Aug. 31, 1948. S. M. BRATTON 2,448,295

PRESS ARRANGEMENT

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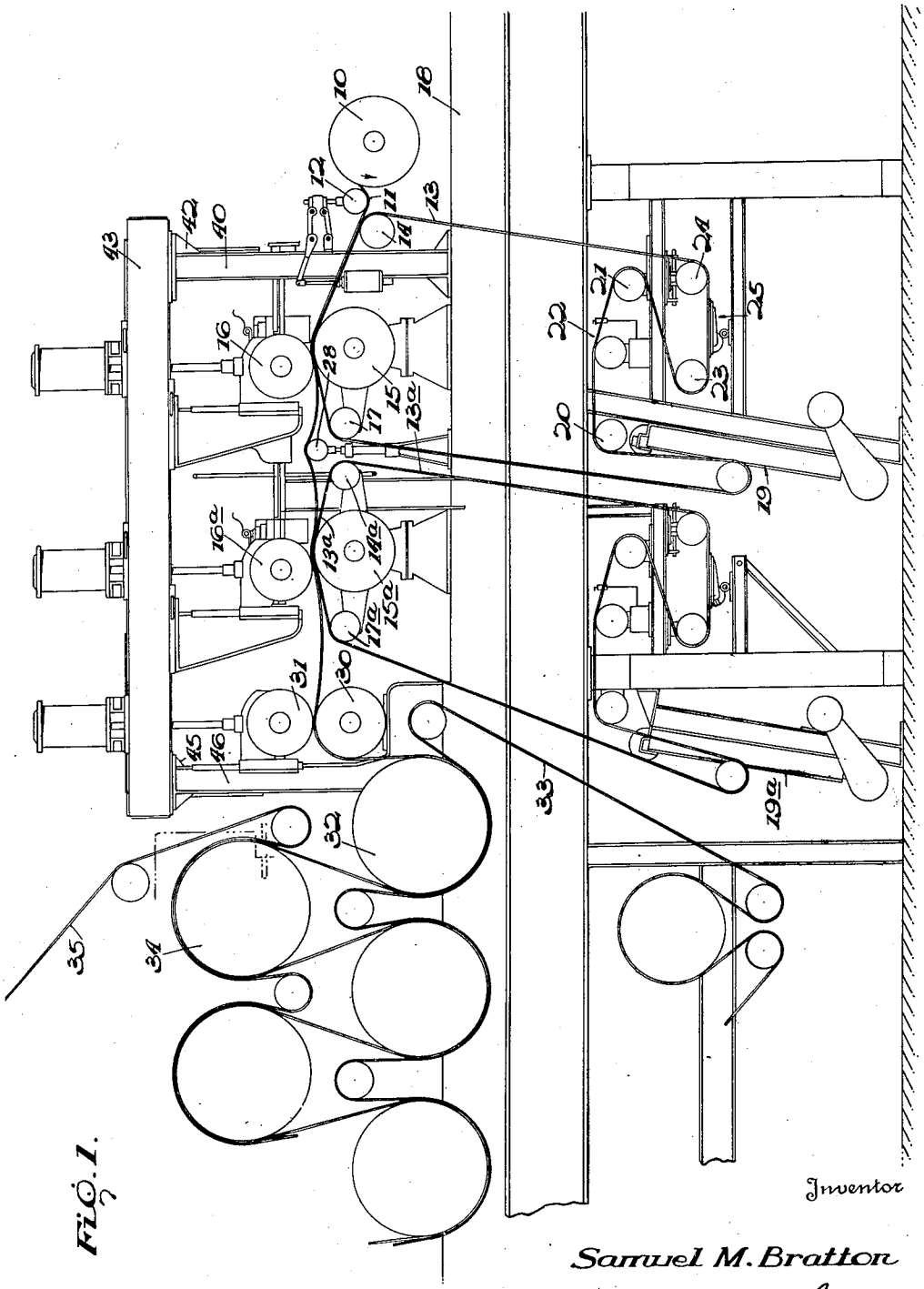


FIG. 1.

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PRESS ARRANGEMENT

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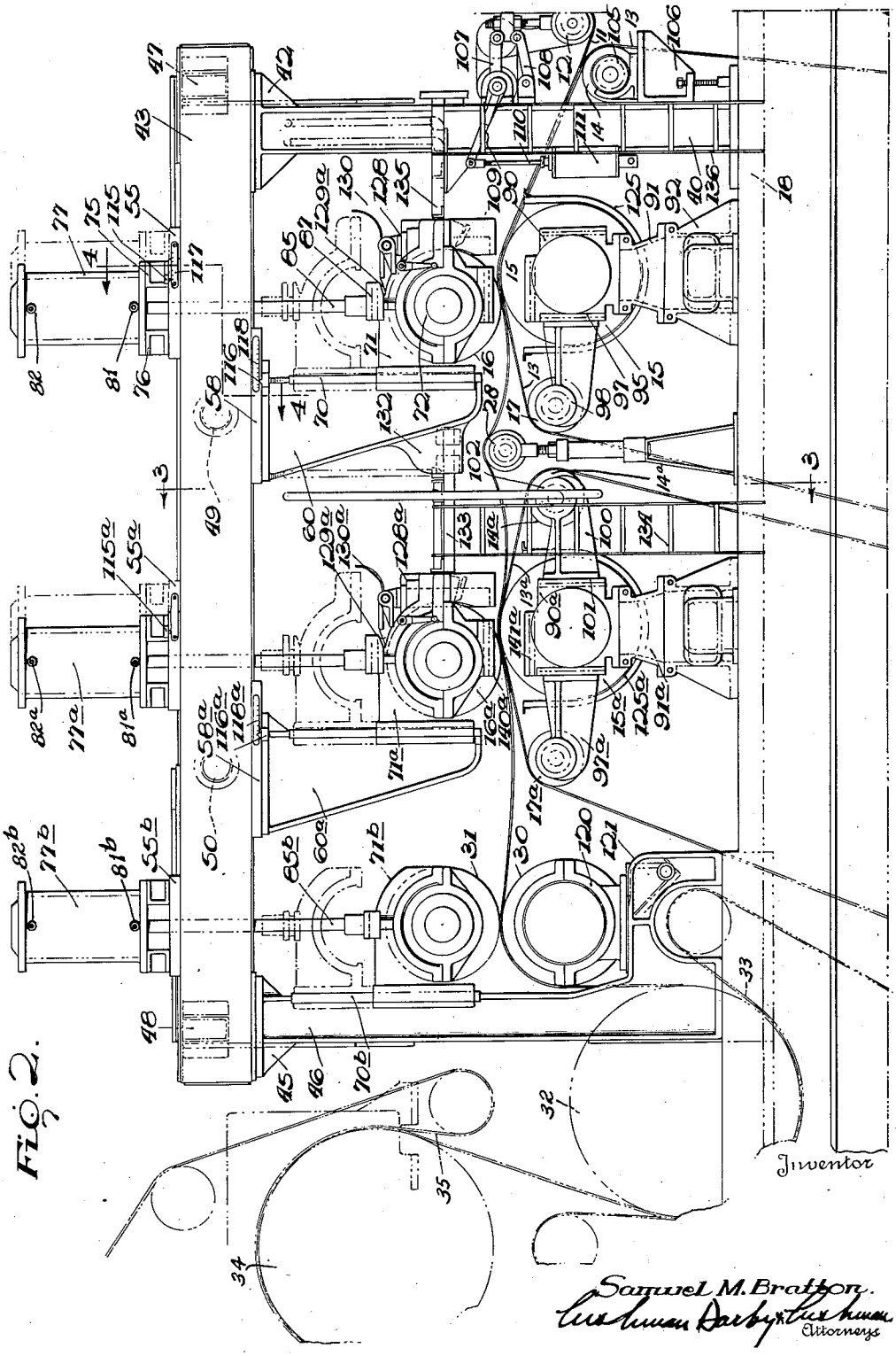


Fig. 2.

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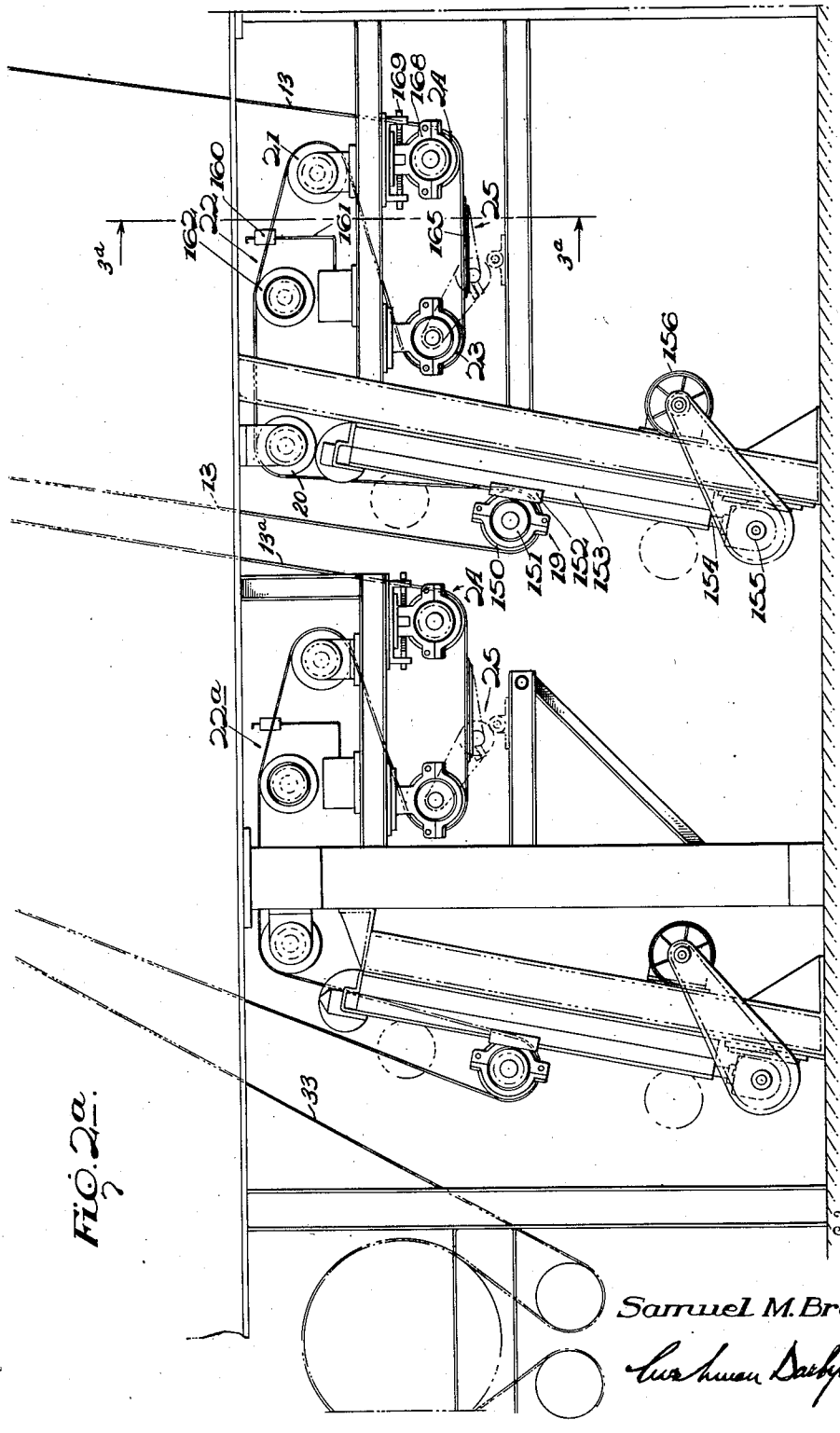


FIG. 2a.

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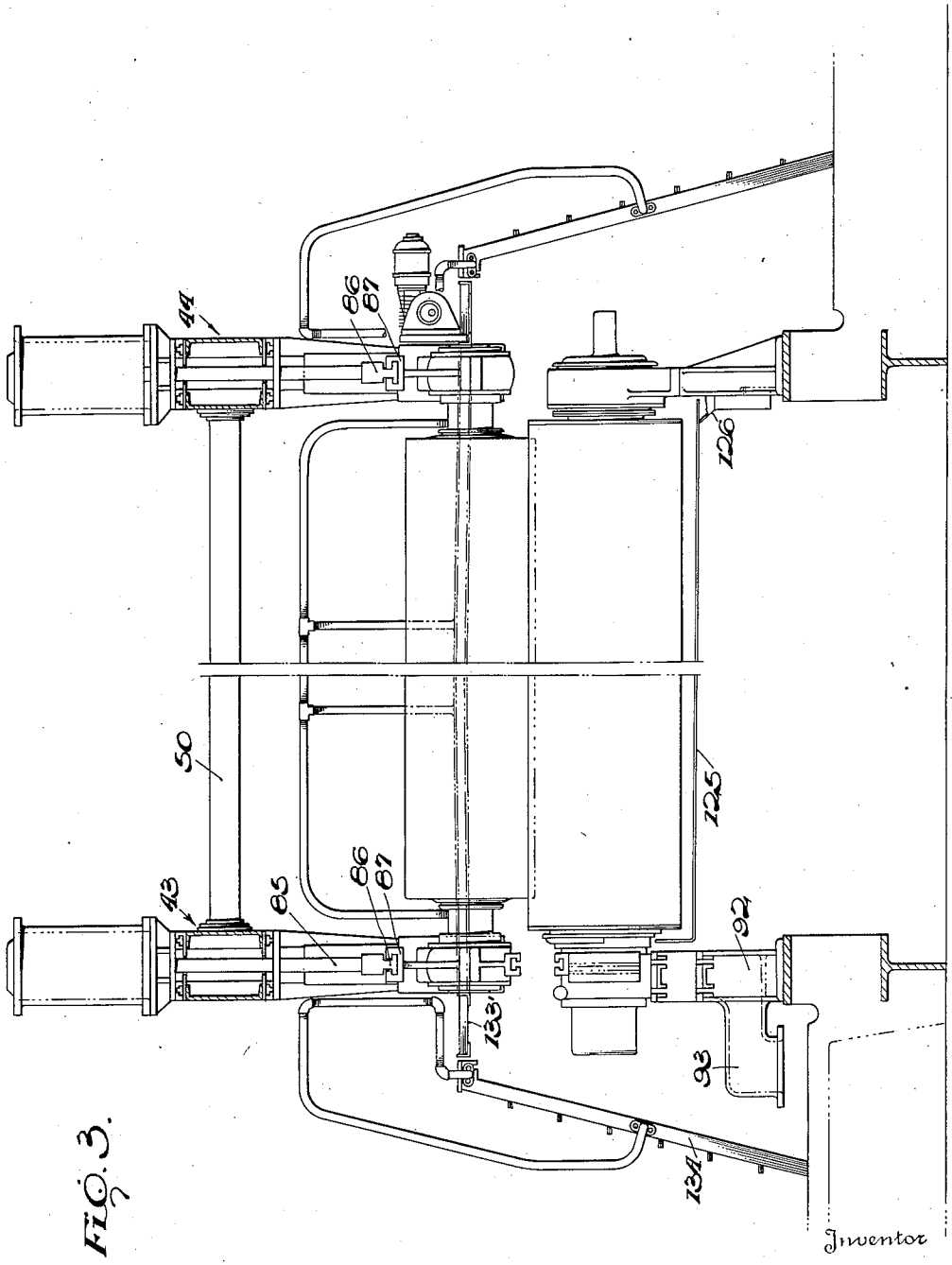


FIG. 3.

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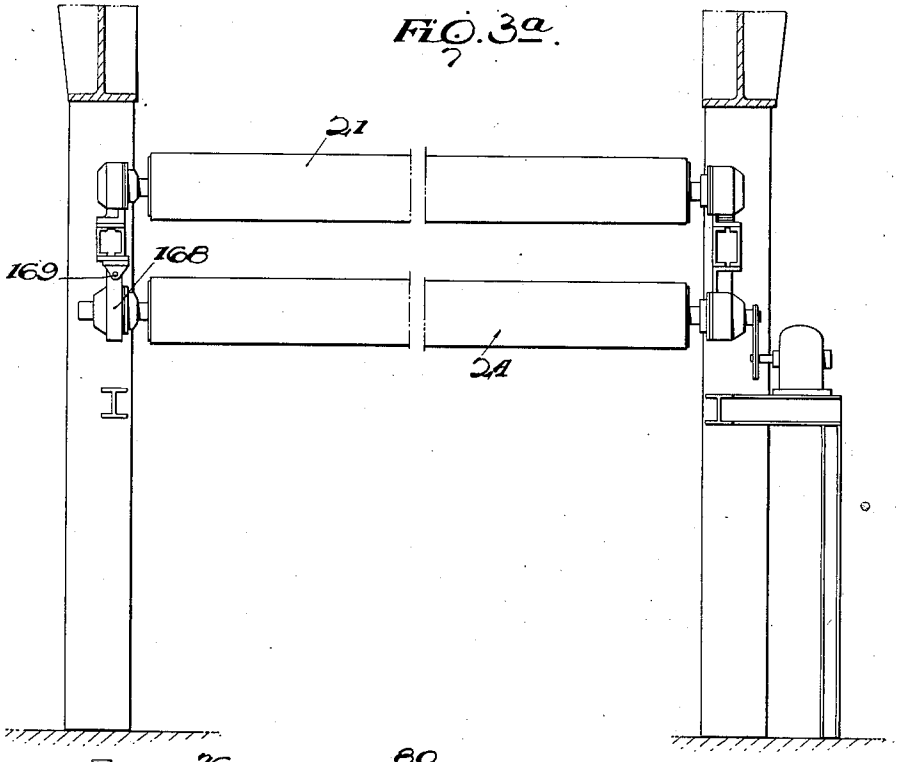
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PRESS ARRANGEMENT

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FIG. 3a.



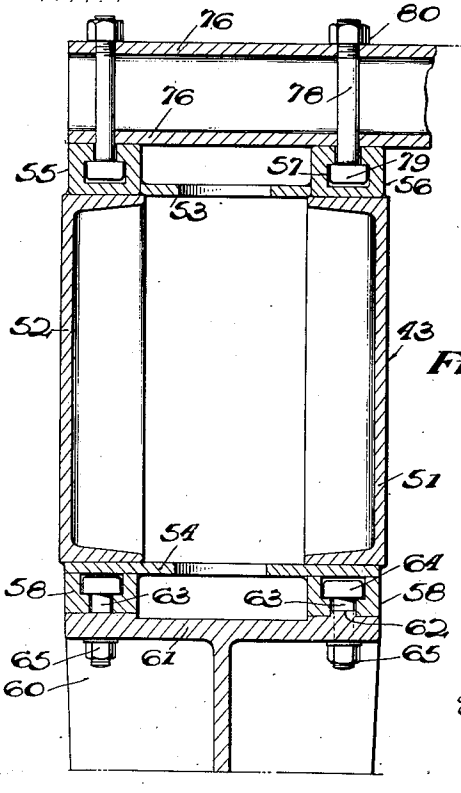


FIG. 4.

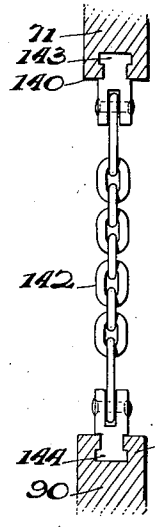


FIG. 5.

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Patented Aug. 31, 1948 2,448,295

UNITED STATES PATENT OFFICE

2,448,295

PRESS ARRANGEMENT

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Application September 1, 1942, Serial No. 456,932

9 Claims. (Cl. 92—49)

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The present invention relates to a new construction and arrangement of parts in the press section of a paper mill, normally positioned between the web-forming machine and the drying rolls.

The primary object of the invention is to conserve space in the mill, to the end that the area occupied by the press rolls and their felts may be decreased, longitudinally of the line of machinery, thereby making it possible to increase the number of drying rolls so that the speed of the entire line may be increased. In numerous paper mills, a limitation has been placed upon the speed of operation of the web-forming machine by the number of drying rolls in the plant, since if the web of paper travels too rapidly through the drying rolls, it is not sufficiently dried at the delivery end. In many cases, it is impossible to add additional stands of drying rolls at the rear or delivery end of the line, because of lack of space, or for other reasons. The present invention, by shortening the space occupied by press rolls, ahead of the drying rolls in the line, makes it entirely feasible to add additional sets of drying rolls at the forward end of the drying section, thereby making it possible to increase the speed of the moving web and greatly increasing the daily production of the mill.

Another object of the invention is to eliminate the heavy, longitudinally elongated bell crank levers conventionally employed to support the journals for the upper press rolls. Another object is to substitute for the conventional press roll supporting means, a support which occupies less space, longitudinally of the line, thereby making it possible to mount a plurality of stands of press rolls closer together than heretofore.

Another object of the invention is to provide means for handling a plurality of press felts, in such manner that a plurality of sets of press rolls may be positioned closer together than heretofore, without having one felt or its guiding means interfere with another. To this end, the invention provides means for guiding, tensioning and tracking the felt, below the mill floor so that certain of these means, instead of being positioned longitudinally between the sets of rolls are positioned substantially therebelow.

A further object of the invention is to provide improved means for suspending the upper press rolls from above, for instance, from an overhead bridge.

Another object is to provide individual controls for raising and lowering the upper press rolls and for applying positive downward pressure thereto,

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or for relieving the normal pressure due to the weight of the rolls, as occasion may dictate.

Another object of the invention is to provide a novel supporting arrangement for the upper felt guide rolls, adapted to conserve space in the line.

Another object is to improve the supporting means for the smoothing rolls normally positioned between the press rolls and the first set of drying rolls.

Other and further objects and advantages of the invention will be apparent to those skilled in the art, from a consideration of the specific embodiment of the invention shown in the accompanying drawings and description below.

In the drawings:

Figure 1 is a somewhat diagrammatic side elevation of the apparatus constructed in accordance with the invention, taken from the tending side;

Figure 2 is an enlarged elevation of the upper portion of Figure 1;

Figure 2*a* is a similar view of the lower portion;

Figure 3 is a vertical section taken substantially on line 3—3 of Figure 2;

Figure 3*a* is a similar view taken on line 3—3 of Figure 2*a*.

Figure 4 is an enlarged section taken on line 4—4 of Figure 2, and

Figure 5 is a fragmentary detail showing a device for raising the lower press rolls.

The apparatus shown somewhat diagrammatically in the accompanying drawings has been designed to operate with a Fourdrinier machine having a wire 234 inches in width. Of course, the invention is not restricted for use in combination with a Fourdrinier machine, as it may be used with a cylinder machine or any other type of web-forming apparatus.

Since the web-forming apparatus does not constitute a part of the invention of the present application, it is not shown in the drawings. The couch roll at the delivery end of the machine, however, is represented diagrammatically at 10. The wet web of paper 11 is picked from the surface of the couch roll by a couch draw roll 12 and delivered to a felt 13 trained over a first guide roll 14, then over a first suction press roll 15 and below a first upper press roll 16. A substantial amount of water will be extracted from the paper web as it passes with the felt between rolls 15 and 16 as is well understood in the art.

The felt 13 is guided downwardly over a guide roll 17, below the machine bed 18 and the mill

floor to a tensioning apparatus, represented generally at 19. From the tensioning apparatus, the felt is guided along a horizontal run by guide rolls 20, 21 where it is subjected to the effect of a felt tracking, centering or guiding apparatus represented generally at 22.

From the guide roll 21, the felt is led rearwardly around another guide roll 23 and then forwardly along another horizontal run to a manually adjustable centering and tracking guide roll 24, from which point the felt travels upwardly to first guide roll 14. In the lower horizontal run between rolls 23, 24, the felt is treated by a felt conditioning apparatus represented generally at 25 which subjects the felt first to a water bath and then to suction, to clean and to partially dry the same.

The web of paper leaves the first felt 13 shortly after its passage between the rolls 15, 16 and is guided over a vertically adjustable roll 28, from which point it is delivered to the second felt 13a, guided over a guide roll 14a and a second lower suction press roll 15a. The second felt and the web of paper pass between the lower suction press roll 15a and an upper press roll 16a, whereupon the felt is led downwardly over a guide roll 17a to felt tensioning, guiding and conditioning devices similar to these previously referred to.

The paper web leaves the felt 13a shortly after its passage through the press rolls 15a and 16a and is led directly between a pair of smoothing rolls 30, 31. From the lower roll 30, the paper is delivered to the first drying roll 32, being pressed against the surface thereof by a drying roll felt 33. The web then passes to the first upper drying roll 34, between its surface and an upper drying roll felt 35. The paper passes back and forth alternately between the upper and lower series of drying rolls, in accordance with conventional practice.

The press roll section of the paper making line in accordance with the present invention is more closely coupled than in accordance with the prior art. For instance, in a typical installation the space between the suction couch roll to the first lower drying roll has been reduced from thirty-six feet, six inches to twenty-five feet. This advantageous result is accomplished by the employment of novel means for supporting the rolls and associated parts. From the bed 18 on the mill floor, a pair of transversely spaced columns or posts project upwardly, one of which is shown at 40. The columns have platforms 42 at their upper ends supporting the forward ends of longitudinal beam structures 43, 44, the latter being supported at their rear ends by similar platforms 45 on the upper ends of transversely spaced posts or columns 46. The beam structures 43, 44 are interconnected at their ends by transverse beams 47, 48 and at intermediate points by transverse tie bars or pipes 49, 50, thus providing a strong, rigid, overhead bridge structure.

As shown in Figure 4, each beam structure is preferably made up from a pair of channel members 51, 52, standing on edge with their upper and lower flanges interconnected by steel plates 53, 54, welded thereto, thereby providing an extremely rigid, box-like structure. At three spaced sections, the upper flanges of the channels carry slideways 55, 56, 55a, 56a and 55b, 56b, each slideway having an upwardly facing keyhole shaped or re-entrant channel 57 therein. Similarly, the lower flanges of the channel members carry downwardly facing slideways 58, 59 and

58a, 59a, each having a re-entrant channel formed therein.

Slideways 58, 59 support a depending hanger 60 which is provided with an upper flange 61 having a rib 62 received in the channel of slideway 58 for centering purposes. The flange is drilled at a plurality of points along each edge, for the reception of bolts 63 having square heads 64 disposed in the re-entrant channel in the slideways and secured in position by nuts 65. Hence, the hangers 60 are firmly clamped in position below the beam structures.

Each depending hanger (Fig. 2) has a front vertical face 70, defined by laterally projecting flanges, adapted to constitute a slideway for a horizontally projecting bracket 71 which carries the journal 72 for the first upper press roll 16.

The depending hanger 60a, carried by the slideways 58a, 59a is substantially identical to the hanger 60 and supports a bracket 71a for the second upper press roll 16a in a similar manner.

The upper slideways 55, 56 support transverse members 75, 76, carrying a cylinder 77, the transverse members being secured to the slideways by bolts 78 having square heads 79 disposed in the re-entrant channels 57 and nuts 80 on their shanks. Thus, the cylinder may be firmly clamped in adjusted position upon the upper slideways, by tightening the nuts 80.

Each cylinder is provided with an internal piston, not shown, connected by a piston rod 85 to the journal bracket 71 positioned therebelow. The lower end of the piston rod 85 carries a shoe 86 having a longitudinally extending flange disposed in a similarly shaped, re-entrant channel 87 integral with the journal bracket 71, thereby providing a sliding fit between the parts in a longitudinal direction.

The lower suction press roll 15 is supported in a pair of transversely spaced journal frames 90, mounted upon blocking pieces 91 carried by pedestals 92, supported upon the foundation plate or bed 18. The pedestal on the tending side is provided with a laterally projecting suction conduit 93 for the drainage of water and the extraction of air from the suction box associated with the roll, as is well understood in the art.

Each journal frame 90 is provided on its rear vertical face with a slideway 95 having a re-entrant groove thereon, to which there is bolted for vertical adjustment a rearwardly projecting arm 97 carrying a journal 98 for the felt guide roll 17. Hence, the vertical position of the arms 97 and the guide roll 17 may be adjusted at will. It is to be noted that the felt guide roll is supported by means carried by the support for the lower press roll, thus providing an unusually compact construction.

The supporting structure for the second lower suction press roll 15a is substantially identical to that provided for the first lower suction roll. In addition to the rearwardly projecting arms 97a for the felt guide roll 17a the bearing frames 90a carry forwardly projecting arms 100, secured to a slideway 101 on the vertical front face of each bearing frame. The arms 100 carry journals 102 for the felt guide roll 14a.

If desired, the first felt guide roll 14 may be similarly supported from the bearing frames 90, but it is usually preferable to mount the same on journals 105 supported for horizontal adjustment on vertically adjustable brackets 106, slidably connected to the columns 40. This arrangement brings the felt nearer to the couch roll 10 and leaves the wet web unsupported throughout

a shorter distance during its transfer from the couch roll to the press section of the machine.

The lifting arrangement for the couch draw roll 12 is also carried by the columns 40. This arrangement preferably comprises parallel links 107, 108 connected by a lever 109 to the piston rod 110 of an air cylinder 111, so that, when the roll 12 is to be lifted, it will swing rearwardly away from the couch roll 10, as is well understood in the art.

It will be seen that, as a result of the mounting of the two pairs of cylinders 77, 77a and the pairs of hangers 60, 60a on their respective slideways, the longitudinal positions of the upper press rolls 16, 16a may be adjusted relative to the lower suction press rolls 15, 15a, which are journalled for rotation about fixed axes. Thus, the point of contact between the upper rolls and the web of paper travelling on the felt over the lower rolls may be varied, to suit different conditions. The cylinders and brackets carry pointers 115, 116, cooperating with fixed scales 117, 118, on the supporting slideways, to indicate the positions of the slidable parts and to adjust them in proper relation to each other.

The lower smoothing roll 30 is preferably journalled in supports 120 mounted upon offset portions 121 of the columns 46. The upper smoothing roll 31 is journalled in brackets 71b, similarly to the brackets 71 and 71a, but mounted for vertical sliding movement upon slideways 76b carried by the columns 46. The brackets 71b are each connected by a piston rod 85b to a piston mounted in a cylinder 77b, carried by the upper bridge structure in a manner similar to the cylinders 77 and 77a. Although the cylinders 77b need not be mounted for adjustment longitudinally of their supporting beams, they are preferably substantial duplicates of the other cylinders and are mounted in the same manner in order that the parts may be of substantially identical construction and interchangeable.

Compressed air may be delivered to opposite ends of each cylinder 77, 77a, and 77b, selectively, from any suitable source, through inlet pipes shown diagrammatically at 81, 82, 81a, 82a, 81b and 82b.

The suction rolls 15 and 15a are provided with troughs 125, 125a to catch any water that is not withdrawn through the internal suction boxes. Each trough is connected to a drain 126 as shown in Fig. 3, so that the water and pulp may be recovered.

The upper press rolls 16 and 16a are provided with oscillating doctor assemblies 128, 128a, including ductor blades 129, 129a, and crumb catchers 130, 130a. Since oscillating doctor assemblies of this type are known in the art, their details of construction need not be described herein. It should be noted that these assemblies are mounted upon the journal bracket 71, 71a for vertical movement with the rolls, when the latter are raised and lowered.

Each depending hanger 60 is provided with a rearwardly projecting lug 132 which carries a rearwardly projecting bar 133, acting as a support for transversely extending floor boards 133', constituting a tending platform which may be reached by a ladder 134.

Ahead of the first upper roll 16, there is a similar tending platform 135, supported by a framework secured to the vertical columns 40. A workman may reach this platform by a ladder 136, a portion of which is shown in Fig. 2.

Means are provided for readily lifting the lower rolls 15, 15a and their journal frames from their supporting structures 91, 91a, when it is desired to remove a worn felt and to substitute a new one. The lower faces of the brackets 71, 71a (Figs. 2 and 5) are provided with downwardly facing slideways 140, 140a having re-entrant keyhole shaped channels therein while the upper faces of the journal frames 90, 90a are similarly provided with slideways 141, 141a having similar upwardly facing re-entrant channels therein. Short sections of chain 142 (Fig. 5) having shoes 143, 144 at their opposite ends are employed to connect the brackets 71 to the journal frames 90, the shoes 143 and 144 being received in the channel members 140, 141. Hence, when fluid is introduced in the lower ends of the cylinders 77, 77a the piston rods will lift the brackets and, through the chains 142, the journal frames 90, making it possible to place a new felt in position, according to procedure well known in the art.

The various felt handling devices positioned below the mill floor may be conventional in their details of construction, but their arrangement, relative to each other, is a radical departure from prior practices. In accordance with standard practice, prior to the present invention, the felt tensioning devices were positioned below the floor or in a pit, but the other instrumentalities, such as the felt centering or tracking mechanism and the felt conditioner, were positioned above the floor, thereby making it necessary to raise the press rolls considerably higher than would otherwise be desired. Moreover, since the tracking devices and felt conditioners were positioned one behind the other in a single, generally horizontal run of the felt, the press roll stands were necessarily spaced a substantial distance apart, thereby occupying an undesirably large space, longitudinally of the line.

According to the present invention, the automatic tracking or centering device 22 is positioned below the floor, substantially in vertical alignment with the press rolls. Moreover, the felt conditioner 25 and the manually adjustable tracking device 24 are positioned below the floor and on a second horizontal run, below the automatic tracking device 22. By thus doubling back the felt in its line of travel, a very substantial amount of space, longitudinally of the line, is conserved.

The tensioning device 19 comprises a roll 150 journalled in a pair of spaced bearings 151 mounted on carriages 152, slidable on vertically extending, inclined ways 153 and controlled by threaded shafts 154. The shafts 154 are connected by intermeshing gears to a cross shaft 155 which may be controlled by a hand wheel 156 or an electric motor, so that the vertical positions of the carriage at 152 may be controlled at will, to place the desired amount of tension on the felt 13.

The tracking or centering device 22 is of known construction and includes a felt feeler 160 and means 161 controlled thereby for shifting one end of the tracking roll 162 forwardly or rearwardly, to shift the blanket toward one side or the other.

The felt conditioner 25, positioned below the lower horizontal run of the blanket, between rolls 23 and 24 comprises a laterally oscillating box 165 connected to a source of suction, and a water spray device to assist in cleaning the felt.

The manually adjustable tracking or centering roll 24 has one of its end journals 168 mounted for forward or rearward movement upon a

threaded shaft 169, in order to compensate for any long range or substantially permanent creeping tendency of the particular blanket or felt being used. The automatic tracking device 22, of course, compensates for local irregularities in the felt in a known manner.

As pointed out above, the felt is guided upwardly from the roll 24 to the first guide roll 14, where it receives the web of paper from the couch draw roll 12.

Although the present invention has been described with considerable particularity, by reference to the specific embodiment shown in the accompanying drawings, it must be understood that it is not limited to the details of construction shown therein and described above, but includes all modifications coming within the scope of the appended claims and their equivalents.

I claim:

1. A press section for use in a paper mill between the making machine and the drying rolls, comprising a bridge positioned above the mill floor, two pairs of depending hangers having vertically disposed slideways carried by the bridge, vertically movable brackets on the slideways, an upper press roll carried by each pair of brackets, means on the bridge for raising, lowering and applying positive downward pressure to the brackets and the rolls carried thereby, and a lower press roll below each of the upper rolls.

2. A press section for use in a paper mill between the making machine and the drying rolls, comprising a pair of parallel, longitudinal beams spaced above the mill floor, two pairs of transversely aligned depending hangers carried by the beams for longitudinal adjustment thereon, a vertically adjustable longitudinally extending bracket carried by each hanger, an upper press roll journalled in each transversally aligned pair of brackets, means mounted on said beams for raising, lowering and applying positive downward pressure to the brackets and the rolls carried thereby, and a lower press roll supported by the mill floor below each of the upper rolls.

3. For use in a paper mill having a mill floor, a press assembly positioned between the making machine and the drying rolls, comprising parallel, longitudinal beam structures spaced above the mill floor, a pair of transversely aligned depending hangers suspended from the beam structures for longitudinal adjustment with respect thereto, a vertically movable, longitudinally projecting bracket connected to and guided by each hanger, a cylinder-piston assembly mounted upon each beam structure for longitudinal adjustment thereon above each bracket, a connection from each assembly to the bracket therebelow, whereby the hangers and the assemblies may be adjusted longitudinally along the beam structure, an upper press roll carried by the brackets for adjustment therewith, and a lower press roll supported by the floor below the upper roll and journalled about a fixed axis.

4. For use in a paper mill having a mill floor, a press assembly positioned between the making machine and the drying rolls, comprising parallel, longitudinal beam structures spaced above the mill floor, a pair of transversely aligned hangers suspended from the beam structures for longitudinal adjustment with respect thereto, a vertically movable longitudinally projecting bracket associated with each hanger, a cylinder mounted upon each beam structure for longitudinal adjustment thereon above each bracket, a piston in each cylinder connected to the bracket therebelow, whereby the hangers, the cylinders and the pistons may be adjusted longitudinally along the beam structure, an upper press roll carried by the brackets for adjustment therewith, a lower press roll supported by the floor below the upper roll and journalled about a fixed axis, and means for introducing fluid into opposite ends of the cylinder, selectively, to raise or lower the piston, the brackets and the upper press roll, or to apply positive downward pressure thereto.

5. A press assembly for use in a paper mill between the making machine and the drying rolls, comprising a pair of parallel, longitudinal beam structures each including a pair of channel members standing on edge in spaced apart relation with their flanges inter-connected, upper and lower slideways secured to said beam structures, a depending hanger suspended from each lower slideway and adjustable longitudinally therealong, a bracket mounted for vertical adjustment on each hanger, a piston-cylinder assembly mounted on each upper slideway and including a rod extending between the channel members and connected to the bracket therebelow, an upper press roll journalled on the brackets, and a lower press roll mounted therebelow and journalled for rotation on a fixed axis.

6. For use in a paper mill having a mill floor, a press assembly positioned between the making machine and the drying rolls, comprising a bridge spaced above the mill floor, a pair of lower rolls supported by the floor below the bridge, a pair of upper press rolls suspended from the bridge, means carried by the bridge for applying positive downward pressure to the upper rolls, a press felt for each pair of upper and lower press rolls, guiding means below the floor for the felts, including tensioning means, means for guiding each felt along a substantially horizontal run below the floor and in substantially vertical alignment with the press rolls thereabove, and tracking means operating on the felt in said horizontal run.

7. For use in a paper mill having a mill floor, a press assembly positioned between the making machine and the drying rolls, comprising a bridge spaced above the mill floor, a pair of lower press rolls supported by the floor below the bridge, a pair of upper press rolls suspended from the bridge, means carried by the bridge for applying positive downward pressure to the upper rolls, a press felt for each pair of upper and lower press rolls, and means below the floor for tensioning, guiding, tracking, and conditioning each of the felts, each of said means including a substantially vertically positioned tensioning assembly, a pair of rolls leading the felt along a substantially horizontal run, tracking and centering means operating on the felt in said horizontal run, and another roll for guiding the felt upwardly toward the press roll.

8. For use in a paper mill having a mill floor, a press assembly positioned between the making machine and the drying rolls, comprising two pairs of press rolls closely spaced together longitudinally of the path of movement of the web of paper, an individual endless felt trained for movement between the rolls of each pair, tensioning and guiding means for each felt serving to direct each felt along a horizontal run below the mill floor, and automatic felt tracking means operating on each felt in said horizontal run.

9. For use in a paper mill having a mill floor, a press section between the making machine and the drying rolls, comprising two pairs of press

rolls closely spaced together longitudinally of the path of movement of the web of paper, an individual endless felt trained for movement between the rolls of each pair, tensioning and guiding means for each felt serving to direct each felt along two separate horizontal runs below the mill floor, automatic felt tracking means below the floor operating on each felt in one of said horizontal runs, and a felt conditioning apparatus operating on each felt in the other horizontal run.

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