The press section also incorporates a suction pickup roll which is supported within the pickup felt by an inner frame mounted on the outer frame in the same manner as the inner frame for the press rolls. Suction is supplied to the forward ends of the pickup roll and each suction press roll through suction tubes which are supported by the inner frames and extend within the looped felts to the rearward side member of the outer frame where the tubes are connected by flexible couplings to a suction supply line. Thus each of the inner frames can be tilted by actuating the corresponding jack so that each of the felts can be replaced without disconnecting the suction lines or requiring the use of an overhead crane. Furthermore, the stretch roll for each of the felts is slidably mounted on horizontally extending rails so that slack can be conveniently provided in each felt during felt change.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view of the front or forward side of a press construction in accordance with the invention;

FIG. 2 is a fragmentary section taken generally along the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary section taken generally along the line 3—3 of FIG. 1;

FIG. 4 is a section taken generally along the line 4—4 of FIG. 1 and illustrating the clearance for changing the upper felt; and

FIG. 5 is a fragmentary section taken generally along the lines 5—5 of FIG. 1 and illustrating the clearance space for changing the lower felt.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The paper machine press section shown in the drawings generally includes a main outer frame 10 having front and rear horizontally extending side members or beams 12 each supported by a plurality of upright posts 15. The main frame 10 further includes an upper portion formed by horizontally extending front and rear side members or beams 16 each supported by a pair of posts 17 secured to the corresponding beam 12. The beams 16 are rigidly connected by a plurality of cross frame members 18.

A support member 19 depends from the forward end of each of the upper beams 16 of the main frame 10, and an arm 20 is pivotally connected to each member 19 by pin 21. The arms 20 support an upper couch roll or lump breaker roll 24 which can be moved vertically by actuating pressure cylinders 26 pivotally mounted on the upper beams 16 and having pistons connected to the arms 20. The roll 24 forms a nip with the couch roll 28 located within the Fourdriner wire 30 which travels across a series of suction boxes 32 and around a drive roll 34.

An inner frame 40 is positioned between the upper beams 16 and the supporting posts 17 of the main frame 10 and includes front and rear horizontally extending beams 42 which are rigidly connected by a pair of cross members 43 (FIG. 3). Each cross member 43 is pivotally connected by a pin 44 to parallel spaced ears 46 rigidly connected to the rear side beam 16. A pad 48 is rigidly connected to the forward end of each cross member 43 of the inner frame 40 and seats on a corresponding pad 50 secured to the forward beam 16 of the main frame 10. A pair of eye bolts 52 rigidly connect each set of pads 48 and 50, and a square key 53 maintains the pads in precise alignment.

A hydraulic jack 55 is mounted on the forward side beam 40 of the inner frame 40 and has a depending ram 56 which is positioned to engage the forward side beam 16 of the main frame 10. As shown in FIG. 1, the jack 55 is positioned approximately midway between the two

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The press section also incorporates a suction pickup roll which is supported within the pickup felt by an inner frame mounted on the outer frame in the same manner as the inner frame for the press rolls. Suction is supplied to the forward ends of the pickup roll and each suction press roll through suction tubes which are supported by the inner frames and extend within the looped felts to the rearward side member of the outer frame where the tubes are connected by flexible couplings to a suction supply line. Thus each of the inner frames can be tilted by actuating the corresponding jack so that each of the felts can be replaced without disconnecting the suction lines or requiring the use of an overhead crane. Furthermore, the stretch roll for each of the felts is slidably mounted on horizontally extending rails so that slack can be conveniently provided in each felt during felt change.

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FIG. 3 is a fragmentary section taken generally along the line 3—3 of FIG. 1;

FIG. 4 is a section taken generally along the line 4—4 of FIG. 1 and illustrating the clearance for changing the upper felt; and

FIG. 5 is a fragmentary section taken generally along the lines 5—5 of FIG. 1 and illustrating the clearance space for changing the lower felt.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The paper machine press section shown in the drawings generally includes a main outer frame 10 having front and rear horizontally extending side members or beams 12 each supported by a plurality of upright posts 15. The main frame 10 further includes an upper portion formed by horizontally extending front and rear side members or beams 16 each supported by a pair of posts 17 secured to the corresponding beam 12. The beams 16 are rigidly connected by a plurality of cross frame members 18.

A support member 19 depends from the forward end of each of the upper beams 16 of the main frame 10, and an arm 20 is pivotally connected to each member 19 by pin 21. The arms 20 support an upper couch roll or lump breaker roll 24 which can be moved vertically by actuating pressure cylinders 26 pivotally mounted on the upper beams 16 and having pistons connected to the arms 20. The roll 24 forms a nip with the couch roll 28 located within the Fourdriner wire 30 which travels across a series of suction boxes 32 and around a drive roll 34.

An inner frame 40 is positioned between the upper beams 16 and the supporting posts 17 of the main frame 10 and includes front and rear horizontally extending beams 42 which are rigidly connected by a pair of cross members 43 (FIG. 3). Each cross member 43 is pivotally connected by a pin 44 to parallel spaced ears 46 rigidly connected to the rear side beam 16. A pad 48 is rigidly connected to the forward end of each cross member 43 of the inner frame 40 and seats on a corresponding pad 50 secured to the forward beam 16 of the main frame 10. A pair of eye bolts 52 rigidly connect each set of pads 48 and 50, and a square key 53 maintains the pads in precise alignment.

A hydraulic jack 55 is mounted on the forward side beam 40 of the inner frame 40 and has a depending ram 56 which is positioned to engage the forward side beam 16 of the main frame 10. As shown in FIG. 1, the jack 55 is positioned approximately midway between the two

The press section also incorporates a suction pickup roll which is supported within the pickup felt by an inner frame mounted on the outer frame in the same manner as the inner frame for the press rolls. Suction is supplied to the forward ends of the pickup roll and each suction press roll through suction tubes which are supported by the inner frames and extend within the looped felts to the rearward side member of the outer frame where the tubes are connected by flexible couplings to a suction supply line. Thus each of the inner frames can be tilted by actuating the corresponding jack so that each of the felts can be replaced without disconnecting the suction lines or requiring the use of an overhead crane. Furthermore, the stretch roll for each of the felts is slidably mounted on horizontally extending rails so that slack can be conveniently provided in each felt during felt change.

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FIG. 3 is a fragmentary section taken generally along the line 3—3 of FIG. 1;

FIG. 4 is a section taken generally along the line 4—4 of FIG. 1 and illustrating the clearance for changing the upper felt; and

FIG. 5 is a fragmentary section taken generally along the lines 5—5 of FIG. 1 and illustrating the clearance space for changing the lower felt.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The paper machine press section shown in the drawings generally includes a main outer frame 10 having front and rear horizontally extending side members or beams 12 each supported by a plurality of upright posts 15. The main frame 10 further includes an upper portion formed by horizontally extending front and rear side members or beams 16 each supported by a pair of posts 17 secured to the corresponding beam 12. The beams 16 are rigidly connected by a plurality of cross frame members 18.

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A hydraulic jack 55 is mounted on the forward side beam 40 of the inner frame 40 and has a depending ram 56 which is positioned to engage the forward side beam 16 of the main frame 10. As shown in FIG. 1, the jack 55 is positioned approximately midway between the two...
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3 support pads 48. The inner frame 40 further includes a pair of side members 58 which extend downwardly between the rearward end of each suction roll 105, and an arm 59 is pivotally connected to the lower end of each side member 58. The arms 59 support the suction pickup roll 60 and a guide roll 62, and a pair of cross synchronizing screw jacks 64 connect the arms 59 to the side members 58. A suction tube 65 (FIG. 2) extends between the inner frame members 58 and is rigidly secured to the forward end of the pickup roll 60 by a swivel duct 67. The rearward end portion of the suction tube 65 is connected to a main suction line 68 (FIG. 2) through a flexible conduit (not shown). An endless felt 70 is directed downwardly around the pickup roll 60 and felt roll 62 and also around a felt roll 72, a felt guide roll 73, an adjustable stretch roll 75 and another felt roll 76 each supported by the inner frame 40. The felt 70 is also directed around a felt roll 77 which is supported by the beams 16 of the outer frame 10 and located between the support pads 59 adjacent a felt suction cleaning tube 78. Thus all of the components located within the endless felt 70 are supported by the pivotal inner frame 40.

A lower inner frame 85 (FIG. 1) includes front and rear side beams 86 which are rigidly connected by a pair of cross members 88 each having a rearward end pivotally connected by a pin 89 (FIG. 5) to parallel spaced ears 91 secured to the rear side beam 12 of the main frame 10. A pad 92 (FIG. 1) is secured to the forward end of each cross member 88 and seats upon a matting pad 93 secured to the front side beam 12 of the main frame 10, in a manner similar to the support for the inner frame 40. A pair of swinging eye bolts 94 and an alignment key 95 connect each set of pads 92 and 93 and serve to clamp the forward side of the inner frame 85 to the forward side of the outer frame 10.

A hydraulic jack 100 is mounted on a cross member 101 and is connected to the beams 86 of the inner frame 85 and has a ram 102 which is positioned to engage a block 103 (FIG. 3) secured to the front side beam 12 of the main frame 10. The jack 100 is located approximately midway between the cross members 88 and the support pads 92 of the inner frame 85. A pair of suction press rolls 105 are supported by the inner frame 85, and a save-all roll 106 extends around the lower half of each press roll 105. A suction tube 108 (FIG. 2) is also supported by the inner frame 85 for each press roll 105 and is connected to the forward end of the press roll by a duct 109. The suction tube 108 is connected to the forward end of each suction tube by a flexible line 110 (FIG. 2) to the main suction supply line 68. Each of the press rolls 105 and the rolls 24 and 60 are driven by a drive 112 (FIG. 3).

The inner frame 85 further includes parallel spaced side members 114 (FIG. 1), and an arm 115 is pivotally connected to each side member 114 by a pin 116. A suction transfer roll 120 is supported by the arms 115, and a pair of cross synchronizing screw jacks 121 connect the arms 115 to the frame members 114 for positioning the suction transfer roll 120 in proper nip relation with the pickup roll 60. The inner frame 85 also includes a depending portion 125 which is positioned between the horizontal side beams 12 of the main frame 10, and the portion 125 is formed by a plurality of cross members 126 (FIG. 3) rigidly secured to the cross members 88 by a plurality of generally vertical members 128.

An endless felt 130 extends over the suction press rolls 105 and a guide roll 120 and a set of felt rolls 134 and 135 are supported by the lower portion 125 of the inner frame 85, and a felt roll 136 and a felt guide roll 137 are supported by the upper portion of the inner frame 85. Thus all of the components located within the endless felt 130 are supported by the inner frame 85.

An upper press roll 145 is positioned above each of the suction press rolls 105, and each upper press roll 105 is supported by a pair of parallel spaced arms 146 pivotally connected by pins 147 to the corresponding suction tube 108. A pair of swivel arms 155 connect each set of arms 146 to the lower ends of a corresponding set of levers 152 each pivotally supported by a pin 153. A pair of air bags 155 connect the upper end of each lever 152 to a pair of hooks 156 rigidly secured to the adjacent beam 16 of the main frame 10.

In operation, as a newly formed paper web W is delivered by the wire 30 over the couch roll 28 and toward the drive roll 34, the web W is removed from the wire 30 by the pickup roll 60 and the felt 70 and is transferred to the felt 130 by the suction roll 120. The web is carried by the felt 130 through the two nips formed between the lower press rolls 105 and the upper press rolls 145 and is then directed from the felt 130 around a guide roll 160 to the first drying drum 162. The nip pressure between each set of press rolls 105 and 145 is controlled by adjusting the differential pressure in each set of air bags 155.

When it is desired to replace the upper felt 70, the old felt is cut transversely and pulled from the press. To insert a new felt 70, the swing bolts 52 are released and the jack 55 is actuated to extend to the support for the inner frame 85 which is connected to the front pivot pins 44. After the forward side of the inner frame 40 is elevated, a space or gap 165 (FIG. 4) of approximately eight inches is produced between each set of support pads 48 and 50. The gaps 165 permit a lower portion of the new felt to be folded around the jack 55 and inserted in the inner frame 40. The forward side of the inner frame 16 of the main frame 10 and the adjacent depending support member 88 of the inner frame 40. The jack 55 is then actuated and the inner frame 40 is lowered until the pads 48 seat on the pads 50. After the ram 56 is retracted, the lower portion of the new felt is positioned around the pickup roll 60 and the guide roll 62, and the upper portion of the new felt is positioned around the rolls 72, 73, 75–77. The swing bolts 52 and the keys 53 cooperate to assure that the inner frame 40 is precisely located and clamped to the main outer frame 10.

When it is desired to replace the lower felt 130, the pickup roll 60 and guide roll 40 and the felt 70 are elevated by actuating the screw jack 64, and the upper press rolls 145 are elevated by actuating the screw jacks 150. The swing bolts 94 are released, and the inner frame 85 is tilted by extending the ram 102 of the hydraulic jack 100. When the forward side of the frame 85 is elevated, a space or gap 168 (FIG. 5) of approximately eight inches is produced between each set of pads 92 and 93. The gaps 168 permit the lower portion of the new felt to be folded around the ram 102 and collected within the space 170 (FIG. 5) between the forward side beam 12 of the outer frame 10 and the adjacent members 128 of the inner frame 85. The forward side of the inner frame 85 is then lowered until the pads 92 seat upon the pads 93. The ram 102 is fully retracted, and the new felt is shifted to a position where it is directed around each of the lower press rolls 105, the suction transfer roll 120 and each of the rolls 134–137 all supported by the inner frame 85.

From the drawings and the above description, it is apparent that a paper machine press section constructed in accordance with the invention provides desirable features and advantages. For example, by supporting all of the rolls and suction tubes within each of the felts 70 and 130 by the corresponding frame members 88 and 85, the felts 70 and 130 can be easily and quickly replaced. Furthermore, the hydraulic jacks 55 and 100 for tilting the inner frames 40 and 85, respectively, make it unnecessary to employ an overhead crane during a felt change.

The support and arrangement of the suction tubes 65 and 108 within the felts 70 and 85 provide an important feature of the invention. That is, by connecting the forward ends of the suction tubes to the
forward ends of the rolls 60, 105 and 120, and by employing flexible lines 110 to connect the rearward ends of the suction tubes to the suction supply line 68, it is unnecessary to disconnect any suction line to replace either of the felts 70 or 130. Furthermore, the cross synchronized screw jacks 64 and 150 enable the suction pickup roll 60 and the upper press rolls 145 to be elevated for inserting either a new felt 70 or a new felt 130.

While the form of apparatus herein described constitute a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A paper machine press section for use in combination with a felt loop supporting a paper web on the outer surface thereof, comprising a main outer frame including substantially vertical side frame members spaced laterally to receive the felt and web therebetween, an inner frame positioned between said side frame members of said main outer frame, a plurality of rolls mounted on said inner frame for supporting and directing the felt loop, pivot means connecting one side of said inner frame to the adjacent said side frame member, said inner frame being spaced from said side frame members sufficiently to provide for tilting of said inner frame between said side frame members, means releasably securing the other side of said inner frame to the adjacent said side frame member, and means for elevating said other side of said inner frame relative to the adjacent said side frame member after releasing said securing means to provide for convenient replacement of the felt loop.

2. A press section as defined in claim 1 wherein said elevating means comprises power operated jack means extending between said inner frame and said other side frame member of said outer frame to effect elevation of said inner frame in response to actuation of said jack means.

3. A press section as defined in claim 2 wherein said means for releasably securing said inner frame to said other side frame member comprises at least two spaced clamp members, and means supporting said jack means between said clamp members.

4. A press section as defined in claim 1 wherein at least one of said rolls comprises a suction roll, means for connecting a drive to one end of said suction roll adjacent said one side frame member, suction conduit means supported within the felt by said inner frame, means connecting said conduit means to the other said end of said suction roll, and means adjacent said one side frame member for connecting said conduit means to a suction supply line.

5. A press section as defined in claim 4 wherein said suction roll comprises a suction pickup roll adapted to be positioned adjacent to a paper forming wire.

6. A press section as defined in claim 1 wherein at least one of said rolls comprises a first press roll, a second press roll positioned outside the felt, and means mounted on said outer frame for supporting said second press roll in nip relation with said first press roll.

7. A press section as defined in claim 6 wherein said means supporting said second press roll include a set of spaced arms pivotally connected to said side frame members of said outer frame, a lever for each said arm, a screw jack connecting each said arm to the corresponding said lever, and air bag means connected to move each said lever.

8. A press section as defined in claim 1 wherein said inner frame includes a depending portion spaced between said side frame members of said outer frame, and a plurality of felt guide rolls supported by said depending portion of said inner frame.

9. A press section as defined in claim 1 wherein said securing means include a key member for effecting precise alignment between said inner and outer frames.

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