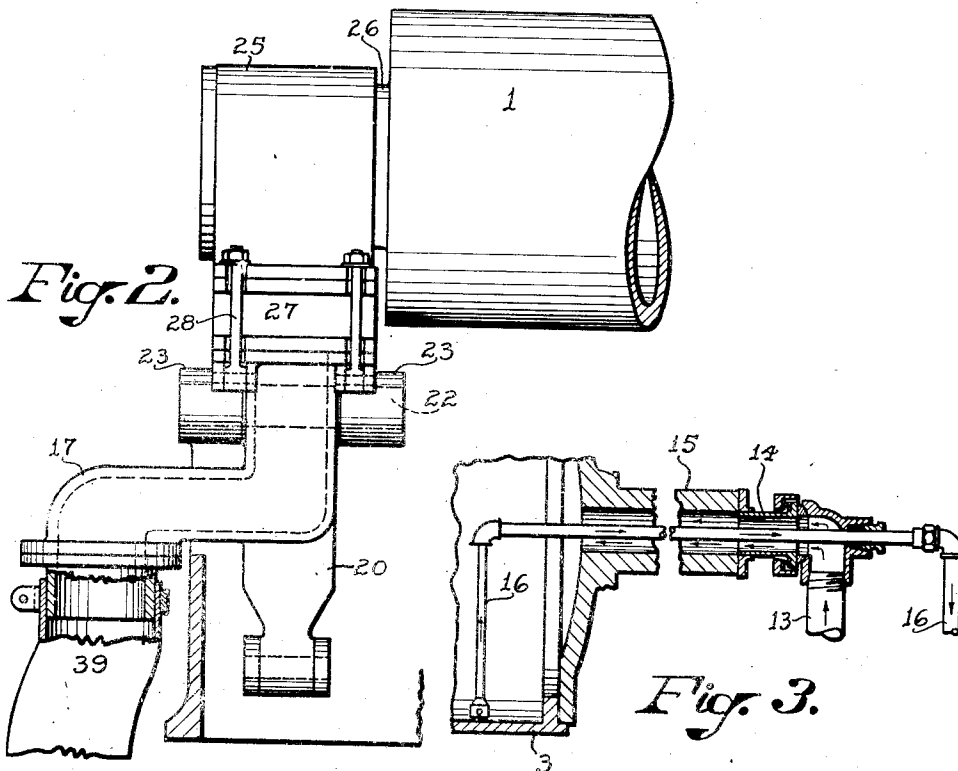


Fig. 4.

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## UNITED STATES PATENT OFFICE

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## PAPERMAKING MACHINE PRESS SECTION

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This invention relates to a paper making machine, and more particularly to the press section which receives the web of paper pulp as it comes from the forming machine and removes further water therefrom.

A standard form of dual press heretofore used comprises three rolls arranged side by side, and in a horizontal alignment with their axes near a horizontal plane. The paper web is carried into each nip between the rolls on two endless felts passing around the end rolls. Each felt serves as a pressure cushioning medium and prevents the web from being crushed and its continuity broken. The rolls are frictionally driven in peripheral synchronism. In one type of dual press roll assembly, each of the outside pressure rolls is mounted at its ends on two levers pivoted in substantially vertical alignment with the roll axis, and each pressure roll is urged toward the center roll by means of separately adjusted heavy springs engaging the bearing housings. These springs and various associated parts have been so constructed and located that they must be disassembled and removed before a new felt can be put into position; and this is a difficult and time wasting operation. The springs are so arranged that it is not possible to move the pressure roll quickly away from the center roll in any emergency, such as in case of danger to the operator or where the paper breaks or some foreign body gets into the nip. Moreover, since the pivot bearings are substantially vertically beneath the center of gravity of the roll, the operator is endangered by the liability of the roll falling outwardly when the spring mechanisms are disassembled for replacing the felt. Also, the separately adjustable springs cannot be adjusted readily and accurately to give a uniform and desired pressure at the opposite ends of the roll, or a predetermined and different pressure at each end of the roll, except as the operator of the machine accidentally or painstakingly adjusts the springs to the required pressure conditions and one at a time. To adjust the rear spring, the operator is obliged to cross the running machine, which is hazardous.

The primary objects of this invention involve overcoming such problems and providing a press section for a paper machine wherein two or three press rolls are so mounted and the pressure roll so moved that the pressure at the nip may be widely varied and precisely controlled and whereby the two ends of the movable roll may be held under an equalized or desired pressure.

A further object is to provide a pressure mech-

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anism for moving the pressure roll which may be remotely controlled, or from one side of the machine, and wherein the pressure at both ends of the roll may be separately adjusted as desired or the two ends of the roll may be held under an equal pressure.

A further object is to provide a manually controlled pressure mechanism which permits a quick removal of the pressure roll to an inoperative position and its subsequent return to a required and predetermined pressure condition.

A further object is to provide a press construction in which the unit employed for imparting pressure to the rolls is out of the way and does not interfere with the replacement of the endless felt.

A further object is to provide a construction which does not require disassembling the machine for the purpose of changing the felt, and wherein each roll is so mounted that the operator is not in danger during the felt changing procedure.

Another object of this invention is to provide a dual press section having a heated press roll which aids in removing the water from the paper web and to so control the pressure of the side rolls that in the case of breakage of the web the endless felts may be removed quickly from contact with the heated roll so as to minimize the danger of scorching the woolen felt by direct contact therewith. 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 somewhat diagrammatic end elevation of a dual press roll assembly;

Fig. 2 is a fragmentary side elevation showing the mounting of one end of a suction press roll;

Fig. 3 is a fragmentary detail showing the manner of steam heating the central press roll; and

Fig. 4 is a diagrammatic view showing the piping, valves and associated devices that supply fluid under pressure and control the fluid pressure actuated mechanisms.

This invention, which applies to various types of presses comprising two or more rolls, has been illustrated in the drawings as a dual press section. This may comprise two movable pressure rolls 1 and 2 arranged in pressure contact with and on opposite sides of a central roll 3, the axes of which are parallel and may lie close to a horizontal plane. The paper web 10, which comes from a Fourdrinier machine or a cylinder mold or other suitable paper making machine, is led over the top of the first roll 1 by means of an

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endless felt 4 made of wool or other suitable material. The paper web passes on top of this endless felt downwardly into the nip between the rolls 1 and 3, and it then travels with a second endless woolen felt 5 upwardly into the nip between the rolls 2 and 3. The first felt 4 passes over a guide roll 6 and a felt roll 7 adjustably mounted on the framework of the machine, and after leaving the pressure roll it passes vertically downwardly through an opening in the floor to a room below where the felt goes around a felt roll for its return to the press. Similarly, the endless felt 5 passes over an adjustable guide roll 8 and a felt roll 9 to a space below the machine for its return travel.

Each journal carrying the central roll 3 is suitably mounted on roller bearings carried in the bearing housing 11, which is supported on a stationary pedestal 12 forming a part of the frame of the machine. The central roll has its axis in a horizontal plane, and the roll axis is stationary. The central roll may be steam heated by suitable means. As shown in Fig. 3, this may comprise a steam pipe 13 communicating through a rotating sleeve 14 with a central hollow space within one end of the rotating journal 15 of the roll 3 and opening into the interior of the roll. The condensate flows outwardly through the stationary pipe 16, the inner end of which depends to a position near the bottom of the roll. The pipe 16 passes axially through the journal and the associated parts arranged for introducing the steam. Suitable glands and packings are employed as desired to prevent leakage. Roll #2 may be a plain solid roll; but roll #1 may be constructed according to standard practice as a suction roll arranged for the downward removal of water from the pulp web through the endless felt and through a foraminous or perforated surface of the roll to a suction chamber therein, and the water may be suitably withdrawn from the roll through the hollow journal and a communicating pipe 17.

In accordance with this invention, the movable pressure roll is so mounted that it may be readily moved towards and from the axis of the associated press roll or be held under suitable pressure to carry on the normal operation of the press, and whereby the movable roll may be held in a desired remote position for the replacement of the woolen felt. To this end, the pressure roll is mounted on a movable support, such as a pair of rocking levers, and pressure mechanism is connected and arranged to move the roll and to hold it under a controlled pressure.

The roll 1, in the embodiment illustrated, is mounted on a pair of substantially vertical rocking levers 20 of the first class carried centrally on axially aligned pivot pins 22 secured in ears 23 projected laterally from two walls or a standard 24 forming a part of the machine base. The axes of the pivot pins are well outside of or to the left of a vertical plane (Fig. 1) passing through the center of mass of the roll and associated movable parts, so that the roll tends to move to the right and lie against the roll 3. The horizontal distance between the two axes is enough so that when the pressure roll is removed from contact with the adjacent roll 3 for the replacement of the felt, gravity will still tend to swing the pressure roll 1 towards the other roll. Also, the pressure roll will be held against the center roll under a light pressure, such as a few hundred pounds, when the supplemental pressure is withdrawn. This is particularly desir-

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able for the operation of washing the felt, which becomes roped or interfolded and would be cut or crushed if a high pressure were applied.

Each bearing housing 25 carrying the journal 26 of the roll is removably mounted on the swinging lever. As illustrated, it is preferably mounted on and suitably aligned, as by means of keys, with a removable cricket 27 which is in turn removably mounted on one of the swinging levers 20. The bearing housing is attached to the cricket and the pivoted lever 20 by means of locking bolts 28, which are pivotally secured to the lever 20 and pass through open slots in flanges on the cricket and bottom plate 29 supporting the bearing housing. The bolts have nuts on their upper ends which secure the parts together. The cricket is made removable so that the roll 1 may be suitably supported and the loop of a new endless felt 4 may be passed through the opening formed by the removal of the cricket. The felt is then looped around the guide roll 6 and the felt roll 7. The latter is removably mounted in half bearing blocks, so that an end of the roll may be raised to install the run of the felt.

Similarly, the other roll 2 may have its two bearing housings 30 removably mounted on its swinging levers. It is preferably mounted on crickets 32 which are removably attached to the pair of substantially vertical rocking levers 34, as above described. The rocking levers have pivot pins 36 corresponding with the pins 22 which are pivotally mounted in suitable bearings 37 carried by the standards 38 on the frame of the machine. This roll 2 is likewise so mounted that its axis is always inside of a vertical plane passing through the axes of the two aligned pivots 36, so that the roll 2 tends to move inwardly towards the central roll when it has been moved far enough to permit replacement of the endless felt. The two levers 34 of roll 2 and the rear lever of roll 1 may be similarly constructed, but the front rocking lever for the suction roll 1 and the removable cricket 27 may be made hollow to provide a passage communicating with the interior of the roll for the removal of water from the web by suction pressure. The pipe 17 projects laterally, as shown in Fig. 2, and is suitably connected to a flexible rubber pipe 39 which permits the required rocking movement of the roll. Various constructions and expedients may be employed for the purpose.

A primary feature of the invention comprises the fluid pressure mechanism employed for moving either or both of the pressure rolls 1 and 2 towards the central roll 3 and holding them under controlled and equalized or suitably varied pressures. A simplified form of construction for accomplishing this end comprises a fluid pressure actuated mechanism 40 of standard construction pivotally swinging on a pin 41 suitably projecting laterally from a side of the machine base. There are four of these fluid pressure mechanisms, one for each of the lower arms of the levers 20 and 34. The levers are located below the axes of their associated rolls and the levers and the fluid pressure mechanisms are located outside of vertical planes passing through the ends of the effective portions of the rolls, or outside of the path of travel of the felts. Hence, they do not interfere with the replacement and run of the felts 4 and 5, while remaining in their operative positions. Each of the fluid pressure mechanisms has a piston chamber carrying a slidable piston 42 mounted on a piston rod 43.

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The outer end of the piston rod, which passes through a suitable gland and packing in the end wall of the casing, is pivotally connected by a pin 44 to the lower arm of the rocking lever 20 or 34. Fluid under a controlled pressure is admitted to either side of the piston through the pipes 46.

If desired, a further pressure roll 50 may be installed above the first suction roll 1 and aid the suction roll in the removal of the water. The journals carrying this roll 50 may have its two ends carried in suitable bearing housings 51 supported on the ends of two parallel rocking levers 52. These levers are pivotally mounted below and at one side of the roll axis on aligned pins 53 carried on slide blocks 54 suitably held in slots 55 in two spaced standards 56 and held in adjusted position by means of screws 57 suitably carried by the standards. The lower end of each rocking lever 52, which is a lever of the first class, is pivotally connected to the piston rod of a fluid pressure device 58 pivotally mounted on a pin 59 suitably affixed to the central standard 12 of the machine frame. Pressure may be suitably admitted to either side of the piston in the chamber, and the parts are so arranged that the pressure roll 50 may be held down against the lower roll 1 under any desired pressure, or it may be upwardly moved and held out of contact therewith. This pressure mechanism may be tied in with the pressure system that moves the two rolls 1 and 2, or it may be entirely independent thereof.

The pressure mechanism for moving the two end rolls 1 and 2 is diagrammatically illustrated in Fig. 4 and comprises standard types of pressure control valves and associated devices. In this diagram, the following legends are employed:

V is a common valve,

VR is a pressure regulating valve,

VPR is a pressure release valve,

VC is a check valve,

V4 is a four way valve,

The crossed arrows indicate a dual pressure gauge.

By means of a suitable motor driven pump 60, fluid is drawn from a tank 61 and circulated as indicated by the arrows on the pipe lines. This fluid passes through a pressure regulating valve into divided passages, one for actuating the fluid pressure mechanisms of roll 1 and the other for actuating roll 2. By means of the four-way valve V—4, which is suitably manually controlled by a lever 62 (Fig. 1) on the standard 12, the fluid may be sent directly through the line 63 to the rear of the pistons and thus will serve to pull the pistons back and remove the pressure roll from contact with the center roll 3. At the same time, fluid exhausts through the pipe 64 and the four way valve. When it is desired to move the pressure roll forward into a pressure contact for a normal paper press operation, then the four way valve is so adjusted that it sends fluid under pressure in the reverse direction through the lines 63 and 64. The pistons are held under the pressures indicated by the dual pressure gauges 65 on the standard 12. The two pressure regulating valves VR are separately manually adjusted by suitable control devices 66 on the standard 12, so that the operator may observe the two needles of each gauge and regulate the fluid pressure mechanisms independently of each other. Thus, the pressures for the front and rear pistons of roll 1 or roll 2 may be made different and according to prede-

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termined or desired values, or the valves may be operated to bring the needles together and thus provide equal pressures at the opposite ends of the roll. The pressure release valves VPR are provided to maintain only the predetermined pressure of valves VR in case a lump passes through the roll nips.

Various mechanical expedients within the knowledge of those acquainted with hydraulic mechanisms and paper machine press sections may be employed; but the primary purpose of this construction involves having a controllable mechanism which will serve either to hold both ends of the pressure roll under the same pressure or to apply different pressures at the two ends of the roll according to the wishes of the machine operator. It will also be apparent that if an accident happens, the operator may very quickly adjust the control valves and cause the rolls 1 or 2 to be removed and held from contact with the central roll 3. This not only relieves the pressure from the paper web but also removes the two endless felts from contact with the steam heated central roll.

The locations of the pressure devices are such that no one needs to be moved or disassembled to permit changing the felts. The levers 20 and 34 are beneath the bearings for the rolls, and the fluid pressure actuated mechanisms are beneath the levers and close to the side walls of the machine base. That is, the levers, their pivots and the fluid pressure mechanisms are below the axes of the pressure rolls and are out of the way. The fluid control devices are located on the central standard 12 beneath the immovable roll 3. Hence, the pressure mechanisms need not be dismantled in any particular, when the felt is to be replaced. The piston device 58 is preferably located on the standard 12; and the lever 52, which is preferably curved to leave full access to the roll 1, is also carried by a wall 56 forming a part of the standard. Hence, the roll 50 may be held in any desired position by admitting fluid to the lower side of the piston. To replace the felt, the crickets are removed after the associated roll has been suitably supported from above. When the parts have been put back into place, the roll 1 or 2 may be again returned into pressure contact with roll 3 and there held under the initial pressure, or the pressure may be varied by suitably controlling the valves. It is to be noted that the pressure devices serve also to hold the rolls away from the stationary roll and in desired locations. That is, they move the roll both ways, whereas a spring can exert pressure only in one direction. Hence, the rolls are moved and a controlled pressure is applied by the use of a fluid pressure actuated mechanism of the type described.

It will now be appreciated that various modifications may be made in the construction in order to satisfy the objects of this invention. Hence, the above disclosure is to be interpreted as setting forth the principles of this invention and a preferred embodiment thereof and not as limiting the claims appended hereto.

I claim:

1. A paper making machine press roll assembly comprising a movable pressure roll and an associated roll arranged to contact peripherally with their axes in parallel and near a horizontal plane, two pivoted levers beneath the ends of the pressure roll, bearing supports for the pressure roll carried on the upper ends of the levers, pivotal supports for the levers having a common axis

beneath the pressure roll and providing for a substantially horizontal swinging movement of the roll, fluid pressure actuated piston and cylinder mechanism connected to swing each lever and move the pressure roll laterally in either direction and a fluid pressure delivery system including a control device to cause said swinging movement and to hold the rolls in contact under a desired pressure.

2. A paper making machine press roll assembly comprising a movable pressure roll and an associated roll arranged to contact peripherally with their axes in parallel and near a horizontal plane, two pivoted levers beneath the ends of the pressure roll, bearing supports for the pressure roll carried on the upper ends of the levers, pivotal supports for the levers having a common axis beneath the pressure roll and providing for a substantially horizontal swinging movement of the roll, two independent fluid pressure actuated piston and cylinder mechanisms connected to swing the levers independently and a fluid pressure delivery system including control devices for applying separately regulated pressures to the pistons to move the pressure roll in either direction and to hold the two ends of the roll under separately controlled pressures.

3. A paper making machine press roll assembly comprising a movable pressure roll and an associated roll arranged to contact peripherally with their axes in parallel and near a horizontal plane, means for leading an endless felt around and beneath the pressure roll, two substantially vertical levers beneath the ends of the pressure roll, bearing supports for the pressure roll mounted on the upper ends of the levers, one of which is removably mounted to provide for replacement of the felt, pivotal supports for the two levers having an axis beneath the pressure roll and which provide for a substantially horizontal swinging movement of the roll, separate fluid pressure actuated piston and cylinder mechanisms connected to move the levers which are located beneath the plane of the roll axes and outside of vertical planes passing through the effective ends of the roll surface which carries the felt, and a fluid pressure delivery system including control devices for supply fluid under pressure to said mechanisms to move the pressure roll in either direction and to hold it under a required pressure.

4. A paper making machine press roll assembly comprising a movable pressure roll and an associated roll arranged to contact peripherally with their axes in parallel and near a horizontal plane, two substantially vertical levers, bearing supports for the pressure roll carried on the upper ends of the levers, pivotal supports for the levers having a common axis located beneath the pressure roll but outside of a vertical plane through the

roll axis so that the pressure roll tends to be moved by a small component of gravity towards the other roll, and fluid pressure actuated mechanism including control devices connected to move the levers and swing the pressure roll laterally in either direction and to hold the pressure roll under a controlled pressure.

5. A paper making machine press roll assembly comprising a movable pressure roll about which an endless felt passes and an associated roll, said rolls being arranged to contact peripherally with their axes in parallel and near a horizontal plane, a stationary standard carrying said associated roll, two pivoted substantially vertical levers beneath the ends of the pressure roll, bearing supports for the pressure roll carried on the upper ends of the levers, pivotal supports for the levers having a common axis beneath the pressure roll and providing for a substantially horizontal swinging movement of the roll, a third roll having its axis above one of said rolls, pivotal supports for the third roll which are carried by said standard with their common axis located above the run of the felt, fluid pressure actuated mechanism on the standard for moving the third roll towards and from the roll beneath, fluid pressure actuated mechanism connected to the lower ends of said levers to swing them in either direction and hold them under a controlled pressure.

6. A paper making machine press roll assembly comprising three rolls having their axes in substantially horizontal alignment, the two outer ones being movable pressure rolls peripherally engaging the central roll, means for leading two endless felts separately around and beneath the pressure rolls, a stationary standard for supporting the central roll, two pairs of axially aligned, substantially vertical rocking levers, supports on the upper end of each pair of levers for a pressure roll, pivotal supports for each pair of levers having its axis beneath the supported roll but outside of a vertical plane through the roll axis so that each pressure roll tends to move laterally toward the central roll under the influence of gravity, a separate fluid pressure actuated mechanism connected to the lower end of each lever which serves for applying pressure to the lever independently of the others, and a fluid pressure system including control devices for transmitting a desired pressure to each mechanism to move the levers in either direction and to hold the roll carried thereby under a predetermined pressure against the central roll, said levers and fluid pressure devices being located outside of vertical planes passing through the effective ends of the rolls and beneath the roll axes so as not to interfere with the replacement of the felt while they remain in operative position.

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